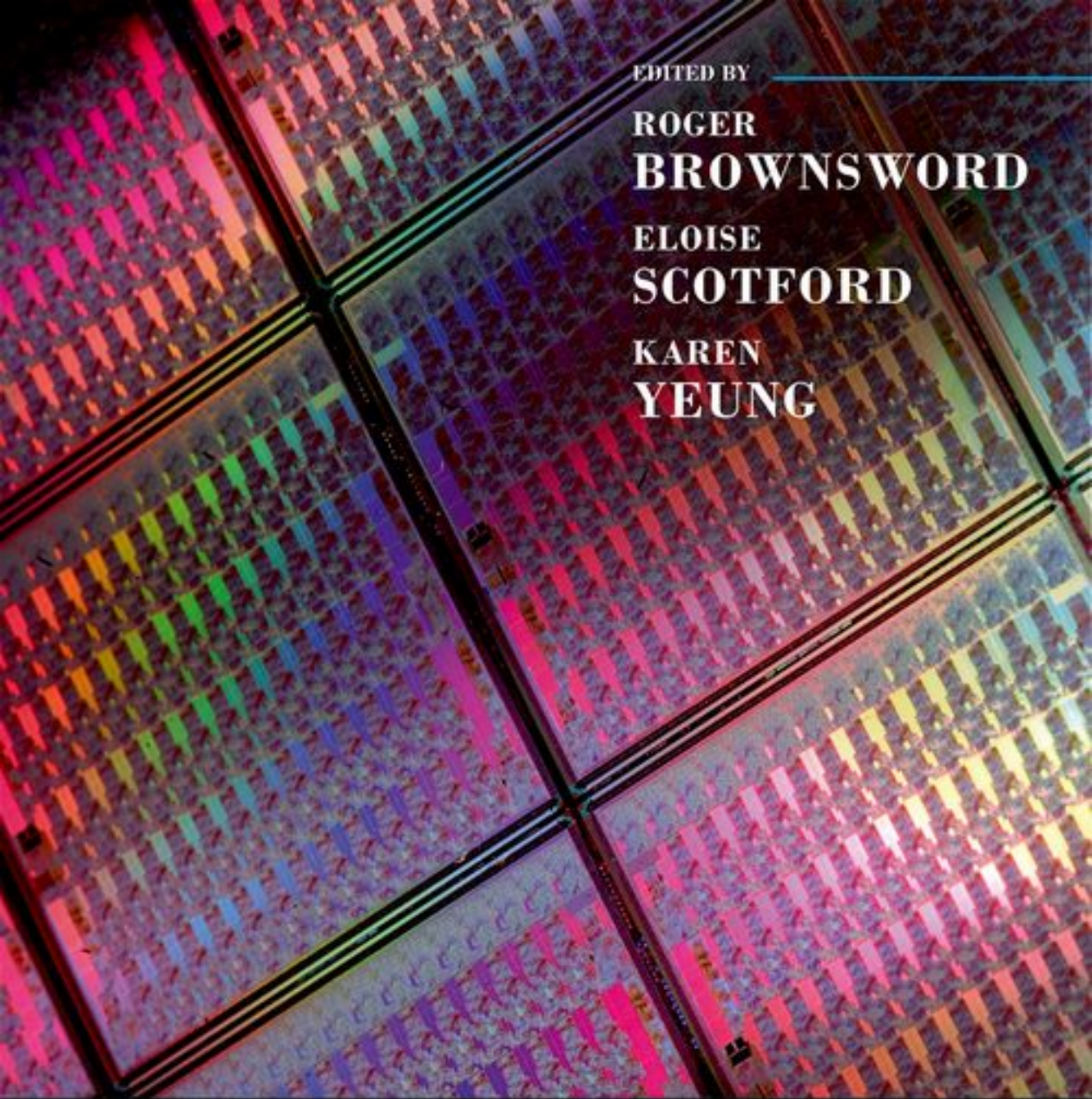




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≡ The Oxford Handbook *of*
**LAW, REGULATION AND
TECHNOLOGY**

The Oxford Handbook of Law, Regulation, and Technology

The Oxford Handbook of Law, Regulation and Technology

Edited by Roger Brownsword, Eloise Scotford, and Karen Yeung

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Acknowledgements

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Acknowledgements

The proposal for this book was first conceived in 2008 in what feels like an earlier technological era: Apple's iPhone had been released a year earlier; Facebook was only four years old; discussions about artificial intelligence were, at least in popular consciousness, only within the realm of science fiction; and the power of contemporary gene editing technologies that have revolutionized research in the biosciences in recent years had yet to be discovered. Much has happened in the intervening period between the book's inception and its eventual birth. The pace of scientific development and technological innovation has been nothing short of breathtaking. While law and legal and regulatory governance institutions have responded to these developments in various ways, they are typically not well equipped to deal with the challenges faced by legal and other policy-makers in seeking to understand and grasp the significance of fast-moving technological developments. As editors, we had originally planned for a much earlier publication date. But time does not stand still, neither for science or technological innovation, nor for the lives of the people affected by their developments, including our own. In particular, the process from this volume's conception through to its completion has been accompanied by the birth of three of our children with a fourth due as this volume goes to press.

Books and babies may be surprising comparators, but despite their obvious differences, there are also several similarities associated with their emergence. In our case, both began as a seemingly simple and compelling idea. Their gestation in the womb of development took many turns, the process was unquestionably demanding, and their growth trajectory typically departed from what one might have imagined or expected. The extent to which support is available and the quality of its provision can substantially shape the quality of the experience of the parent and the shape of the final output. To this end, we are enormously grateful to our contributors, for their thoughtful and penetrating insights, and especially to those whose contributions were completed some time ago and who have waited patiently for the print version to arrive. We are indebted to The Dickson Poon School of Law at King's College London, which provided our shared intellectual home throughout the course of this book's progression, and serves as home for the Centre for Technology, Ethics, Law & Society, which we founded in 2007. We are especially grateful

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to the School for providing funds to support research assistance for the preparation of the volume, and to support a meeting of contributors in Barcelona (p. vi) in the summer of 2014. This physical meeting of authors enabled us to exchange ideas, refine our arguments, and helped to nurture an emerging community of scholars committed to critical inquiry at the frontiers of technological development and its interface with law and regulatory governance. We are also grateful for the assistance of several members of the Oxford University Press editorial team, who were involved at various stages of the book's development, including Emma Taylor, Gemma Parsons, Elinor Shields, and Natasha Flemming, and especially to Alex Flach, who has remained a stable and guiding presence from the point of the book's conception through to its eventual emergence online and into hard copy form.

Although a surrounding community of support is essential in producing a work of this ambition, there are often key individuals who provide lifelines when the going gets especially tough. The two of us who gave birth to children during the book's development were very fortunate to have the devotion and support of loyal and loving partners without whom the travails of pregnancy would have been at times unbearable (at least for one of us), and without whom we could not have managed our intellectual endeavours while nurturing our young families. In giving birth to this volume, there is one individual to whom we express our deep and heartfelt gratitude: Kris Pérez Hicks, one of our former students, who subsequently took on the role of research assistant and project manager. Not only was Kris's assistance and cheerful willingness to act as general dogsbody absolutely indispensable in bringing this volume to completion, but he also continued to provide unswerving support long after the funds available to pay him had been depleted. Although Kris is not named as an editor of this volume, he has been a loyal, constant, and committed partner in this endeavour, without whom the process of gestation would have been considerably more arduous; we wish him all the very best in the next stage of his own professional and personal journey. Eloise also thanks Mubarak Waseem and Sonam Gordhan, who were invaluable research assistants as she returned from maternity leave in 2015–16. We are also indebted to each other: working together, sharing, and refining our insights and ideas, and finding intellectual inspiration and joint solutions to the problems that invariably arose along the way, has been a privilege and a pleasure and we are confident that it will not spell the end of our academic collaboration.

While the journey from development to birth is a major milestone, it is in many ways the beginning, rather than the end, of the journey. The state of the world is not something that we can predict or control, although there is no doubt that scientific development and technological innovation will be a feature of the present century. As our hopes for our children are invariably high in this unpredictable world, so too are our hopes and ambitions for this book. Our abiding hope underlying this volume is that an enhanced understanding of the many interfaces between law, regulation, and technology will improve the chances of stimulating technological developments that contribute to human flourishing and, at the same time, minimize applications that are, for one reason or another, unacceptable. Readers, (p. vii) whatever their previous connections and experience with law, regulatory governance, or technological progress, will see that the terrain of the book is

Acknowledgements

rich, complex, diverse, intellectually challenging, and that it demands increasingly urgent and critical interdisciplinary engagement. In intellectual terms, we hope that, by drawing together contributions from a range of disciplinary and intellectual perspectives across a range of technological developments and within a variety of social domains, this volume demonstrates that scholarship exploring law and regulatory governance at the technological frontier can be understood as part of an ambitious scholarly endeavour in which a range of common concerns, themes, and challenges can be identified. Although, 50 years from now, the technological developments discussed in this book may well seem quaint, we suggest that the legal, social, and governance challenges and insights they provoke will prove much more enduring. This volume is intended to be the beginning of the conversations that we owe to each other and to our children (whether still young or now fully fledged adults) in order to shape the technological transformations that are currently underway and to lay the foundations for a world in which we can all flourish.

KY, ES, and RB

London

3 March 2017 (p. viii)

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The Oxford Handbook of Law, Regulation and Technology

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Law, Regulation, and Technology: The Field, Frame, and Focal Questions

Roger Brownsword, Eloise Scotford, and Karen Yeung

The Oxford Handbook of Law, Regulation and Technology

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Abstract and Keywords

This chapter introduces law, regulation, and technology as a rapidly developing field of research. It offers a frame for an ambitious set of scholarly inquiries by suggesting three connected themes for research, each evoking ideas of ‘disruption’: (1) technology’s disruption of legal doctrine and its normative foundations; (2) its disruption of regulatory frameworks more generally, often provoking concerns about regulatory legitimacy; and (3) challenges in constructing regulatory environments that are ‘fit for purpose’ in light of rapid technological development and disruption. The chapter then outlines the Handbook’s structure, reflecting on the core values that underpin the law and regulation of technology; the doctrinal questions posed by new technologies; and how regulatory governance processes and institutions have been shaped by technological innovation. The final section examines these issues across six key policy spheres for technological development. We conclude by reflecting on the future of research and education in the field.

Keywords: technology, law, regulation, governance, regulatory environment, disruption

LIKE any Oxford Handbook, the *Oxford Handbook of Law, Regulation and Technology* seeks to showcase the leading scholarship in a particular field of academic inquiry. Some fields are well-established, with settled boundaries and clearly defined lines of inquiry; others are more of emerging ‘works-in-progress’. While the field of ‘law and information technology’ (sometimes presented as ‘law and technology’) might have some claim to be placed in the former category, the field of ‘law, regulation, and technology’—at any rate, in the way that we characterize it—is clearly in the latter category. This field is one of extraordinarily dynamic activity in the ‘world-to-be-regulated’—evidenced by the almost daily announcement of a new technology or application—but also of technological innovation that puts pressure on traditional legal concepts (of ‘property’, ‘patentability’, ‘consent’, and so on) and transforms the instruments and institutions of the regulatory enterprise itself.

The breathless pace and penetration of today's technological innovation bears emphasizing. We know that, for example, so long as 'Moore's Law'—according to which the number of transistors in a dense integrated circuit doubles approximately every two years—continues to obtain, computing power will grow like compound interest, and that this will have transformative effects, such as the tumbling costs of sequencing each human's genome while the data deluge turns into an (p. 4) ever-expanding data ocean. Yet, much of what contemporary societies now take for granted—particularly of modern information and communication technologies—is of very recent origin. It was only just over twenty years ago that:

Amazon.com began ..., letting people order through its digital shopfront from what was effectively a warehouse system. In the same year, eBay was born, hosting 250,000 auctions in 1996 and 2m in 1997. Google was incorporated in 1998. The first iPod was sold in 2001, and the iTunes Store opened its online doors in 2003. Facebook went live in 2004. YouTube did not exist until 2005

(Harkaway 2012: 22).

As Will Hutton (2015: 17) asserts, we surely stand at 'a dramatic moment in world history', when our children can expect 'to live in smart cities, achieve mobility in smart transport, be powered by smart energy, communicate with smart phones, organise [their] financial affairs with smart banks and socialise in ever smarter networks.' If Hutton is correct, then we must assume that law and regulation will not be immune from this pervasive technological smartness. Those who are associated with the legal and regulatory enterprise will be caught up in the drama, experiencing new opportunities as well as their share of disruptive shocks and disturbances.

In this context of rapid technological change, the contours of legal and regulatory action are not obvious, nor are the frames for analysis. This Introduction starts by constructing the field for inquiry—law, regulation and technology—reflecting on key terms and exploring the ways in which we might frame our inquiries and focal issues for analysis. We suggest that the Handbook's chapters raise fundamental questions around three general themes coalescing around the idea of 'disruption': (1) technology's disruption of legal orders; (2) the wider disruption to regulatory frameworks more generally, often provoking concerns about regulatory legitimacy; and (3) the challenges associated with attempts to construct and preserve regulatory environments that are 'fit for purpose' in a context of rapid technological development and disruption. We then explain the structure and the organization of the Handbook, and introduce the concepts and contributions in each Part. Finally, we offer some concluding thoughts about this burgeoning field of legal research, including how it might inform the work of lawmakers, regulators, and policy-makers, and about its potential spread into the law school curriculum.

1. The Field and its Terminological Terrain

In the early days of ‘law and technology’ studies, ‘technology’ often signalled an interest in computers or digital information and communication technologies. (p. 5) However, the most striking thing about the field of technology, as constructed in this Handbook, is its breadth. This is not a Handbook on law and regulation that is directed at a particular stream or type of technology—it is not, for example, a handbook on *Law and the Internet* (Edwards and Waelde 1997) or *Information Technology Law* (Murray 2010) or *Computer Law* (Reed 1990) or *Cloud Computing Law* (Millard 2013) or *The Regulation of Cyberspace* (Murray 2007); nor is it a handbook on *Law and Human Genetics* (Brownsword, Cornish, and Llewelyn 1998) or on *Innovation and Liability in Biotechnology* (Smyth and others 2010), nor even on *Law and Neuroscience* (Freeman 2011) or a handbook on the regulation of nanotechnologies (Hodge, Bowman, and Maynard 2010). Rather, this work covers a broad range of modern technologies, including information and communication technologies, biotechnologies, neurotechnologies, nanotechnologies, robotics, and so on, each of which announces itself from time to time, often with a high-level report, as a technology that warrants regulatory attention.

However, it is not just the technology wing of the Handbook that presupposes a broad field of interest. The law and regulation wing is equally widely spanned. The field of inquiry is not restricted to interest in specific pieces of legislation (such as the UK’s Computer Misuse Act 1990, the US Digital Millennium Copyright Act 1998, the EU General Data Protection Regulation 2016, or the Council of Europe’s Oviedo Convention¹, and so on). Nor is this Handbook limited to assessing the interface between a particular kind of technology and some area or areas of law—for example, the relationship between world trade law and genetic engineering (Wüger and Cottier 2008); or the relationship between remote sensing technologies and the criminal law, tort law, contract law, and so on (Purdy 2014). It is also about the ways in which a variety of norms that lack ‘hard’ legal force, arising nationally, internationally, and transnationally (and the social and political institutions that support them), can be understood as intentionally seeking to guide and direct the conduct of actors and institutions that are concerned with the research, development, and use of new technologies. Indeed, regulatory governance scholars are inclined to claim that, without attending to this wider set of norms, and the institutional dynamics that affect how those norms are understood and applied, we may fail to obtain a realistic account of the way in which the law operates in any given domain. So, on both wings—that of law and regulation, as well as that of technology—our field of inquiry is broadly drawn.

The breadth of the field covered in this volume raises questions about what we mean by ‘law’, and ‘regulation’, and ‘technology’, and the title of the Handbook may imply that these are discrete concepts. However, these are all contested and potentially intersecting concepts, and the project of the Handbook would lose conceptual focus if we were to adopt conceptions of the three titular concepts that reduce the distance between them. For example, if ‘law’ is understood broadly, it may swallow up much of what is typically understood as ‘regulation’; and, because both law and regulation display strong instru-

mental characteristics (they can be construed as means to particular ends), they might themselves be examples of a 'technology'. (p. 6) Not only that, turning the last point on its head, it might be claimed that when the technology of 'code' is used, its regulative effect itself represents a particular kind of 'law' (Lessig 1999).

One possible response to these conceptual puzzles is simply to dismiss them and to focus on more practical questions. This is not to dismiss conceptual thinking as unimportant; it is merely to observe that it hardly qualifies as one of the leading global policy challenges. If humans in the developing world are denied access to decent health care, food, clean water, and so on, we must ask whether laws, regulations, and technologies help or hinder this state of affairs. In rising to these global challenges, it makes no real practical difference whether we conceive of law in a restricted Westphalian way or in a broad pluralistic way that encompasses much of regulatory governance (see, for example, Tamanaha 2001); and it makes no practical difference whether we treat 'law' as excluded from or included within the concept of 'technology'.

However, for the purpose of mapping this volume's field of inquiry, we invited contributors to adopt the following definitions as starting points in reflecting on significant facets of the intersection between law, regulation, and technology. For 'law', we suggested a fairly conventional, state-centric understanding, that is, law as authoritative rules backed by coercive force, exercised at the national level by a legitimately constituted (democratic) nation-state, and constituted in the supranational context by binding commitments voluntarily entered into between sovereign states (typified by public international law). In the case of 'regulation', we invited contributors to begin with the definition offered by Philip Selznick (1985), and subsequently refined by Julia Black as 'the intentional use of authority to affect behaviour of a different party according to set standards, involving instruments of information-gathering and behaviour modification' (2001). On this understanding of regulation, law is but one institution for purposively attempting to shape behaviour and social outcomes, but there may be many other means, including the market, social norms, and technology itself (Lessig 1999). Finally, our working definition of 'technology' covers those entities and processes, both material and immaterial, which are created by the application of mental and/or physical effort in order to achieve some value or evolution in the state of relevant behaviour or practice. Hence, technology is taken to include tools, machines, products, or processes that may be used to solve real-world problems or to improve the status quo (see Bennett Moses, this volume).

These working definitions are intended merely to lay down markers for examining a broad and intersecting field of research. Debates over these terms, and about the conceptualization of the field or some parts of it, can significantly contribute to our understanding. In this volume, for example, Elizabeth Fisher examines how understandings of law and technology are being co-produced in the field of environmental law, while Han Somssen argues that the current era of technology-driven environmental change—the Anthropocene—presses us to reconceive our understandings of environmental law. Conceptual inquiries of this kind are important. (p. 7) Accordingly, although the contents of this Handbook require a preliminary frame of reference, it was not our intention either to pre-

scribe closely circumscribed definitions of law, regulation, or technology, or to discourage contributors from developing and operating with their own conceptual schemes.

2. The Frame and the Focus

Given the breadth of the field, one might wonder whether there is a unifying coherence to the various inquiries within it (Bennett Moses 2013). The short answer is, probably not. Any attempt to identify an overarching purpose or common identity in the multiple lines of inquiry in this field may well fail to recognize the richness and variety of the individual contributions and the depth of their insights. That said, we suggest that the idea of ‘disruption’ acts as an overarching theme that frames scholarly inquiries about the legal and regulatory enterprise in the face of technological change. This section examines three dimensions of this overarching theme—legal disruption, regulatory disruption, and the challenge of constructing regulatory environments that are fit for purpose in light of technological disruption. The ‘disruptive’ potential of technological innovation is arguably most familiar in literature concerned with understanding its microeconomic effects on established market orders (Leiser and Murray, this volume). Within this literature, Clayton Christensen famously posited a key distinction between ‘sustaining innovations’, which improve the performance of established products along the dimensions that mainstream customers in major markets have historically valued, and ‘disruptive technologies’, which are quite different: although they typically perform poorly when first introduced, these new technologies bring a very different value proposition and eventually become more mainstream as customers are attracted to their benefits. The eventual result is that established firms fail and new market entrants take over (Christensen 1997: 11). As the contributions to this volume vividly demonstrate, it is not merely market orders that are disrupted by technological innovation: new technologies also provoke the disruption of legal and regulatory orders, arguably because they can disturb the ‘deep values’ upon which the legitimacy of existing social orders rests and on which accepted legal and regulatory frameworks draw. It is, therefore, hardly surprising that technological innovation, particularly that of a ‘disruptive’ kind, raises complex challenges associated with intentional attempts to cultivate a ‘regulatory environment’ for technology that is fit for purpose. These different dimensions of disruption generated by technological change—legal disruption, regulatory disruption, and the challenges of creating an adequate regulatory environment for disruptive technologies—overlap, and they are reflected (p. 8) in different ways in the chapters of this volume. Separately and together, they give rise to important questions that confront law and regulatory governance scholars in the face of technological change and its challenges.

In the first dimension, we see many ways in which technological innovation is legally disruptive. If technological change is as dramatic and transformative as Hutton suggests, leaving no area of social life untouched, this includes its impact on law (Hutton 2015). Established legal frameworks, doctrines, and institutions are being, and will be, challenged by new technological developments. This is not a new insight, when we consider how other major social changes perturb the legal fabric of society, such as the Industrial Revolu-

tion historically, or our recognition of climate change and its impacts in the present day. These social upheavals challenge and disrupt the legal orders that we otherwise rely on to provide stability and certainty (Fisher, Scotford, and Barritt in press). The degree of legal disruption can vary and can occur in different ways. Most obviously, long-standing doctrinal rules may require re-evaluation, as in the case of contract law and its application to e-commerce (Waddams, this volume). Legal and regulatory gaps may emerge, as we see in public international law and EU law in the face of new technological risks (see Rayfuse and Macrory, this volume). Equally, technological change can provoke legal change, evident in the transformation of the law of civil procedure through 'techno-legal assemblages' as a result of digital information communication technologies (Contini and Cordella, this volume). Technological change can also challenge the normative underpinnings of bodies of law, questioning their fundamental aims or raising issues about how their goals can be accommodated in a context of innovation (see, for example, Herring, Novitz, and Morgan on family, labour, and tort law respectively, this volume). These different kinds of legal disruptions provoke a wide range of academic inquiries, from doctrinal concerns to analysing the aims and values that underlie legal doctrine.

Second, the disruption provoked by technological innovation extends beyond the formal legal order to the wider regulatory order, often triggering concerns about the adequacy of existing regulatory regimes, the institutions upon which they rely (including the normative standards that are intended to guide and constrain the activities of the regulated community), and the relationship and interactions between regulatory organizations with other institutions of governance. Because technological innovation frequently disrupts existing regulatory forms, frameworks, and capacities, it often prompts claims that regulatory legitimacy has been undermined as a result, usually accompanied by calls for some kind of regulatory reform, but sometimes generating innovation in the regulatory enterprise itself. For example, Maria Lee examines the law's role in fostering decision-making institutions that enable democratic participation by stakeholders affected by technological developments and the broader public, in order to help identify common ground so that regulatory interventions might be regarded as 'acceptable' or 'legitimate' (whether the issue is about safety or conflicting interests or values) (Lee, this (p. 9) volume; see also Macrory, this volume). In a different vein, Leiser and Murray demonstrate how technological innovation that has cross-boundary impacts, of which the development of the Internet is a prime example, has spawned a range of regulatory institutions that rely heavily on attempts by non-state actors to devise effective regulatory interventions that are not confined to the boundaries of the state.

In addition to institutional aspects of regulatory governance, technological innovation may also disrupt the ideas and justifications offered in support of regulatory intervention. While much academic reflection concerning regulatory intervention from the late 1970s onwards was animated by the need to respond to market failure, more recent academic reflection frames the overarching purpose of the regulatory enterprise in terms of 'managing risk' (Black 2014; Yeung, this volume). This shift in focus has tracked the increasing popularity of the term 'regulatory governance' rather than 'regulation', and highlights the increasingly 'decentred' nature of intentional attempts to manage risk that are undertak-

en not only (and sometimes not even) by state institutions, but also by non-governmental institutions, including commercial firms and civil society organizations. This turn also reflects the need to account for the multiplicity of societal interests and values in the regulatory enterprise beyond market failure in narrow economic terms. Aligning regulation with the idea of 'risk governance' provides a more direct conceptual linkage between concerns about the 'risks' arising from technological innovation and concerns about the need to tame their trajectories (Renn 2008). It also draws attention to three significant dimensions of risk: first, that the label 'risk' is typically used to denote the possibility that an undesirable state of reality (adverse effects) may occur; second, that such a possibility is contingent and uncertain—referring to an unwanted event that may or may not happen at some time in the future; and third, that individuals often have widely different responses to the way in which they perceive and respond to risks, and which risks they consider most troubling or salient. Reflecting on this incomplete knowledge that technological innovation generates, Andrew Stirling demonstrates how the 'precautionary principle' can broaden our attention to diverse options, practices, and perspectives in policy debates over technology, encouraging more robust methods in appraisal, making value judgments more explicit, and enhancing qualities of deliberation (Stirling, this volume). Stirling's analysis highlights that a fundamental challenge for law and regulation in responding to technological developments concerns the quest for social credibility and acceptability, providing a framework in which technological advances may lay claim to legitimacy, while ensuring that the legitimacy of the law and regulatory institutions are themselves maintained.

Of course, the idea of regulatory legitimacy is protean, reflecting a range of political, legal, and regulatory viewpoints and interests. In relation to regulatory institutions, Julia Black characterizes 'regulatory legitimacy' primarily as an empirical phenomenon, focusing on perceptions of a regulatory organization as having a 'right to govern' among those it seeks to govern, and those on behalf of whom it (p. 10) purports to govern (Black 2008: 144). Yet she also notes that these perceptions are typically rooted in normative criteria that are considered relevant and important (Black 2008: 145). These normative assessments are frequently contested, differently expressed by different writers, and they vary with constitutional traditions. Nonetheless, Black suggests (drawing on social scientific studies of organization legitimacy) that these assessments can be broadly classified into four main groups or 'claims' that are commonly made, each contestable and contested, not only between different groups, but within them, and each with their own logics:

- (1) constitutional claims:** these emphasise conformance with written norms (thus embracing law and so-called 'soft law' or non-legal, generalized written norms) and conformity with legal values of procedural justice and other broadly based constitutional values such as consistency, proportionality, and so on;
- (2) justice claims:** these emphasise the values or ends which the organization is pursuing, including the conception of justice (republican, Rawlsian, utilitarian, for example, or various religious conceptions of 'truth' or 'right');
- (3) functional or performance-based legitimacy claims:** these focus on the outcomes and consequences of the organization (e.g. efficiency, expertise, and effectiveness)

and the extent to which it operates in conformance with professional or scientific norms, for example; and

(4) *democratic claims*: these are concerned with the extent to which the organization or regime is congruent with a particular model of democratic governance, e.g. representative, participatory, or deliberative (Black 2008: 145–146).

While Black's normative claims to legitimacy are framed in an empirical context, much literature in this field is concerned with the legitimacy of technology or its regulation in a normative sense, albeit with a varied range of anchoring points or perspectives, such as the rule or nature of law, constitutional principles, or some other conception of the right or the good, including those reflecting the 'deep values' underlying fundamental rights (Brownsword and Goodwin 2012: ch 7; Yeung 2004). Thus, for example, Giovanni Sartor argues that human rights law can provide a 'unifying purposive perspective' over diverse technologies, analysing how the deployment of technologies conforms, or does not conform, with fundamental rights such as dignity, privacy, equality, and freedom (Sartor, this volume). In these legitimacy inquiries, we can see some generic challenges that lawyers, regulators, and policy-makers must inevitably confront in making collective decisions concerning technological risks (Brownsword 2008; Brownsword and Goodwin 2012; Brownsword and Yeung 2008; Stirling 2008).

These challenges can also be seen in the third theme of disruption that runs through many of the individual contributions in this volume. Reflecting the fundamentally *purposive* orientation of the regulatory enterprise, this theme interrogates the 'adequacy' of the regulatory environment in an age of rapid technological change (p. 11) and innovation. When we ask whether the regulatory environment is adequate, or whether it is 'fit for purpose', we are proposing an audit of the regulatory environment that invites a review of: (i) the adequacy of the 'fit' or 'connection' between the regulatory provisions and the target technologies; (ii) the effectiveness of the regulatory regime in achieving its purposes; (iii) the 'acceptability' and 'legitimacy' of the means, institutional forms, and practices used to achieve those purposes; (iv) the 'acceptability' and 'legitimacy' of the purposes themselves; (v) the 'acceptability' and 'legitimacy' of the processes used to arrive at those purposes; and (vi) the 'legitimacy' or 'acceptability' of the way in which those purposes and other purposes which a society considers valuable and worth pursuing are prioritized and traded-off against each other.

Accepting this invitation, some scholars will be concerned with the development of regulatory institutions and instruments that are capable of maintaining an adequate connection with a constant stream of technological innovation (Brownsword 2008: ch 6). Here, 'connection' means both maintaining a fit between the content of the regulatory standards and the evolving form and function of a technology, and the appropriate adaptation of existing doctrines or institutions, particularly where technologies might be deployed in ways that enhance existing legal or regulatory capacities (Edmond 2000). In the latter case, technological advances might improve the application of existing doctrine, as in the evaluation of memory-based evidence through the insights of neuroscience in criminal law (Claydon, this volume), or they can improve the enforcement of existing bodies of law,

as in the case of online processes for tax collection (Cockfield, this volume). Other scholars might focus on questions of effectiveness, including the ways in which new technological tools such as Big Data analytics and DNA profiling might contribute towards the more effective and efficient achievement of legal and regulatory objectives. Others will want to audit the means employed by regulators for their consistency with constitutional and liberal-democratic values; still others will want to raise questions of morality and justice—including more fine-grained questions of privacy or human dignity and the like.

That said, what precisely do we mean by the ‘regulatory environment’? Commonly, following a crisis, catastrophe, or scandal—whether this is of global financial proportions or on the scale of a major environmental incident; whether this is a Volkswagen, Enron, or Deepwater Horizon; or whether, more locally, there are concerns about the safety of patients in hospitals or the oversight of charitable organizations—it is often claimed that the regulatory environment is no longer fit for purpose and needs to be ‘fixed’. Sometimes, this simply means that the law needs revising. But we should not naively expect that simple ‘quick fixes’ are available. Nor should we expect in diverse, liberal, democratic communities that society can, or will, speak with one voice concerning what constitutes an acceptable purpose, thus raising questions about whether one can meaningfully ask whether a regulatory environment is ‘fit for purpose’ unless we first clarify *what* purpose we mean, and (p. 12) *whose* purpose we are concerned with. Nevertheless, when we say that the ‘regulatory environment’ requires adjustment, this might help us understand the ways in which many of the law, regulation, and technology-oriented lines of inquiry have a common focus. These various inquiries assume an environment that includes a complex range of signals, running from high-level formal legislation to low-level informal norms, and the way in which those norms interact. As Simon Roberts pointed out in his Chorley lecture (2004: 12):

We can probably all now go along with some general tenets of the legal pluralists. First, their insistence on the heterogeneity of the normative domain seems entirely uncontroversial. Practically any social field can be fairly represented as consisting of plural, interpenetrating normative orders/systems/discourses. Nor would many today wish to endorse fully the enormous claims to systemic qualities that state law has made for itself and that both lawyers and social scientists have in the past too often uncritically accepted.

So, if post-crisis, post-catastrophe, or post-scandal, we want to fix the problem, it will rarely suffice to focus only on the high-level ‘legal’ signals; rather, the full gamut of normative signals, their interaction, and their reception by the regulated community will need to be taken into account. As Robert Francis emphasized in his report into the Mid-Staffordshire NHS Foundation Trust (centring on the appalling and persistent failure to provide adequate care to patients at Stafford Hospital, England), the regulatory environment for patient care needs to be unequivocal; there should be no mixed messages. To fix the problem, there need to be ‘common values, shared by all, putting patients and their safety first; we need a commitment by all to serve and protect patients and to support each other in that endeavour, and to make sure that the many committed and caring pro-

professionals in the NHS are empowered to root out any poor practice around them.’²

Already, though, this hints at deeper problems. For example, where regulators are under-resourced or in some other way lack adequate capacities to act, or when regulatees are over-stretched, then even if there is a common commitment to the regulatory goals, simply rewriting the rules will not make much practical difference. To render the regulatory environment fit for purpose, to tackle corruption, and to correct cultures of non-compliance, some deeper excavation, understanding, and intervention (including additional resources) might be required—rewriting the rules will only scratch the surface of the problem, or even exacerbate it.

Although the regulatory environment covers a wide, varied, and complex range of regulatory signals, institutions, and organizational practices, this does not yet fully convey the sense in which the development of new technologies can disrupt the regulatory landscape. To be sure, no one supposes that *the* ‘regulatory environment’ is simply out there, waiting like Niagara Falls to be snapped by each tourist’s digital camera. In the flux of social interactions, there are many regulatory environments waiting to be constructed, each one from the standpoint of particular individuals or groups. Even in the relatively stable regulatory environment of a national legal (p. 13) system, there are already immanent tensions, whether in the form of ‘dangerous supplements’ to the rules, prosecutorial and enforcement agency discretion, jury equity, cop culture, and cultures of regulatee avoidance and non-compliance. From a global or transnational standpoint, where ‘law is diffused in myriad ways, and the construction of legal communities is always contested, uncertain and open to debate’ (Schiff Berman 2004–5: 556), these tensions and dynamics are accentuated. And when cross-border technologies emerge to disrupt and defy national regulatory control, the construction of the regulatory environment—let alone a regulatory environment that is fit for purpose—is even more challenging (seminally, see Johnson and Post 1996).

Yet, we have still not quite got to the nub of the matter. The essential problem is that the regulatory governance challenges would be more graspable if only the world would stand still: we want to identify a regulatory environment with relatively stable features and boundaries; we want to think about how an emerging technology fits with existing regulatory provisions (do we have a gap? do we need to revise some part of the rules? or is everything fine?); we want to be able to consult widely to ensure that our regulatory purposes command public support; we want to be able to model and then pilot our proposed regulatory interventions (including interventions that make use of new technological tools); and, then, we should be in a position to take stock and roll out our new regulatory environment, fully tested and fit for purpose. If only the world was a laboratory in which testing and experimentation could be undertaken with the rigour of a double-blind, randomized, controlled trial. And even if that were possible, all this takes far too much time. While we are consulting and considering in this idealized way, the world has moved on: our target technology has matured, new technologies have emerged, and our regulatory environment has been further disrupted and destabilized. This is especially true in the provision of digital services, with the likes of Google, Uber, and Facebook adopting business models that are premised on rolling out new digital services before they are fully

tested in order to create new business opportunities and to colonize new spaces in ways that their technological innovations make possible, dealing with any adverse public, legal, or regulatory blowback after the event (Vaidhyathan 2011; Zuboff 2015). In the twenty-first century, we must regulate ‘on the hoof’; our various quests for regulatory acceptability, for regulatory legitimacy, for regulatory environments that are adequate and fit for purpose, are not just gently stirred; they are constantly shaken by the pace of technological change, by the global spread of technologies, and by the depth of technological disturbance.

This prompts the thought that the broader, the deeper, and the more dynamic our concept of the regulatory environment, the more that this facilitates our appreciation of the multifaceted relationship between law, regulation, and technology. At the same time, we must recognize that, because the landscape is constantly (p. 14) changing—and in significant ways—our audit of the regulatory enterprise must be agile and ongoing. The more adequate our framing of the issues, the more complex the regulatory challenges appear to be.

For better or worse, we can expect an acceleration in technological development to be a feature of the present century; and those who have an interest in law and regulation cannot afford to distance themselves from the rapidly changing context in which the legal and regulatory enterprises find themselves. The hope underlying this Handbook is that an enhanced understanding of the many interfaces between law, regulation, and technology will aid our appreciation of our existing regulatory structures, improve the chances of putting in place a regulatory environment that stimulates technologies that contribute to human flourishing and, at the same time, minimize applications that are, for one reason or another, unacceptable.

3. Structure and Organization

The Handbook is organized around the following four principal sets of questions.

First, Part II considers core values that underpin the law and regulation of technology. In particular, it examines what values and ideals set the relevant limits and standards for judgments of legitimate regulatory intervention and technological application, and in what ways those values are implicated by technological innovation.

Second, Part III examines the challenges presented by developments in technology in relation to legal doctrine and existing legal institutions. It explores the ways in which technological developments put pressure on, inform, or possibly facilitate the development of existing legal concepts and procedures, as well as when and how they provoke doctrinal change.

Third, Part IV explores the ways (if any) in which technological developments have prompted innovations in the forms, institutions, and processes of regulatory governance and seeks to understand how they might be framed and analysed.

Fourth, Part V considers how law, regulation, and technological development affect key fields of global policy and practice (namely, medicine and health; population, reproduction, and the family; trade and commerce; public security; communications, media, and culture; and food, water, energy, and the environment). It looks at which interventions are conducive to human flourishing, which are negative, which are counter-productive, and so on. It also explores how law, regulation, and technological developments might help to meet these basic human needs.

These four sets of questions are introduced and elaborated in the following sections.

(p. 15) 4. Legitimacy as Adherence to Core Normative Values

In cases where a new technology is likely to have catastrophic or extremely destructive effects—such as the prospect of genetically engineering deadly pathogens that could spread rapidly through human populations—we can assume that no reasonable person will see such development as anything other than a negative. In many cases, however, the way that disruptive effects of a particular technological development are regarded as positive or negative is likely to depend on how it impacts upon what one personally stands to lose or gain. For example, in reflecting upon the impact of ICTs on the professions, including the legal profession, Richard and Daniel Susskind (Susskind and Susskind 2015) argue that, although they may threaten the monopoly of expertise which the professions currently possess, from the standpoint of ‘recipients and alternative providers’, they may be ‘socially constructive’ (at 110), while enabling the democratization of legal knowledge and expertise that can then be more fairly and justly distributed (at 303–308). In other words, apart from the ‘safety’ of a technology in terms of its risks to human health, property, or the environment, there is a quite different class of concerns relating to the preservation of certain values, ideals, and the social institutions with which those values and ideals are conventionally associated.

In Part II of the Handbook, the focus is precisely on this class of normative values—values such as justice, human rights, and human dignity—that underpin and infuse debates about the legitimacy of particular legal and regulatory positions taken in relation to technology. Among the reference values that recur in deliberations about regulating new technologies, our contributors speak to the following: liberty; equality; democracy; identity; responsibility (and our underlying conception of agency); the common good; human rights; and human dignity.³ Perhaps the much-debated value of human dignity best exemplifies anxieties about the destabilizing effect of new technologies on ‘deep values’. In his contribution to this Handbook, Marcus Düwell suggests that human dignity should be put at the centre of the normative evaluation of technologies, thereby requiring us ‘to think about structures in which technologies are no longer the driving force of societal developments, but which give human beings the possibility to give form to their lives; the possibility of being in charge and of leading fulfilled lives’ (see Düwell, this volume). In this vein, Düwell points out that if we orient ourselves to the principle of respect for human

dignity, we will reverse the process of developing technologies and then asking what kinds of legal, ethical, and social problems they create; rather, we will direct the development of technologies by reflecting on the requirements of respect for human dignity (compare Tranter 2011, for criticism of the somewhat unimaginative way in which legal scholars have tended to respond to technological developments). (p. 16) But Düwell's reconstruction and reading of human dignity is likely to collide with that of those conservative dignitarians who have been particularly critical of developments in human biotechnology, contending that the use of human embryos for research, the patenting of stem cell lines, germ-line modifications, the recognition of property in human bodies and body parts, the commercialization and commodification of human life, and so on, involve the compromising of human dignity (Caulfield and Brownsword 2006).

As adherence to, and compatibility with, various normative values is a necessary condition of regulatory legitimacy, arguments often focus on the legitimacy of particular features of a regulatory regime, whether relating to regulatory purposes, regulatory positions, or the regulatory instruments used, which draw attention to these different values. However, even with the benefit of a harder look at these reference values, resolving these arguments is anything but straightforward, for at least five reasons. First, the values are themselves contested (see, for example, Baldwin on 'identity', this volume; and Snelling and McMillan on 'equality', this volume). So, if it is suggested that modern technologies impact negatively on, say, liberty, or equality, or justice, an appropriate response is that this depends not only on which technologies one has in mind, but, crucially, what one means by liberty, equality, or justice (see Brownsword on 'liberty', this volume). Similarly, when we engage with the well-known 'non-identity' (of persons never-to-be born) puzzle that features in debates about the regulation of reproductive technologies, it is hard to escape the shadow of profound philosophical difficulty (see Gavaghan, this volume); or, when today's surveillance societies are likened to the old GDR, we might need to differentiate between the 'domination' that Stasi-style surveillance instantiated and the shadowy intelligence activities of Western states that fail to meet 'democratic' ideals (see Sorell and Guelke, this volume). Even where philosophers can satisfactorily map the conceptual landscape, they might have difficulty in specifying a particular conception as 'best', or in finding compelling reasons for debating competing conceptions when no one conception can be demonstrated to be 'correct' (compare Waldron 2002).

Second, even if we agreed on our conception of the reference value, questions remain. For example, some claims about the legitimacy of a particular technology might hinge on disputed questions of fact and causation. This might be so, for example, if it is claimed that the overall impact of the Internet is positive/negative in relation to democracy or the development of a public sphere in which the common good can be debated (on the notion of the common good, see Dickenson, this volume); or if it is claimed that the use of technological management or genetic manipulation will crowd out the sense of individual responsibility.

Third, values can challenge the legitimacy of technological interventions systemically, or they may raise novel discrete issues for evaluation. These different types of normative challenges are exemplified in relation to the value of justice. Sometimes, new scientific insights, many of which are enabled by new technologies, prompt (p. 17) us to consider whether there is a *systemic* irrationality in core ethical, legal, and social constructs through which we make sense of the world, such as the concept of responsibility through which our legal and social institutions hold humans to account for their actions, and pass moral and legal judgment upon them (see, for example, Greene and Cohen 2004). It is not that advances in scientific understanding challenge the validity of some particular law or regulation, but that the law, or regulation, or morals, or any other such normative code or system is *pervasively* at odds with scientific understanding. In other words, it is not a case of one innocent person being unjustly convicted. Rather, the scientists' criticism is that current legal processes of criminal conviction and punishment are unjust because technological developments show that we are not always sufficiently in control of our actions to be fairly held to account for them (Churchland 2005; Claydon, this volume), despite our deeply held conviction and experience to the contrary. Such a claim could scarcely be more destabilizing: we should cease punishing and stigmatizing those who break the rules; we should recognize that it is irrational to hold humans to account. In response, others argue that, even if we accept this claim, it is not axiomatic that we should or would subsequently give up a practice that strongly coheres with our experience (see Morse, in this volume).

Scientific advances can affect our sense of what is fair or just in other ways that need not strike at the core moral and legal concepts and constructs through which we make sense of the world. Sometimes, scientific advances and the technological applications they enable may shed light on ways in which humans might be biologically identified as different. Yet, in determining whether differences of this kind should be taken into account in the distribution of social benefits and burdens, we are invariably guided by some fairly primitive notions of justice. In the law, it is axiomatic that 'like cases should be treated alike, and unlike cases unlike'. When the human genome was first sequenced, it was thought that the variations discovered in each person's genetic profile would have radically disruptive implications for our willingness to treat A and B as like cases. There were concerns that insurers and employers, in particular, would derive information from the genetic profiles of, respectively, applicants for insurance and prospective employees that would determine how A and B, who otherwise seemed to be like cases, would be treated (O'Neill 1998). Given that neither A nor B would have any control over their genetic profiles, there was a widely held view that it would be unfair to discriminate between A and B on such grounds. Moreover, if we were to test the justice of the basic rules of a society by asking whether they would be acceptable to a risk-averse agent operating behind a Rawlsian 'veil of ignorance', it is pretty clear that a rule permitting discrimination on genetic grounds would fail to pass muster (Rawls 1971). In that light, the US Genetic Information Non-Discrimination Act 2008 (the GINA law), which is designed to protect citizens against genetic discrimination in relation to health insurance and employment, would seem to be one of the constitutional cornerstones of a just society.

(p. 18) Justice is not exhausted, however, by treating like cases alike. Employers might treat all their employees *equally*, but equally *badly*. In this non-comparative sense, by which criterion (or criteria) is treatment to be adjudged as just or unjust? Should humans be treated in accordance with their 'need', or their 'desert', or their 'rights' (Miller 1976)? When a new medical technology becomes available, is it just to give priority to those who are most in need, or to those who are deserving, or to those who are both needy and deserving, or to those who have an accrued right of some kind? If access to the technology—suppose that it is an 'enhancing' technology that will extend human life or human capabilities in some way—is very expensive, should only those who can afford to pay have access to it? If the rich have lawfully acquired their wealth, would it be unjust to deny them access to such an enhancing technology or to require them to contribute to the costs of treating the poor (Nozick 1974)? If each new technology exacerbates existing inequalities by generating its own version of the digital divide, is this compatible with justice? Yet, in an already unequal society where technologies of enhancement are not affordable by all, would it be an improvement in justice if the rich were to be prohibited from accessing the benefits of these technologies—or would this simply be an empty gesture (Harris 2007)? If, once again, we draw on the impartial point of view enshrined in standard Rawlsian thinking about justice, what would be the view of those placed behind a veil of ignorance if such inequalities were to be proposed as a feature of their societies? Would they insist, in the spirit of the Rawlsian difference principle, that any such inequalities will be unjust, unless they serve to incentivize productivity and innovation such that the position of the worst off is better than under more equal conditions?

Fourth, and following on from this, deep values relating to the legitimacy of technological change will often raise conflicting normative positions. As Rawls recognized in his later work (Rawls 1993), the problem of value conflicts can be deep and fundamental, traceable to 'first principle' pluralism, or internal to a shared perspective. Protagonists in a plurality might start from many different positions. Formally, however, value perspectives tend to start from one of three positions often referred to in the philosophical literature as rights-based, duty-based (deontological), or goal- or outcome-based. According to the first, the protection and promotion of rights (especially human rights) is to be valued; according to the second, the performance of one's duties (both duties to others and to oneself) is to be valued; and, according to the third, it is some state of affairs—such as the maximization of utility or welfare, or the more equal distribution of resources, or the advancement of the interests of women, or the minimization of distress, and so on—that is the goal or outcome to be valued. In debates about the legitimacy of modern technologies, the potential benefits are often talked up by utilitarians; individual autonomy and choice is trumpeted by rights ethicists; and, reservations about human dignity are expressed by duty ethicists. Often, this will set the dignitarians in opposition to the utilitarian and rights advocates. Where value plurality (p. 19) takes this form, compromise and accommodation are difficult (Brownsword 2003, 2005, and 2010). There can also be tensions and 'turf wars' where different ethics, such as human rights and bioethics, claim to control a particular sector (see Murphy, this volume). In other cases, though, the difficulty might not run so deep. Where protagonists at least start in the same place, but then

disagree about some matter of interpretation or application, there is the possibility of provisional settlement. For example, in a community that is committed to respect for human rights, there might well be different views about: (i) the existence of certain rights, such as ‘the right not to know’ (Chadwick, Levitt, and Shickle 2014) and ‘the right to be forgotten’ (as recognized by the European Court of Justice (CJEU) in the *Google Spain* case, Case C-131/12); (ii) the scope of particular rights that are recognized, such as rights concerning privacy (see Bygrave, this volume), property (see Goodwin, this volume), and reproductive autonomy (see McLean, this volume); and (iii) the relative importance of competing rights (such as privacy and freedom of expression). However, regulators and adjudicators can give themselves some leeway to accommodate these differences (using notions of proportionality and the ‘margin of appreciation’); and regulated actors who are not content with the outcome can continue to argue their case.

Finally, in thinking about the values that underpin technological development, we also need to reckon with the unpredictable speed and trajectory of that development and the different rates at which such technologies insinuate themselves into our daily lives. At the time that Francis Fukuyama published *Our Posthuman Future* (2002), Fukuyama was most agitated by the prospect of modern biotechnologies raising fundamental concerns about human dignity, while he was altogether more sanguine about information and communication technologies. He saw the latter as largely beneficial, subject to some reservations about the infringement of privacy and the creation of a digital divide. But revisiting these technologies today, Fukuyama would no doubt continue to be concerned about the impact of modern biotechnologies on human dignity, given that new gene-editing technologies raise the real possibility of irreversibly manipulating the human genome, but he would surely be less sanguine about the imminent arrival of the Internet of Things (where the line that separates human agents from smart agent-like devices might become much less clear); or about machine learning that processes data to generate predictions about which humans will do what, but without really understanding why they do what they do, and often with serious consequential effects (see Hildebrandt 2015, 2016); or about the extent to which individuals increasingly and often unthinkingly relinquish their privacy in return for data-driven digital conveniences (Yeung 2017) in which many of their transactions and interactions within some on-line environments are extremely vulnerable and, perhaps more worryingly, allow for highly granular surveillance of individual behaviours, movements, and preferences that were not possible in a pre-digital era (Michael and Clarke 2013).

(p. 20) The above discussion highlights that the interweaving of emerging technologies with fundamental value concepts is complex. As a report from the Rathenau Institute points out in relation to human rights and human dignity, while technologies might strengthen those values, they might also ‘give rise to risks and ethical issues and therefore threaten human rights and human dignity’ (van Est and others 2014: 10). In other words, sometimes technologies impact positively on particular values; sometimes they impact negatively; and, on many occasions, at a number of levels, it is unclear and moot or

to be determined whether the impact is positive or negative (see Brownsword, this volume).

5. Technological Change: Challenges for Law

In Part III, contributors reflect on the impact of technological developments on their particular areas of legal expertise. As indicated above, this can include a wide range of inquiries, from whether there are any deficiencies or gaps in how particular areas of law apply to issues and problems involving new technologies, to how technology is shaping or constructing doctrinal areas or challenging existing doctrine. Gregory Mandel suggests that some general insights about the interaction of existing areas of law and new technologies can be drawn from historical experience, including that unforeseeable types of legal disputes will arise and pre-existing legal categories may be inapplicable or poorly suited to resolve them. At the same time, legal decision-makers should also be 'mindful to avoid letting the marvels of a new technology distort their legal analysis' (Mandel, this volume). In other words, Mandel counsels us to recognize that technological change occurs against a rich doctrinal and constitutional backdrop of legal principle (on the significance of constitutional structures in informing the regulation of technologies, see Snead and Maloney, this volume). The importance of attending to legal analysis also reflects the fact that bodies of established law are not mere bodies of rules but normative frameworks with carefully developed histories, and fundamental questions can thus arise about how areas of law should develop and be interpreted in the face of innovation. Victor Flatt highlights how technology was introduced as a tool or means of regulation in US environmental law, but has become a goal of regulation in itself, unhelpfully side-lining fundamental purposes of environmental protection (Flatt, this volume). Jonathan Herring highlights how the use of technology in parenting raises questions about the nature of relationships between parents and children, and how these are understood and constructed by family law (Herring, this volume). (p. 21) Similarly, Tonia Novitz argues that the regulatory agenda in relation to technology in the workplace should be extended to allow enabling of workers' rights as well as their surveillance and control by employers (Novitz, this volume). These underlying normative issues reflect the extent to which different legal areas can be disrupted and challenged by technological innovation.

The more obvious legal and doctrinal challenges posed by technology concern what law, if any, can and should regulate new technologies. Famously, David Collingridge (1980) identified a dilemma for regulators as new technologies emerge. Stated simply, regulators tend to find themselves in a position such that either they do not know enough about the (immature) technology to make an appropriate intervention, or they know what regulatory intervention is appropriate, but they are no longer able to turn back the (now mature) technology. Even when regulators feel sufficiently confident about the benefit and risk profile of a technology, or about the value concerns to which its development and application might give rise, a bespoke legislative framework comes with no guarantee of sustainability. These challenges for the law are compounded where there is a disconnect be-

tween the law and the technology as the courts are encouraged to keep the law connected by, in effect, rewriting existing legislation (Brownsword 2008: ch 6).

In response to these challenges, some will favour a precautionary approach, containing and constraining the technology until more is understood about it, while others will urge that the development and application of the technology should be unrestricted unless and until some clear harm is caused. In the latter situation, the capacity of existing law to respond to harms caused, or disputes generated, by technology becomes particularly important. Jonathan Morgan (this volume) highlights how tort law may be the 'only sort of regulation on offer' for truly novel technology, at least initially. Another approach is for legislators to get ahead of the curve, designing a new regulatory regime in anticipation of a major technological innovation that they see coming. Richard Macrory explains how the EU legislature has designed a pre-emptive carbon capture and storage (CCS) technology (Macrory, this volume). Others again will point to the often powerful political, economic, and social forces that determine the path of technological innovation in ways that are often wrongly perceived as inevitable or unchallengeable. Some reconciliation might be possible, along the lines that Mandel has previously suggested, arguing that what is needed is more sophisticated upstream governance in order to (i) improve data gathering and sharing; (ii) fill any regulatory gaps; (iii) incentivize corporate responsibility; (iv) enhance the expertise of, and coordination between, regulatory agencies; (v) provide for regulatory adaptability and flexibility; and (vi) promote stakeholder engagement (Mandel 2009). In this way, much of the early regulatory weight is borne by informal codes, soft law, and the like; but, in due course, as the technology begins to mature, it will be necessary to consider how it engages with various areas of settled law.

(p. 22) This engagement is already happening in many areas of law, as Part III demonstrates. One area of law that is a particularly rich arena for interaction with technological development is intellectual property (IP) law (Aplin 2005). There are famous examples of how the traditional concepts of patent law have struggled with technological innovations, particularly in the field of biotechnology. The patentability of biotechnology has been a fraught issue because there is quite a difference between taking a working model of a machine into a patent office and disclosing the workings of biotechnologies (Pottage and Sherman 2010). In *Diamond v Chakrabarty* 447 US 303 (1980), the majority of the US Supreme Court, taking a liberal view, held that, in principle, there was no reason why genetically modified organisms should not be patentable; and, in line with this ruling, the US Patent Office subsequently accepted that, in principle, the well-known Harvard Oncomouse (a genetically modified test animal for cancer research) was patentable. In Europe, by contrast, the patentability of the Oncomouse did not turn only on the usual technical requirements of inventiveness, and the like; for, according to Article 53(a) of the European Patent Convention, a European patent should not be granted where publication or commercial exploitation of the invention would be contrary to *ordre public* or morality. Whilst initially the exclusion on moral grounds was pushed to the margins of the European patent regime, only to be invoked in the most exceptional cases where the grant of a patent was inconceivable, more recently, Europe's reservations about patenting inven-

tions that are judged to compromise human dignity (as expressed in Article 6 of Directive 98/44/EC) were reasserted in Case C-34/10 *Oliver Brüstle v Greenpeace eV*, where the Grand Chamber of the CJEU held that the products of *Brüstle's* innovative stem cell research were excluded from patentability because his 'base materials' were derived from human embryos that had been terminated. This tension in applying well-established IP concepts to technological innovations reflects the fact that technological development has led to the creation of things and processes that were never in the contemplation of legislators and courts as they have developed IP rights. This doctrinal disconnection is further exemplified in the chapter by Dinusha Mendis, Jane Nielsen, Dianne Nicol, and Phoebe Li (this volume), in which they examine how both Australian and UK law, in different ways, struggle to apply copyright and patent protections to the world of 3D printing.

Other areas of law may apply to a changing technological landscape in a more straightforward manner. In relation to e-commerce, for example, contract lawyers debated whether a bespoke legal regime was required for e-commerce, or whether traditional contract law would suffice. In the event, subject to making it clear that e-transactions should be treated as functionally equivalent to off-line transactions and confirming that the former should be similarly enforceable, the overarching framework formally remains that of off-line contract law. At the same time, Stephen Waddams explains how this off-line law is challenged by computer technology, particular through the use of e-signatures, standard form contracts on websites, and online methods of giving assent (Waddams, this volume). Furthermore, in practice, (p. 23) the bulk of disputes arising in consumer e-commerce do not go to court and do not draw on traditional contract law—famously, each year, millions of disputes arising from transactions on eBay are handled by Online Dispute Resolution (ODR). There are also at least three disruptive elements ahead for contract law and e-commerce. The first arises not so much from the underlying transaction, but instead from the way that consumers leave their digital footprints as they shop online. The collection and processing of this data is now one of the key strands in debates about the re-regulation of privacy and data protection online (see Bygrave, this volume). The second arises from the way in which on-line suppliers are now able to structure their sites so that the shopping experience for each consumer is 'personalized' (see Draper and Turow, this volume). In off-line stores, the goods are not rearranged as each customer enters the store and, even if the parties deal regularly, it would be truly exceptional for an off-line supplier, unlike an e-supplier, to know more about the customer than the customer knows about him or herself (Mik 2016). The third challenge for contract law arises from the automation of trading and consumption. Quite simply, how does contract law engage with the automated trading of commodities (transactions being completed in a fraction of a second) and with a future world of routine consumption where human operatives are taken out of the equation (both as suppliers and as buyers) and replaced by smart devices?

In these areas of law, as in others, we can expect both engagement and friction between traditional doctrine and some new technology. Sometimes attempts will be made to accommodate the technology within the terms of existing doctrine—and, presumably, the more flexible that doctrine, the easier it will be to make such an accommodation. In other cases, doctrinal adjustment and change may be needed—in the way, for example, that the

'dangerous' technologies of the late nineteenth century encouraged the adoption of strict liability in a new body of both regulatory criminal law and, in effect, regulatory tort law (Sayre 1933; Martin-Casals 2010); and, in the twenty-first century, in the way that attempts have been made to immunize internet service providers against unreasonable liability for breach of copyright, defamation, and so on (Karapapa and Borghi 2015; Leiser and Murray, this volume). In other cases, there will be neither accommodation nor adjustment and the law will find itself being undermined or rendered redundant, or it will be resistant in seeking to protect long-standing norms. Uta Kohl (this volume) thus shows how private international law is tested to its limits in its attempts to assert national laws against the globalizing technology of the Internet. Each area of law will have its own encounter with emerging technologies; each will have its own story to tell; and these stories pervade Part III of the Handbook.

The different 'subject-focused' lines of inquiry in Part III should not be seen to suggest that discrete legal areas work autonomously in adapting, responding to, or regulating technology (as Part IV shows, laws work within a broader regulatory context that shapes their formulation and implementation). Moreover, we need to be aware of various institutional challenges, the multi-jurisdictional reach of some (p. 24) technological developments, the interactions with other areas of law, and novel forms of law that existing doctrine does not easily accommodate. At the same time, existing legal areas shape the study and understanding of law and its institutions, and thus present important perspectives and methodological approaches in understanding how law and technology meet.

6. Technological Change: Challenges for Regulation and Governance

Part IV of the Handbook aims to provide a critical exploration of the implications for regulatory governance of technological development. Unlike much scholarly reflection on regulation and technological development, which focuses on the need of the latter over the former, the aim of this part is to explore the ways in which technological development influences and informs the regulatory enterprise itself, including institutional forms, systems and methodologies for decision-making concerning technological risk. By emphasizing the ways in which technological development has provoked innovations in the forms, institutions, and processes of regulatory governance, the contributions in Part IV demonstrate how an exploration of the interface between regulation and technology can deepen our understanding of regulatory governance as an important social, political, and legal phenomenon. The contributions are organized in two sub-sections. The first comprises essays concerned with understanding the ways in which the regulation of new technologies has contributed to the development of distinctive institutional forms and processes, generating challenges for regulatory policy-makers that have not arisen in the regulation of other sectors. The second sub-section collects together contributions that explore the implications of employing technology as an *instrument* of regulation, and the risks and challenges thus generated for both law and regulatory governance.

The focus in Part IV shifts away from doctrinal development by judicial institutions to a broader set of institutional arenas through which intentional attempts are made to shape, constrain, and promote particular forms of technological innovation. Again, as seen in relation to the different areas of legal doctrine examined in Part III, technological disruption can have profound and unsettling effects that strike at the heart of concepts that we have long relied upon to organize, classify, and make sense of ourselves and our environment, and which have been traditionally presupposed by core legal and ethical distinctions. For example, several contributions observe how particular technological innovations are destabilizing fundamental ontological categories and legal processes: the rise of robots and other artificially (p. 25) intelligent machines blurs the boundary between agents and things (see Leta-Jones and Millar, this volume); digital and forensic technologies are being combined to create new forms of ‘automated justice’, thereby blurring the boundary between the process of criminal investigation and the process of adjudication and trial through which criminal guilt is publicly determined (see Bowling, Marks & Keenan, this volume); and the growth of contemporary forms of surveillance have become democratized, no longer confined to the monitoring of citizens by the state, which enable and empower individuals and organizations to utilize on-line networked environments to engage in acts of surveillance in a variety of ways, thus blurring the public-private divide upon which many legal and regulatory boundaries have hitherto rested (see Timan, Galič, and Koops, this volume). Interrogating the institutional forms, dynamics, and tensions which occur at the interface between new technologies and regulatory governance also provides an opportunity to examine how many of the core values upon which assessments of legitimacy rest—explored in conceptual terms in Part II—are translated into contemporary practice, as stakeholders in the regulatory endeavour give practical expression to these normative concerns, seeking to reconcile competing claims to legitimacy while attempting to design new regulatory regimes (or re-design existing regimes) and to formulate, interpret, and apply appropriate regulatory standards within a context of rapid technological innovation.

By bringing a more varied set of regulatory governance institutions into view, contributions in Part IV draw attention to the broader geopolitical drivers of technological change, and how larger socio-economic forces propel institutional dynamics, including intentional attempts to manage technological risk and to shape the direction of technological development, often in ways that are understood as self-serving. Moreover, the forces of global capitalism may severely limit sovereign state capacity to influence particular innovation dynamics, due to the influence of powerful non-state actors operating in global markets that extend beyond national borders. In some cases, this has given rise to new and sometimes unexpected opportunities for non-traditional forms of control, including the role of market and civil society actors in the formulation of regulatory standards and in exerting some kind of regulatory oversight and enforcement (see Leiser and Murray, this volume; Timan, Galič, and Koops, this volume). Yet the role of the state continues to loom large, albeit with a reconfigured role within a broader network of actors and institutions vying for regulatory influence. Thus, while traditional state and state-sponsored institutions retain a significant role, their attempts to exert both regulatory influence and obtain a synoptic

view of the regulatory domain are now considerably complicated by a more complex, global, fluid, and rapidly evolving dynamic in which the possession and play of (economic) power is of considerable importance (and indeed, one which nation states seek to harness by enrolling the regulatory capacities of market actors as critical gatekeepers).

(p. 26) The second half of Part IV shifts attention to the variety of ways in which regulators may adopt technologies as regulatory governance instruments. This examination is a vivid reminder that, although technology is often portrayed as instrumental and mechanistic, it is far from value-free. The value laden dimension of technological means and choices, and the importance of attending to the problem of value conflict and the legitimacy of the processes through which such conflicts are resolved, is perhaps most clearly illustrated in debates about (re-)designing the human biological structure and functioning in the service of collective social goals rather than for therapeutic purposes (see Yeung, this volume). Yet the domain of values also arises in much more mundane technological forms (Latour 1994). As is now widely acknowledged, 'artefacts have politics', as Langdon Winner's famous essay reminds us (Winner 1980). Yet, when technology is enlisted intentionally as a means to exert control over regulated populations, their inescapable social and political dimensions are often hidden rather than easily recognizable. Hence, while it is frequently claimed that sophisticated data mining techniques that sift and sort massive data sets offer tremendous efficiency gains in comparison with manual evaluation systems, Fleur Johns demonstrates how a task as apparently mundane as 'sorting' (drawing an analogy between people sorting, and sock sorting) is in fact rich with highly value laden and thus contestable choices, yet these are typically hidden behind a technocratic, operational façade (see Johns, this volume). When used as a critical mechanism for determining the plight of refugees and asylum seekers, the consequences of such technologies could not be more profound, at least from the perspective of those individuals whose fates are increasingly subject to algorithmic assessment. Yet, the sophistication of contemporary technological innovations, including genomics, may expand the possibilities of lay and legal misunderstanding of both the scientific insight and its social implications, as Kar and Lindo demonstrate in highlighting how genomic developments may reinforce unjustified racial bias based on a misguided belief that these insights lend scientific weight to folk biological understandings of race (see Kar and Lindo, this volume). Taken together, the contributions in the second half of Part IV might be interpreted as a caution against naïve faith in the claimed efficacy of our ever-expanding technological capacities, reminding us that not only do our tools reflect our individual and collective values, but they also emphasize the importance of attending to the social meaning that such interventions might implicate. In other words, the technologies that we use to achieve our ends import particular social understandings about human value and what makes our life meaningful and worthwhile (see Yeung, this volume; Agar, this volume). Particular care is needed in contemplating the use of sophisticated technological interventions to shape the behaviour of others, for such interventions inevitably implicate how we understand our authority over, and obligations towards, our fellow human beings. In liberal democratic societies, we must attend carefully to the fundamental obligation to treat others with dignity and respect: as people, rather than as technologically malleable

objects. The ways in which our (p. 27) advancing technological prowess may tempt us to harness people in pursuit of non-therapeutic ends may signify a disturbing shift towards treating others as things rather than as individuals, potentially denigrating our humanity. The lessons of Part IV could not be more stark.

7. Key Global Policy Challenges

In the final part of the Handbook, the interface between law, regulation, and technological development is explored in relation to six globally significant policy sectors: medicine and health; population, reproduction, and the family; trade and commerce; public security; communications, media, and culture; and, food, water, energy, and the environment. Arguably, some of these sectors, relating to the integrity of the essential infrastructure for human life and agency, are more important than others—for example, without food and water, there is no prospect of human life or agency. Arguably, too, there could be a level of human flourishing without trade and commerce or media; but, in the twenty-first century, it would be implausible to deny that, in general, these sectors relate to important human needs. However, these needs are provided for unevenly across the globe, giving rise to the essential practical question: where existing, emerging, or new technologies might be applied in ways that would improve the chances of these needs being met, should the regulatory environment be modified so that such an improvement is realized? Or, to put this directly, is the regulatory environment sometimes a hindrance to establishing conditions that meet basic human needs in all parts of the world? If so, how might this be turned around so that law and regulation nurture the development of these conditions?

Needless to say, we should not assume that ‘better’ regulatory environments or ‘better’ technologies will translate in any straightforward way into a heightened sense of subjective well-being for humans (Agar 2015). In thinking about how law and regulation can help to foster the pursuit of particular societal values and aspirations, many inquiries will focus on what kind of regulatory environment we should create in order to accommodate and control technological developments. But legal and regulatory control does not always operate *ex post facto*: it may have an important *ex ante* role, incentivizing particular kinds of technological change, acting as a driver (or deterrent) that can encourage (or discourage) investment or innovation in different ways. This can be seen through taxation law creating incentives to research certain technologies (see Cockfield, this volume), or through legal liability encouraging the development of pollution control technology (see Pontin, this volume). As Pontin demonstrates, however, the conditions by which legal (p. 28) frameworks cause technological innovation are contingent on industry-specific and other contextual and historical factors. The more common example of how legal environments incentivize technological development is through intellectual property law, and patent law in particular, as previously mentioned. A common complaint is that the intellectual property regime (now in conjunction with the regime of world trade law) conspires to deprive millions of people in the developing world of access to essential medicines. Or, to put the matter bluntly, patents and property are being prioritized over people

(Sterckx 2005). While the details of this claim are contested—for example, a common response is that many of the essential drugs (including basic painkillers) are out of patent protection and that the real problem is the lack of a decent infrastructure for health care—it is unclear how the regulatory environment might be adjusted to improve the situation. If the patent incentive is weakened, how are pharmaceutical companies to fund the research and development of new drugs? If the costs of research and development, particularly the costs associated with clinical trials, are to be reduced, the regulatory environment will be less protective of the health and safety of all patients, both those in the developing world and the developed world. Current regulatory arrangements are also criticized on the basis that they have led to appalling disparities of access to medicines, well-known pricing abuses in both high- and low-income countries, massive waste in terms of excessive marketing of products and investments in medically unimportant products (such as so-called ‘me-toos’), and under-investment in products that have the greatest medical benefits (Love and Hubbard 2007: 1551). But we might take some comfort from signs of regulatory flexibility in the construction of new pathways for the approval of promising new drugs—as Bärbel Dorbeck-Jung is encouraged by the development in Europe of so-called ‘adaptive drug licensing’ (see Dorbeck-Jung, this volume).

It is not only the adequacy of the regulatory environment in incentivizing technological development in order to provide access to essential drugs that might generate concerns. Others might be discouraged by the resistance to taking forward promising new gene-editing techniques (see Harris and Lawrence, this volume). Yet there are difficult and, often, invidious judgments to be made by regulators. If promising drugs are given early approval, but then prove to have unanticipated adverse effects on patients, regulators will be criticized for being insufficiently precautionary; equally, if regulators refuse to license germ-line gene therapies because they are worried about, perhaps irreversible, downstream effects, they will be criticized for being overly precautionary. (In this context, we might note the questions raised by Dickenson (this volume) about the licensing of mitochondrial replacement techniques and the idea of the common good).

In relation to the deployment and (*ex post*) regulation of new, and often rapidly developing technologies, the legal and regulatory challenge is no easier. Sometimes, the difficulty is that the problem needs a coordinated and committed international response; it can take only a few reluctant nations (offering a regulatory haven—for (p. 29) example, a haven from which to initiate cybercrimes) to diminish the effectiveness of the response. At other times, the challenge is not just one of effectiveness, but of striking acceptable balances between competing policy objectives. In this respect, the frequently expressed idea that a heightened threat to ‘security’ needs to be met by a more intensive use of surveillance technologies—that the price of more security is less liberty or less privacy—is an obvious example. No doubt, the balancing metaphor, evoking a hydraulic relationship between security and privacy (as one goes up, the other goes down), invites criticism (see for example, Waldron 2003), and there are many potentially unjust and counter-productive effects of such licences for security. Nevertheless, unless anticipatory and precautionary measures are to be eschewed, the reasonableness and proportionality of using of surveillance technologies in response to perceived threats to security should be a con-

stant matter for regulatory and community debate. Debate about competing values in regulating new technologies is indeed important and can be stifled, or even shut down, if the decision-making structures for developing that regulation do not allow room for competing values to be considered. This is a particularly contested aspect of the regulation of genetically modified organisms and novel foods, as exemplified in the EU, where scientific decision-making is cast as a robust framework for scrutinizing new technologies, often to the exclusion of other value concerns (see Lee, this volume).

Consider again the case of trade and commerce, conducted against a backcloth of diverse and fragmented international, regional, and national laws as well as transnational governance (see Cottier, this volume). In practice, commercial imperatives can be given an irrational and unreasonable priority over more important environmental and human rights considerations. While such ‘collateralization’ of environmental and human rights concerns urgently requires regulatory attention (Leader 2004), in globally competitive markets, it is understandable why enterprises turn to the automation of their processes and to new technological products. The well-known story of the demise of the Eastman Kodak Corporation, once one of the largest corporations in the world, offers a salutary lesson. Evidently, ‘between 2003 and 2012—the age of multibillion-dollar Web 2.0 start-ups like Facebook, Tumblr, and Instagram—Kodak closed thirteen factories and 130 photo labs and cut 47,000 jobs in a failed attempt to turn the company round’ (Keen 2015: 87–88). As firms strive for ever greater efficiency, the outsourcing of labour and the automation of processes is expected to provoke serious disruption in patterns of employment (and unemployment) (Steiner 2012). With the development of smart robots (currently one of the hottest technological topics), the sustainability of work—and, concomitantly, the sustainability of consumer demand—presents regulators with another major challenge. Facilitating e-commerce in order to open new markets, especially for smaller businesses, might have been one of the easier challenges for regulators. By contrast, if smart machines displace not only repetitive manual or clerical work, but also skilled professional work (such as that undertaken by pharmacists, doctors, (p. 30) and lawyers: see Susskind and Susskind 2015), we might wonder where the ‘rise of the robots’ will lead (Ford 2015; Colvin 2015). In both off-line and online environments, markets will suffer from a lack of demand for human labour (see Dau-Schmidt, this volume).

But the turn to automation arising from the increasing ‘smartness’ of our machines combined with global digital networks may threaten our collective human identity even further. Although the rise of robots can improve human welfare in myriad ways, engaging in tasks previously undertaken by individuals that are typically understood as ‘dirty dangerous drudgery’, they nurture other social anxieties. Some of these are familiar and readily recognizable, particularly those associated with the development of autonomous weapons, with ongoing debate about whether autonomous weapon systems should be prohibited on the basis that they are inherently incapable of conforming with contemporary laws of armed conflict (see Anderson and Waxman, this volume). Here contestation arises concerning whether only humans ought to make deliberate kill decisions, and whether automated machine decision-making undermines accountability for unlawful acts of violence. It is not only the technological sophistication of machines that generates con-

cerns about the dangers associated with ‘technology run amok’. Similar anxieties arise in relation to our capacity to engineer the biological building blocks upon which life is constructed. Although advances in genomic science are frequently associated with considerable promise in the medical domain, these developments have also generated fears about the potentially catastrophic, if not apocalyptic, consequences of biohazards and bioterrorism, and the need to develop regulatory governance mechanisms that will effectively prevent and forestall their development (see Lentzos, this volume). Yet, in both these domains of domestic and international security, the technological advances have been so rapid that both our regulatory and collective decision-making institutions of governance have struggled to keep pace, with no clear ethical and societal consensus emerging, while scientific research in these domains continues its onward march. As we remarked earlier, if only the world would stand still ... if only.

In some ways, these complexities can be attributable to the ‘dual use’ character of many technologies that are currently emerging as general purpose technologies, that is, technologies that can be applied for clearly beneficial purposes, and also for purposes that are clearly not. Yet many technological advances defy binary characterization, reflecting greater variation and ambivalence in the way in which these innovations and their applications are understood. Consider networked digital technologies. On the one hand, they have had many positive consequences, radically transforming the way in which individuals from all over the world can communicate and access vast troves of information with lightning speed (assuming, of course, that networked communications infrastructure is in place). On the other hand, they have generated new forms of crime and radically extended the ease with which online crimes can be committed against those who are geographically distant from their perpetrators. But digital technologies have subtler, yet equally pervasive, effects. This is vividly illustrated in Draper and Turrow’s critical exploration of the ways in which networked digital technologies are being utilized by the (p. 31) media industry to generate targeted advertising in ways that it claims are beneficial to consumers by offering a more ‘meaningful’, highly personalized informational environment (see Draper & Turrow, this volume). Draper and Turrow warn that these strategies may serve to discriminate, segregate, and marginalize social groups, yet in ways that are highly opaque and for which few if any avenues for redress are currently available. In other words, just as digital surveillance technologies enable cybercriminals to target and ‘groom’ individual victims, so also they open up new opportunities through which commercial actors can target and groom individual consumers. It is not only the opacity of these techniques that is of concern, but the ways in which digital networked technologies create the potential for asymmetric relationships in which one actor can ‘victimize’ multiple others, all at the same time (see Wall, this volume).

While all the policy issues addressed in Part V of the Handbook are recognized as being ‘global’, there is more than one way of explaining what it is that makes a problem a ‘global’ one. No matter where we are located, no matter how technologically sophisticated our community happens to be, there are some policy challenges that are of common concern—most obviously, unless we collectively protect and preserve the natural environment that supports human life, the species will not be sustainable. Not only can technological

developments sometimes obscure this goal of environmental protection regulation (see Flatt, this volume), but technological interventions can also mediate connections between different aspects of the environment, such as between water resources and different means of energy production, leading to intersecting spheres of regulation and policy trade-offs (see Kundis Craig, this volume). Other challenges arise by virtue of our responsibilities to one another as fellow humans. It will not do, for example, to maintain first-class conditions for health care in the first world and to neglect the conditions for health and well-being elsewhere. Yet further challenges arise because of our practical connectedness. We might ignore our moral responsibilities to others but, in many cases, this will be imprudent. No country can altogether immunize itself against external threats to the freedom and well-being of its citizens. New technologies can exacerbate such threats, but can also present new opportunities to discharge our responsibilities to others. If we are to rise to these challenges in a coordinated and consensual way, the regulatory environment—nationally, regionally, and globally—represents a major focal point for our efforts, and sets the tone for our response to the key policy choices that we face.

8. Concluding Thoughts

In conclusion, our hope is that this Handbook and the enriched understanding of the many interfaces between law, regulation, and technology that it offers might improve (p. 32) the chances of cultivating a regulatory environment that stimulates the kind of technological innovation that contributes to human flourishing, while discouraging technological applications that do not. However, as the contributions in this volume vividly demonstrate, technological disruption has many, often complex and sometimes unexpected, dimensions, so that attempts to characterize technological change in binary terms—as acceptable or unacceptable, desirable or undesirable—will often prove elusive, if not oversimplistic. In many ways, technological change displays the double-edged quality that we readily associate with change of any kind: even change that is clearly positive inevitably entails some kind of loss. So, although the overwhelming majority of people welcome the ease, simplicity, low cost, and speed of digital communication in our globally networked environment, we may be rapidly losing the art of letter writing and with it, the loss of receiving old-fashioned paper Christmas cards delivered by a postman through the letterbox (Burleigh 2012). While losses of this kind may evoke nostalgia for the past, sometimes the losses associated with technological advance may be more than merely sentimental. In reflecting on the implications of computerization in healthcare, Robert Wachter cautions that it may result in a loss of clinical skill and expertise within the medical profession, and points to the experience of the aviation industry in which the role of pilots in the modern digital airplane has been relegated primarily to monitoring in-flight computers. He refers to tragic airline crashes, such as the 2009 crashes of Air France 447 off the coast of Brazil and Colgan Air 3407 near Buffalo, in which, after the machines failed, it became clear that the pilots did not know how to fly the planes (Wachter 2015: 275). Yet measuring these kinds of subtle changes, which may lack material, visible form, and which are often difficult to discern, is not easy and we often fail to appreciate what we have lost until after it has gone (Carr 2014). But in this respect, there may be nothing

particularly novel about technological change, and in many ways, the study of technological change can be understood as a prism for reflecting on the implications of social change of any kind, and the capacity, challenges, successes, and failures of law and regulatory governance regimes to adapt in the face of such change.

Furthermore, technological disruption—and the hopes and anxieties that accompany such change—is nothing new. Several of the best known literary works of the 19th and 20th centuries evoke hopes and fears surrounding technological advances, including *Brave New World*, which brilliantly demonstrates the attractions and horrors of pursuing a Utopian future by engineering the human mind and body (Huxley 1932); *Nineteen Eighty Four*, with its stark depiction of the dystopian consequences of pervasive, ubiquitous surveillance (Orwell 1949); and before that, *Frankenstein*, which evokes deep-seated anxieties at the prospect of the rogue scientist and the consequences of technology run amok (Shelley 1818). These socio-technical imaginaries, and the narratives of hope and horror associated with technological creativity and human hubris, have an even longer lineage, often with direct contemporary analogues in ongoing contestation faced by contemporary societies pertaining to particular technological developments (Jasanoff 2009). For example, in contemplating (p. 33) the possibility of geoengineering to combat climate change, we are reminded of young Phaethon's fate in ancient Greek mythology; the boy convinced his father, the sun god Helios, to grant the wish to drive the god's 'chariot'—the sun—from east to west across the sky and through the heavens, as the sun god himself did each day. Despite Helios' caution to Phaethon that no other being, not even the almighty Zeus himself, could maintain control of the sun, Phaethon took charge of the fiery chariot and scorched much of the earth as he lost control of the chariot sun. Phaethon was himself destroyed by Zeus, in order to save the planet from destruction and the sun returned to Helios's control (Abelkop and Carlson 2012–13). If we consider the power of the digital networked global environment and its potential to generate new insight and myriad services ranging from enhancing productivity, pleasure, or health, we may also be reminded of Daedalus's Labyrinth: a maze developed with such ingenuity that it safely contained the beast within. But in containing the Minotaur, it also prevented the escape of the young men who were ritually led in to satisfy the monster's craving for human flesh. In a similar way, the digital conveniences which the sophistication of Big Data and machine learning technologies offer which 'beckon with seductive allure' (Cohen 2012) are often only able to do so by sucking up our personal data in ways that leave very little of our daily lives and lived experience untouched in ways that threaten to erode the privacy commons that is essential for individual self-development and a flourishing public realm.

As Sheila Jasanoff reminds us, these abiding narratives not only demonstrate the long history associated with technological development, but also bear witness to the inescapable political dimensions with which they are associated, and the accompanying lively politics (Jasanoff 2009). Accordingly, any serious attempt to attempt to answer the question, 'how should we, as a society, respond?', requires reflection from multiple disciplinary lenses in which legal scholarship, on the one hand, and regulatory governance studies, on the other, represent only one small subset of lenses that can aid our understanding. But recognizing the importance of interdisciplinary and multidisciplinary scholarship in under-

standing the varied and complex interfaces between technological innovation and society is not to downplay the significance of legal and regulatory perspectives, particularly given that in contemporary constitutional democracies, the law continues to wield an exclusive monopoly on the legitimate exercise of coercive state power. It is to our legal institutions that we turn to safeguard our most deeply cherished values, and which provide the constitutional fabric of democratic pluralistic societies. Having said that, as several of the contributions to this volume demonstrate, markets and technological innovation are often indifferent to national boundaries and, as the twenty-first century marches on, the practical capacity of the nation state to tame their trajectories is continually eroded.

The significance of legal and regulatory scholarship in relation to new technologies is not purely academic. Bodies such as the European Group on Ethics in Science and New Technologies, the UK's Nuffield Council on Bioethics, and the US (p. 34) National Academy of Sciences, not only monitor and report on the ethical, legal, and social implications of emerging technologies, but they also frequently operate with academic lawyers and regulatory theorists as either chairs or members of their working parties. Indeed, at the time of writing these concluding editorial thoughts, we are also working with groups that are reviewing the ethical, legal, and social implications of the latest gene editing technologies (Nuffield Council on Bioethics 2016; World Economic Forum, Global Futures Council on Biotechnology 2016), machine learning (including driverless cars and its use by government) (The Royal Society 2016), utilizing Big Data across a range of social domains by both commercial and governmental institutions (The Royal Society and British Academy 2016), and the UK National Screening Committee's proposal to roll-out NIPT (non-invasive pre-natal testing) as part of the screening pathway for Downs syndrome and the other trisomies (UK National Screening Committee 2016). Given that lawyers already play a leading part in policy work of this kind, and given that their role in this capacity is far more than to ensure that other members of relevant working groups understand 'the legal position', there is a wonderful opportunity for lawyers to collaborate with scientists, engineers, statisticians, software developers, medical experts, sociologists, ethicists, and technologists in developing an informed discourse about the regulation of emerging technologies and the employment of such technologies within the regulatory array. It also represents an important opportunity for the scholarship associated with work of this kind to be fed back into legal education and the law curriculum. However, the prospects for a rapid take-up of programmes in 'law, regulation, and technology' are much less certain.

On the face of it, legal education would seem just as vulnerable to the disruption of new technologies as other fields. However, the prospects for a radically different law school curriculum, for a new 'law, technology, and regulation' paradigm, will depend on at least six inter-related elements, namely: the extent to which, from the institutional perspective, it is thought that there is 'a business case' to be made for developing programmes around the new paradigm; how technological approaches to legal study can be accommodated by the traditional academic legal community (whose members may tend to regard disputes, cases, and courts as central to legal scholarship); the willingness of non-lawyers to invest time in bringing students who are primarily interested in law and regulation up to speed with the relevant technologies; the view of the legal profession; the demand from (and

market for) prospective students; and the further transformative impact of information technologies on legal education.

It is impossible to be confident about how these factors will play out. Some pundits predict that technology will increasingly take more of the regulatory burden, consigning many of the rules of the core areas of legal study to the history books. What sense will it then make to spend time pondering the relative merits of the postal rule of acceptance or the receipt rule when, actually, contractors no longer use the postal service to accept offers, or to retract offers or acceptances, but instead (p. 35) contract online or rely on processes that are entirely automated? If the community of academic lawyers can think more in terms of today and tomorrow, rather than of yesterday, there might be a surprisingly rapid dismantling of the legal curriculum. That said, the resilience of the law-school curriculum should not be underrated. To return to Mandel's advice, the importance of legal analysis should not be underestimated in the brave new world of technology, and the skills of that analysis have a long and rich history.

Summing up, the significance of the technological developments that are underway is not simply that they present novel and difficult targets for regulators, but that they also offer themselves as regulatory tools or instruments. Given that technologies progressively intrude on almost all aspects of our lives (mediating the way that we communicate, how we transact, how we get from one place to another, even how we reproduce), it should be no surprise that technologies will also intrude on law-making, law-application, and so on. There is no reason to assume that our technological future is dystopian; but, equally, there is no guarantee that it is not. The future is what we make it and lawyers need to initiate, and be at the centre of, the conversations that we have about the trajectory of our societies. It is our hope that the essays in the Handbook will aid in our understanding of the technological disruptions that we experience and, at the same time, inform and inspire the conversations that need to take place as we live through these transformative times.

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Notes:

(1.) The Convention for the protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine, Council of Europe, 04/04/1997.

(2.) Chairman's statement, p. 4. Available at: <http://www.midstaffspublicinquiry.com/sites/default/files/report/Chairman%27s%20statement.pdf>.

(3.) Readers will note that 'justice' does not appear in this list. As will be clear from what we have already said about this value, this is not because we regard it as unimportant. To the contrary, a chapter on justice was commissioned but, due to unforeseen circumstances, it was not possible to deliver it in time for publication.

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Law, Liberty, and Technology

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Abstract and Keywords

This chapter assesses the relationship between liberty and technology. Adopting a broad conception of liberty, covering both the normative and the practical optionality of developing, applying, or using some particular technology, four questions are pursued. These questions concern: (i) the patterns of normative liberty in relation to new technologies and their applications; (ii) the gap between normative liberty and practical liberty; (iii) the impact of technologies on basic liberties; and (iv) the relationship between law, liberty, and ‘technological management’. While the expansion or contraction of normative liberties remains relevant, the key claim of the chapter is that, in future, it is the use of ‘technological management’—for a range of purposes, from crime control to the regulation of health and safety, and environmental protection—that needs to be monitored carefully, and particularly so for its impact on real options.

Keywords: liberty, technology, optionality, paper options and real options, technological management

1. Introduction

NEW technologies offer human agents new tools, new ways of doing old things, and new things to do. With each new tool, there is a fresh option—and, on the face of it, with each option there is an enhancement of, or an extension to, human liberty. At the same time, however, with some new technologies and their applications, we might worry that the price of a short-term gain in liberty is a longer-term loss of liberty (Zittrain 2009; Vaidhyanathan 2011); or we might be concerned that whatever increased security comes with the technologies of the ‘surveillance society’ it is being traded for a diminution in our political and civil liberties (Lyon 2001; Bauman and Lyon 2013).

Given this apparent tension between, on the one hand, technologies that enhance liberty and, on the other, technologies that diminish it, the question of how liberty and technology relate to one another is a particularly significant one for our times. For, if we can clarify the way that technologies and their applications impact on our liberty, we should be in a better position to form a view about the legitimacy of a technological use and to make a

more confident and reasoned judgement about whether we should encourage or discourage the development of some technology or its application.

(p. 42) How should we begin to respond to the question of whether new technologies, or particular applications of new technologies, impact positively or negatively on the liberty of individuals? No doubt, the cautious response to such a question is that the answer rather depends on which technologies and which technological applications are being considered and which particular conception of liberty is being assumed.

Adopting such a cautious approach, we can start by sketching a broad, or an ‘umbrella’, conception of liberty that covers both the *normative* and the *practical* optionality of developing, applying, or using some particular technology. In other words, we open up the possibility of assessing not only whether there is a ‘normative liberty’ to develop, apply, or use some technology in the sense that the rules permit such acts but also whether there is a ‘practical liberty’ to do these things in the sense that these acts are a real option. Having then identified four lines of inquiry at the interface of liberty—both normative and practical—and technology, we will focus on the question of the relationship between law, liberty, and ‘technological management’. The reason why this particular question is especially interesting is that it highlights the way in which technological tools can be employed to manage the conduct of agents, not by modifying the background normative coding of the conduct (for example, not by changing a legal permission to a prohibition) but by making it practically impossible for human agents to do certain things. Whereas legal rules specify our normative options, technological management regulates our practical options. In this way, law is to some extent superseded by technological management and the test of the liberties that we actually have is not so much in the legal coding but in the technological management of products, places, and even of people themselves (see Chapter 34 in this volume). Or, to put this another way, in an age of technological management, the primary concern for freedom-loving persons is not so much about the use of coercive threats that represent the tyranny of the majority (or, indeed, the tyranny of the minority) but the erosion of practical liberty by preventive coding and design (Brownsword 2013a, 2015).

2. Liberty

From the many different and contested theories of liberty (Raz 1986; Dworkin 2011: ch 17), I propose to start with Wesley Newcomb Hohfeld’s seminal analysis of legal relationships (Hohfeld 1964). Although Hohfeld’s primary purpose was to clarify the different, and potentially confusing, senses in which lawyers talk about ‘A having a right’, his conceptual scheme has the virtue of giving a particularly clear and precise characterization of what it is for A to have what I am calling a ‘normative liberty’. Following Hohfeld, we can say that if (i) relative to a particular set of (p. 43) rules (the ‘reference normative code’ as I will term it), (ii) a particular agent (A), (iii) has a liberty to do some particular act (x), (iv) relative to some other particular agent (B), then this signifies that the doing of x by A is neither required nor prohibited, but is simply permitted or optional. Or, stated in

other words, the logic of A having this normative liberty is that, whether A does x or does not do x, there is no breach of a duty to B. However, before going any further, two important points need to be noted.

The first point is that the Hohfeldian scheme is one of fundamental legal *relationships*. Liberties (like rights or duties or powers) do not exist at large; rather, these are concepts that have their distinctive meaning within a scheme of normative relations between agents. Accordingly, for Hohfeld, the claim that 'A has a liberty to do x' only becomes precise when it is set in the context of A's legal relationship with another person, such as B. If, in this context, A has a liberty to do x, then, as I have said, this signifies that A is under no duty to B in relation to the doing or not doing of x; and, correlatively, it signifies that B has no right against A in relation to the latter's doing or not doing of x. Whether or not A enjoys a liberty to do x relative to agents other than B—to C, D, or E—is another question, the answer to which will depend on the provisions of the reference normative code. If, according to that code, A's liberty to do x is specific to the relationship between A and B, then A will not have the same liberty relative to C, D, or E; but, if A's liberty to do x applies quite generally, then A's liberty to do x will also obtain in relation to C, D, and E.

The second point is that Hohfeld differentiates between 'A having a liberty to do x relative to B' and 'A having a claim right against B that B should not interfere with A doing or not doing x'. In many cases, if A has a liberty to do x relative to B, then A's liberty will be supported by a protective claim right against B. For example, if A and B are neighbours, and if A has a liberty relative to B to watch his (A's) television, then A might also have a claim right against B that B should not unreasonably interfere with A's attempts to watch television (e.g. by disrupting A's reception of the signals). Where A's liberty is reinforced in this way, then this suggests that a degree of importance is attached to A's enjoyment of the options that he has. This is a point to which we will return when we discuss the impingement of technology on 'civil liberties' and 'fundamental rights and freedoms', such liberties, rights, and freedoms being ones that we take the state as having a *duty* to respect. Nevertheless, in principle, the Hohfeldian scheme allows for the possibility of there being reciprocal liberties in the relationship between A and B such that A has a liberty to watch his television, but, at the same time, B has a liberty to engage in some acts of interference. For present purposes, we need not spend time trying to construct plausible scenarios of such reciprocal liberties; for, in due course, we will see that, in practice, A's options can be restricted in many ways other than by unneighbourly interference.

Although, for Hohfeld, the reference normative code is the positive law of whichever legal system is applicable, his conceptual scheme works wherever the basic (p. 44) formal relationships between agents are understood in terms of 'A having a right against B who has a duty' and 'A having a liberty relative to B who has no right'. Hence, the Hohfeldian conception of liberty can be extended to many legal orders as well as to moral, religious, and social orders. In this way, this notion of normative liberty allows for the possibility that relative to some legal orders, there is a liberty to do x but not so according to others—for example, whereas, relative to some legal orders, researchers are permitted to use human embryos for state-of-the-art stem cell research, relative to others they are not; and it al-

allows for the possibility that we might arrive at different judgements as to the liberty to do x depending upon whether our reference point is a code of legal, moral, religious, or social norms—for example, even where, relative to a particular national legal order, researchers might be permitted to use human embryos for stem cell research, relative to, say, a particular religious or moral code, they might not.

Thus far, it seems that the relationship between liberty and particular technologies or their applications, will depend upon the position taken by the reference normative code. As some technology or application moves onto the normative radar, a position will be taken as to its permissibility and, in the light of that position, we can speak to how liberty is impacted. However, this analysis is somewhat limited. It suggests that the answer to our question about the relationship between liberty and technology is along the lines that normative codes respond to new technologies by requiring, permitting, or prohibiting certain acts concerning the development, application, and use of the technologies; and that, where the acts are permitted we have liberty, and where they are not permitted we do not have liberty. To be sure, we can tease out more subtle questions where agents find themselves caught by overlapping, competing, and conflicting normative codes. For example, we might ask why it is that, even though the background legal rules permit doctors to make use of modern organ harvesting and transplantation technologies, healthcare professionals tend to observe their own more restrictive codes; or, conversely, why it is that doctors might sometimes be guided by their own informal permissive norms rather than by the more formal legal prohibitions. Even so, if we restrict our questions to normative liberties, our analysis is somewhat limited.

If we are to enrich this account, we need to employ a broader conception of liberty, one that draws on not only the normative position but also the practical possibility of A doing x, one that covers both normative and practical liberty. For example, if we ask whether we have a liberty to fly to the moon or to be transported there on nanotechnologically engineered wires, then relative to many normative codes we would seem to have such a liberty—or, at any rate, if we read the absence of express prohibition or requirement as implying a permission, then this is the case. However, given the current state of space technology, travelling on nanowires is not yet a technical option; and, even if travelling in a spacecraft is technically possible, it is prohibitively expensive for most persons. So, in 2016, space travel is a normative liberty but, save for a handful of astronauts, not yet a practical liberty for most humans. (p. 45) But, who knows, at some time in the future, human agents might be able to fly to the moon in fully automated spacecraft in much the way that it seems they will soon be able to travel along Californian freeways in driverless cars (Schmidt and Cohen 2013). In other words, the significance of new technologies and their applications is that they present new technical options, and, in this sense, they expand the *practical* liberty (or the practical *freedom*) of humans—or, at any rate, the practical liberty (or freedom) of some humans—subject always to two caveats: one caveat is that the governing normative codes might react in a liberty-restricting manner by prohibiting or requiring the acts in question; and the other caveat is that the new technical

options might disrupt older options in ways that cast doubt on whether, overall, there has been a gain or a loss to practical liberty.

This account, combining the normative and practical dimensions of liberty, seems to offer more scope for engaging with our question. On this approach, for example, we would say that, before the development of modern technologies for assisted conception, couples who wanted to have their own genetically related children might be frustrated by their unsuccessful attempts at natural reproduction. In this state of frustration, they enjoyed a 'paper' normative liberty to make use of assisted conception because such use was not prohibited or required; but, before reliable IVF and ICSI technologies were developed, they had no real practical liberty to make use of assisted conception. Even when assisted conception became available, the expense involved in accessing the technology might have meant that, for many human agents, its use remained only a paper liberty.

Again if, for example, the question concerns the liberty of prospective file-sharers to share their music with one another, then more than one normative coding might be in play; whether or not prospective file-sharers have a normative liberty to share their music will depend upon the particular reference normative code that is specified. According to many copyright codes, file-sharing is not permitted and so there is no normative liberty to engage in this activity; but, according to the norms of 'open-sourcers' or the social code of the file-sharers, this activity might be regarded as perfectly permissible. When we add in the practical possibilities, which will not necessarily align with a particular normative coding, the analysis becomes even richer. For example, when the normative coding is set for prohibition, it might still be possible in practice for some agents to file-share; and, when the normative coding is set for permission, some youngsters might nevertheless be in a position where it is simply not possible to access file-sharing sites. In other words, normative options (and prohibitions) do not necessarily correlate with practical options, and vice versa. Finally, where the law treats file-sharing as impermissible because it infringes the rights of IP proprietors, there is a bit more to say. Although the law does not treat file-sharing as a liberty, it allows for the permission to be bought (by paying royalties or negotiating a licence)—but, for some groups, the price of permission might be too high and, in practice, those who are in these groups are not in a position to take advantage of this conditional normative liberty.

(p. 46) In the light of these remarks, if we return to A who (according to the local positive legal rules) has a normative liberty relative to B to watch, or not to watch, television, we might find that, in practice, A's position is much more complex. First, A might have to answer to more than one normative code. Even though there is no legal rule prohibiting A from watching television, there might be other local codes (including rules within the family) that create a pressure not to watch television. Second, even if A has a normative liberty to watch television, it might be that A has no real option because television technologies are not yet available in A's part of the world, or they might be so expensive that A cannot afford to rent or buy a television. Or, it might be that the television programmes are in a language that A does not understand, or that A is so busy working that he simply has no time to watch television. These reasons are not all of the same kind: some involve

conflicting normative pressures, others speak to the real constraints on A exercising a normative liberty. In relation to the latter, some of the practical constraints reflect the relative accessibility of the technology, or A's lack of capacity or resources; some constraints are, as it were, internal to A, others external; some of the limitations are more easily remedied than others; and so on. Such variety notwithstanding, these circumstantial factors all mean that, even if A has a paper normative liberty, it is not matched by the practical liberty that A actually enjoys. Third, there is also the possibility that the introduction of a television into A's home disrupts the leisure options previously available to, and valued by, A. For example, the members of A's family may now prefer to watch television rather than play board games or join A in a 'sing song' around the piano (cf Price 2001). It is a commonplace that technologies are economically and socially disruptive; and, so far as liberty is concerned, it is in relation to real options that the disruption is most keenly felt.

3. Liberty and Technology: Four Prospective Lines of Inquiry

Given our proposed umbrella conception of liberty, and a galaxy of technologies and their applications, there are a number of lines of inquiry that suggest themselves. In what follows, four such possibilities are sketched. They concern inquiries into: (i) the pattern of normative optionality; (ii) the gap between normative liberty and practical liberty (or the gap between paper options and real options); (iii) the impact of technologies on basic liberties; and (iv) the relationship between law, liberty, and technological management.

(p. 47) 3.1 The Pattern of Normative Optionality

First, we might gauge the pattern and extent of normative liberty by working through various technologies and their applications to see which normative codes treat their use as permissible. In some communities, the default position might be that new technologies and their applications are to be permitted unless they are clearly dangerous or harmful to others. In other communities, the test of permissibility might be whether a technological purpose—such as human reproductive cloning or sex selection or human enhancement—compromises human dignity (see, e.g. Fukuyama 2002; Sandel 2007). With different moral backgrounds, we will find different takes on normative liberty.

If we stick simply to legal codes, we will find that, in many cases the use of a particular technology—for example, whether or not to use a mobile phone or a tablet, or a particular app on the phone or tablet, or to watch television—is pretty much optional; but, in some communities, there might be social norms that almost require their use or, conversely, prohibit their use in certain contexts (such as the use of mobile phones at meetings, or in 'quiet' coaches on trains, or at the family dinner table). Where we find divergence between one normative code and another in relation to the permissibility of using a particular technology, further questions will be invited. Is the explanation for the divergence, perhaps, because different expert judgements are being made about the safety of a tech-

nology or because different methodologies of risk assessment are being employed (as seemed to be the case with GM crops), or does the difference go deeper to basic values, to considerations of human rights and human dignity (as was, again, one of the key factors that explained the patchwork of views concerning the acceptability of GM crops) (Jasanoff 2005; Lee 2008; Thayyil 2014)?

For comparatists, an analysis of this kind might have some attractions; and, as we have noted already, there are some interesting questions to be asked about the response of human agents who are caught between conflicting normative codes. Moreover, as the underlying reasons for different normative positions are probed, we might find that we can make connections with familiar distinctions drawn in the liberty literature, most obviously with Berlin's famous distinction between negative and positive liberty (Berlin 1969). In Berlin's terminology, where a state respects the negative liberty of its citizens, it gives them space for self-development and allows them to be judges of what is in their own best interests. By contrast, where a state operates with a notion of positive liberty, it enforces a vision of the real or higher interests of citizens even though these are interests that citizens do not identify with as being in their own self-interest. To be sure, this is a blunt distinction (MacCallum 1967; Macpherson 1973). Nevertheless, where a state denies its citizens access to a certain technology (for example, where the state filters or blocks access to the Internet, as with the great Chinese firewall) because it judges that it is not in the interest of citizens to have such access, then this contrasts quite dramatically with (p. 48) the situation where a state permits citizens to access technologies and leaves it to them to judge whether it is in their self-interest (Esler 2005; Goldsmith and Wu 2006). For the former state to justify its denial of access in the language of liberty, it needs to draw on a positive conception of the kind that Berlin criticized; while, for the latter, if respect for negative liberty is the test, there is nothing to justify.

While legal permissions in one jurisdiction are being contrasted with legal prohibitions or requirements in another, it needs to be understood that legal orders do not always treat their permissions as unvarnished liberties. Rather, we find *incentivized* permissions (the option being incentivized, for example, by a favourable tax break or by the possibility of IP rights), *simple* permissions (neither incentivized nor disincentivized), and *conditional* or *qualified* permissions (the option being available subject to some condition, such as a licensing approval).

To dwell a moment on the incentivization given to technological innovation by the patent regime, and the relationship of that incentivization to liberty, the case of Oliver Brüstle is instructive. Briefly, in October 2011, the CJEU, responding to a reference from the German Federal Court of Justice, ruled that innovative stem cell research conducted by Oliver Brüstle was excluded from patentability by Article 6(2)(c) of Directive 98/44/EC on the Legal Protection of Biotechnological Inventions—or, at any rate, it was so excluded to the extent that Brüstle's research relied on the use of materials derived from human embryos which were, in the process, necessarily terminated.¹ *Brüstle* attracted widespread criticism, one objection being that the decision does not sit well with the fact that in Germany—and it is well known that German embryo protection laws are among the strongest in

Europe—Brüstle’s research was perfectly lawful. Was this not, then, an unacceptable interference with Brüstle’s liberty? Whether or not, in the final analysis, the decision was acceptable would require an extended discussion. However, the present point is simply that there is no straightforward incoherence in holding that (in the context of a plurality of moral views in Europe) Brüstle’s research should be given no IP encouragement while recognizing that, in many parts of Europe, it would be perfectly lawful to conduct such research (Brownsword 2014a). The fact of the matter is—as many liberal-minded parents find when their children come of age—that options have to be conceded, and that some acts of which one disapproves must be treated as permissible; but none of this entails that each particular choice should be incentivized or encouraged.

3.2 The Gap between Normative Liberty and Practical Liberty

The *Brüstle* case is one illustration of the gap between a normative liberty and a practical liberty, between a paper option and a real option. Following the decision, (p. 49) even though Brüstle’s research remained available as a paper option in Germany (and many other places where the law permits such research to be undertaken), the fact that its processes and products could not be covered in Europe by patent protection might render it less than a real option. Just how much of a practical problem this might be for Brüstle would depend on the importance of patents for those who might invest in the research. If the funds dried up for the research, then Brüstle’s normative liberty would be little more than a paper option. Granted, Brüstle might move his research operation to another jurisdiction where the work would be patentable, but this again might not be a realistic option. Paper liberties, it bears repetition, do not always translate into real liberties.

So much for the particular story of Brüstle; but the more general point is that there are millions of people worldwide for whom liberty is no more than a paper option. From the fact that there is no rule that prohibits the doing of *x*, it does not follow that all those who would wish to do *x* will be in a position to do so. Moreover, as I have already indicated in section 2 of the chapter, there are many reasons why a particular person might not be able to exercise a paper option, some more easily rectifiable than others. This invites several lines of inquiry, most obviously perhaps, some analysis of the reasons why there are practical obstructions to the exercise of those normative liberties and then the articulation of some strategies to remove those obstructions.

No doubt, in many parts of the world, where people are living on less than a dollar a day, the reason why paper options do not translate into real options will be glaringly obvious. Without a major investment in basic infrastructure, without the development of basic capabilities, and without a serious programme of equal opportunities, whatever normative liberties there are will largely remain on paper only (Nussbaum 2011). In this context, a mix of some older technologies with modern lower cost technologies (such as nano-remediation of water and birth control) might make a contribution to the practical expansion of liberty (Edgerton 2006; Demissie 2008; Haker 2015). At the same time, though, modern agricultural and transportation technologies can be disruptive of basic food security

as well as traditional farming practices (a point famously underlined by the development of the so-called 'terminator gene' technology that was designed to prevent the traditional reuse of seeds).

Beyond this pathology of global equity, there are some more subtle ways in which, even among the most privileged peoples of the world, real options are not congruent with paper options. To return to an earlier example, there might be no law against watching television but A might find that, because his family do not enjoy watching the kind of programmes that he likes, he rarely has the opportunity to watch what he wants to watch (so he prefers not to watch at all); or, it might be that, although there are two television sets in A's house, the technology does not actually allow different programmes to be watched—so A, again, has no real opportunity to watch the programmes that he likes. This last-mentioned practical (p. 50) constraint, where a technological restriction impacts on an agent's real options, is a matter of central interest if we are to understand the relationship between modern technologies and liberty; and it is a topic to which we will return in section 4.

3.3 Liberty and Liberties

As a third line of inquiry, we might consider how particular technologies bear on particular basic and valued liberties (Rawls 1972; Dworkin 1978). In modern liberal democracies, a number of liberties or freedoms are regarded as of fundamental importance, constituting the conditions in which humans can express themselves and flourish as self-determining autonomous agents. So important are these liberties or freedoms that, in many constitutions, the enjoyment of their subject matter is recognized as a basic right. Now, recalling the Hohfeldian point that it does not always follow that, where A has a *liberty* to do x relative to B, A will also have a *claim right* against B that B should not interfere with A doing x, it is apparent that when A's doing of x (whether x involves expressing a view, associating with others, practising a religion, forming a family or whatever) is recognized as a basic right, this will be a case where A has a conjoined liberty and claim right. In other words, in such a case, A's relationships with others, including with the state, will involve more than a liberty to do x; A's doing, or not doing, of x will be protected by claim rights. For example, if A's privacy is treated by the reference normative order as a liberty to do x relative to others, then if, say, A is asked to disclose some private information, A may decline to do so without being in breach of duty. So long as A is treated as having *nothing more than a liberty*, A will have no claim against those who 'interfere' with his privacy—other things being equal, those who spy and pry on A will not be in breach of duty. However, if the reference normative order treats A's privacy as a fundamental freedom and a basic right, A will have more than a liberty to keep some information to himself, A will have specified rights against others who fail (variously) to respect, to protect, to preserve, or to promote A's privacy. Where the state or its officers fail to respect A's privacy, they will be in breach of duty.

With this clarification, how do modern technologies bear on liberties that we regard as basic rights? While such technologies are sometimes lauded as enabling freedom of expression and possibly political freedoms—for example, by engaging younger people in political debates—they can also be viewed with concern as potentially corrosive of democracy and human rights (Sunstein 2001; McIntyre and Scott 2008). In this regard, it is a concern about the threat to privacy (viewed as a red line that preserves a zone of private options) that is most frequently voiced as new technologies of surveillance, tracking and monitoring, recognition and detection, and so on are developed (Griffin 2008; Larsen 2011; Schulhofer 2012).

(p. 51) The context in which the most difficult choices seem to be faced is that of security and criminal justice. On the one hand, surveillance that is designed to prevent acts of terrorism or serious crime is important for the protection of vital interests; but, on the other hand, the surveillance of the innocent impinges on their privacy. How is the right balance to be struck (Etzioni 2002)? Following the Snowden revelations, there is a sense that surveillance might be disproportionate; but how is proportionality to be assessed? (See Chapter 3 in this volume.)

In the European jurisprudence, the *Case of S. and Marper v The United Kingdom*² gives some steer on this question. In the years leading up to *Marper*, the authorities in England and Wales built up the largest per capita DNA database of its kind in the world, with some 5 million profiles on the system. At that time, if a person was arrested, then, in almost all cases, the police had the power to take a DNA sample from which an identifying profile was made. The sample and the profile could be retained even though the arrest (for any one of several reasons) did not lead to the person being convicted. These sweeping powers attracted considerable criticism—particularly on the twin grounds that there should be no power to take a DNA sample except in the case of an arrest in connection with a serious offence, and that the sample and profile should not be retained unless the person was actually convicted (Nuffield Council on Bioethics 2007). The question raised by the *Marper* case was whether the legal framework that authorized the taking and retention of samples, and the making and retention of profiles, was compatible with the UK's human rights commitments.

In the domestic courts, while the judges were not quite at one in deciding whether the right to informational privacy was engaged under Article 8(1) of the European Convention on Human Rights,³ they had no hesitation in accepting that the state could justify the legislation under Article 8(2) by reference to the compelling public interest in the prevention and detection of serious crime. However, the view of the Grand Chamber in Strasbourg was that the legal provisions were far too wide and disproportionate in their impact on privacy. Relative to other signatory states, the United Kingdom was a clear outlier: to come back into line, it was necessary for the UK to take the right to privacy more seriously.

Following the ruling in *Marper*, a new administration in the UK enacted the Protection of Freedoms Act 2011 with a view to following the guidance from Strasbourg and restoring

proportionality to the legal provisions that authorize the retention of DNA profiles. Although we might say that, relative to European criminal justice practice, the UK's reliance on DNA evidence has been brought back into line, the burgeoning use of DNA is an international phenomenon—for example, in the United States, the FBI coordinated database holds more than 8 million profiles. Clearly, while DNA databases make some contribution to crime control, there needs to be a compelling case for their large-scale construction and widespread use (Krimsky and Simoncelli 2011). Indeed, with a raft of new technologies, from neuro-imaging to thermal imaging, available to the security services and law enforcement (p. 52) officers we can expect there to be a stream of constitutional and ECHR challenges centring on privacy, reasonable grounds for search, fair trial, and so on, before we reach some settlement about the limits of our civil liberties (Bowling, Marks, and Murphy 2008).

3.4 Law, Liberty, and Technological Management

Fourth, we might consider the impact of 'technological management' on liberty. Distinctively, technological management—typically involving the design of products or places, or the automation of processes—seeks to exclude (i) the possibility of certain actions which, in the absence of this strategy, might be subject only to rule regulation or (ii) human agents who otherwise would be implicated in the regulated activities.

Now, where an option is practically available, it might seem that the only way in which it can be restricted is by a normative response that treats it as impermissible. However, this overlooks the way in which 'technological management' itself can impinge on practical liberty and, at the same time, supersede any normative prescription and, in particular, the legal coding.

For example, there was a major debate in the United Kingdom at the time that seat belts were fitted in cars and it became a criminal offence to drive without engaging the belt. Critics saw this as a serious infringement of their liberty—namely, their option to drive with or without the seat belt engaged. In practice, it was quite difficult to monitor the conduct of motorists and, had motorists not become enculturated into compliance, there might have been a proposal to design vehicles so that cars were simply immobilized if seat belts were not worn. In the USA, where such a measure of technological management was indeed adopted before being rejected, the implications for liberty were acutely felt (Mashaw and Harfst 1990: ch 7). Although the (US) Department of Transportation estimated that the so-called interlock system would save 7,000 lives per annum and prevent 340,000 injuries, 'the rhetoric of prudent paternalism was no match for visions of technology and "big brotherism" gone mad' (Mashaw and Harfst 1990: 135). As Mashaw and Harfst take stock of the legislative debates of the time:

Safety was important, but it did not always trump liberty. [In the safety lobby's appeal to vaccines and guards on machines] the freedom fighters saw precisely the dangerous, progressive logic of regulation that they abhorred. The private passen-

ger car was not a disease or a workplace, nor was it a common carrier. For Congress in 1974, it was a private space.

(1990: 140)

Not only does technological management of this kind aspire to limit the practical options of motorists, including removing the real possibility of non-compliance (p. 53) with the law, there is a sense in which it supersedes the rules of law themselves. This takes us to the next phase of our discussion.

4. Law, Liberty, and Technological Management

In this section, I introduce the liberty-related issues arising from the development of technological management as a regulatory tool. First, I explain the direction of regulatory travel by considering how technological management can appeal as a strategy for crime control as well as for promoting health and safety and environmental protection. Second, I comment on the issues raised by the way in which technological management impinges on liberty by removing practical options.

4.1 The Direction of Regulatory Travel

Technological management might be applied for a variety of purposes—for example, as a measure of crime control; for health and safety reasons; for ‘environmental’ purposes; and simply for the sake of efficiency and economy. For present purposes, we can focus on two principal tracks in which we might find technological management being employed.

The first track is that of the mainstream criminal justice system. As we have seen already, in an attempt to improve the effectiveness of the criminal law, various technological tools (of surveillance, identification, detection, and correction) might be (and, indeed, are) employed. If these tools that encourage (but do not guarantee) compliance could be sharpened into full-scale technological management, it would seem like a natural step for regulators to take. After all, if crime control—or, even better, crime prevention—is the objective, why not resort to a strategy that eliminates the possibility of offending (Ashworth, Zedner, and Tomlin 2013)? For those who despair that ‘nothing works’, technological management seems to be the answer.

Consider the case of road traffic laws and speed limits. Various technologies (such as speed cameras) can be deployed but full-scale technological management is the final answer. Thus, Pat O’Malley charts the different degrees of technological control applied to regulate the speed of motor vehicles:

In the ‘soft’ versions of such technologies, a warning device advises drivers they are exceeding the speed limit or are approaching changed traffic regulatory conditions, but there are (p. 54) progressively more aggressive versions. If the driver ignores warnings, data—which include calculations of the excess speed at any moment, and the distance over which such speeding occurred (which may be consid-

ered an additional risk factor and *thus* an aggravation of the offence)—can be transmitted directly to a central registry. Finally, in a move that makes the leap from perfect detection to perfect prevention, the vehicle can be disabled or speed limits can be imposed by remote modulation of the braking system or accelerator.

(2013: 280)

Similarly, technological management can prevent driving under the influence of drink or drugs by immobilizing vehicles where sensors detect that a person who is attempting to drive is under the influence.

The other track is one that focuses on matters of health and safety, conservation of energy, protection of the environment, and the like. As is well known, with the industrialization of societies and the development of transport systems, new machines and technologies presented many dangers to their operators, to their users, and to third parties which regulators tried to manage by introducing health and safety rules (Brenner 2007). The principal instruments of risk management were a body of ‘regulatory’ criminal laws, characteristically featuring absolute or strict liability, in conjunction with a body of ‘regulatory’ tort law, again often featuring no-fault liability but also sometimes immunizing business against liability (Martin-Casals 2010). However, in the twenty-first century, we have the technological capability to manage the relevant risks: for example, in dangerous workplaces, we can replace humans with robots; we can create safer environments where humans continue to operate; and, as ‘green’ issues become more urgent, we can introduce smart grids and various energy-saving devices (Bellantuono 2014). In each case, technological management, rather than the rules of law, promises to bear a significant part of the regulatory burden.

Given the imperatives of crime prevention and risk management, technological management promises to be the strategy of choice for public regulators of the present century. For private regulators, too, technological management has its attractions. For example, when the Warwickshire Golf and Country Club began to experience problems with local ‘joy-riders’ who took the golf carts off the course, the club used GPS technology so that the carts were immobilized if anyone tried to drive them beyond the permitted limits (Brownsword 2015). Although the target acts of the joy-riders continued to be illegal on paper, the acts were rendered ‘impossible’ in practice and the relevant regulatory signal became ‘you cannot do this’ rather than ‘this act is prohibited’ (Brownsword 2011). To this extent, technological management overtook the underlying legal rule: the joy-riders were no longer responsible for respecting the legally backed interests of the golf club; and the law was no longer the reason for this particular case of crime reduction. In both senses, the work was done by the technology.

For at least two reasons, however, we should not be too quick to dismiss the relevance of the underlying legal rule or the regulators’ underlying normative intention. One reason is that an obvious way of testing the legitimacy of a particular use (p. 55) of technological management is to check whether, had the regulators used a rule rather than a technological fix to achieve their purposes, it would have satisfied the relevant test of

'legality' (whether understood as the test of legal validity that is actually recognized or as a test that ideally should be recognized and applied). If the underlying rule would *not* have satisfied the specified test of legality, then the use of technological management must also fail that test; by contrast, if the rule would have satisfied the specified test, then the use of technological management at least satisfies a necessary (if not yet sufficient) condition for its legality (Brownsword 2016). The other reason for not altogether writing off rules is that, even though, in technologically managed environments, regulatees are presented with signals that speak to what is possible or impossible, there might be some contexts in which they continue to be guided by what they know to be the underlying rule or normative intention.

While there will be some success stories associated with the use of technological management, there might nevertheless be many concerns about its adoption—about the transparency of its adoption, about the accountability and legal responsibilities of those who adopt such a regulatory strategy, about the diminution of personal autonomy, about its compatibility with respect for human rights and human dignity, about how it stands relative to the ideals of legality, about compromising the conditions for moral community, and about possible catastrophe, and so on. However, our focal question is how technological management relates to liberty.

4.2 The Impingement of Technological Management on Liberty

How does technological management impinge on liberty? Because technological management bypasses rules and engages directly with what is actually possible, the impingement is principally in relation to the dimension of practical liberty and real options. We can assess the impingement, first, in the area of crime, and then in relation to the promotion of health and safety and the like, before offering a few short thoughts on the particular case of 'privacy by design'.

4.2.1 Technological management, liberty, and crime control

We can start by differentiating between those uses of technological management that are employed (i) to prevent acts of wilful harm that either already are by common consent criminal offences or that would otherwise be agreed to be rightly made criminal offences (such as the use of the golf carts by the joy-riders) and (ii) to prevent acts that some think should be criminalized but which others do not (perhaps, for example, the use of the 'Mosquito'—a device emitting a piercing high-pitched (p. 56) sound that is audible only to teenagers—to prevent groups of youngsters gathering in certain public places).⁴

In the first case, technological management targets what is generally agreed to be (a) a serious public wrong and (b) an act of *intentional* wrongdoing. On one view, this is exactly where crime control most urgently needs to adopt technological management (Brownsword 2005). What is more, if the hardening of targets or the disabling of prospective offenders can be significantly improved by taking advantage of today's technologies, then the case for doing so might seem to be obvious—or, at any rate, it might seem to be so provided that the technology is accurate (in the way that it maps onto offences, in its

predictive and pre-emptive identification of 'true positive' prospective offenders, and so on); provided that it does not unwisely eliminate enforcement discretion; and provided that it does not shift the balance of power from individuals to government in an unacceptable way (Mulligan 2008; Kerr 2013). Even if these provisos are satisfied, we know that, when locked doors replace open doors, or biometrically secured zones replace open spaces, the context for human interactions is affected: security replaces trust as the default. Moreover, when technological management is applied in order to prevent or exclude intentional wrongdoing, important questions about the compromising of the conditions for moral community are raised.

With regard to the general moral concern, two questions now arise. First, there is the question of pinpointing the moral pathology of technological management; and the second is the question of whether a particular employment of technological management will make any significant difference to the context that is presupposed by moral community.

In relation to the first of these questions, compelled acts forced by technological management might be seen as problematic in two scenarios (depending on whether the agent who is forced to act in a particular way judges the act to be in line with moral requirements). In one scenario, the objection is that, even if an act that is technologically managed accords with the agent's own sense of the right thing, it is not a paradigmatic (or authentic) moral performance—because, in such a case, the agent is no longer freely doing the right thing, and no longer doing it for the right reason. As Ian Kerr (2010) has neatly put it, moral virtue is one thing that cannot be automated; to be a good person, to merit praise for doing the right thing, there must also be the practical option of doing the wrong thing. That said, it is moot whether the problem with a complete technological fix is that it fails to leave open the possibility of 'doing wrong' (thereby disabling the agent from confirming to him or herself, as well as to others, their moral identity and their essential human dignity) (Brownsword 2013b); or that it is the implicit denial that the agent is any longer the author of the act in question; or, possibly the same point stated in other words, that it is the denial of the agent's responsibility for the act (Simester and von Hirsch 2014: ch 1). In the alternative scenario, where a technologically managed environment compels the agent to act against his or her conscience, the objection is (p. 57) perhaps more obvious: quite simply, if a community with moral aspirations encourages its members to form their own moral judgements, it should not then render it impossible for agents to act in ways that accord with their sense of doing the right thing. Where technological management precludes acts that everyone agrees to be immoral, this objection will not apply. However, as we will see shortly, where technological management is used to compel acts that are morally contested, there are important questions about the legitimacy of closing off the opportunity for conscientious objection and civil disobedience.

Turning to the second question, how should we judge whether a particular employment of technological management will make any significant difference to the context that is presupposed by moral community? There is no reason to think that, in previous centuries, the fitting of locks on doors or the installing of safes, and the like, has fatally compromised the conditions for moral community. Even allowing for the greater sophistication,

variety, and density of technological management in the present century, will this make a material difference? Surely, it might be suggested, there still will be sufficient occasions left over for agents freely to do the right thing and to do it for the right reason as well as to oppose regulation that offends their conscience. In response to these questions, it will be for each community with moral aspirations to develop its own understanding of why technological management might compromise moral agency and then to assess how precautionary it needs to be in its use of such a regulatory strategy (Yeung 2011).

In the second case, where criminalization is controversial, those who oppose the criminalization of the conduct in question would oppose a criminal law to this effect and they should oppose *a fortiori* the use of technological management. One reason for this heightened concern is that technological management makes it more difficult for dissenters to express their conscientious objection or to engage in acts of direct civil disobedience.

Suppose, for example, that an act of 'loitering unreasonably in a public place' is controversially made a criminal offence. If property owners now employ technological management, such as the Mosquito, to keep their areas clear of groups of teenagers, this will add to the controversy. First, there is a risk that technological management will overreach by excluding acts that are beyond the scope of the offence or that should be excused—here, normative liberty is reduced by the application of measures of technological management that redefine the practical liberty of loitering teenagers; second, without the opportunity to reflect on cases as they move through the criminal justice system, the public might not be prompted to revisit the law (the risk of 'stasis'); and, for those teenagers who wish to protest peacefully against the law by directly disobeying it, they cannot actually do so—to this extent, their practical liberty to protest has been diminished (Rosenthal 2011).

Recalling the famous case of Rosa Parks, who refused to move from the 'white-only' section of the bus, Evgeny Morozov points out that this important act of civil disobedience was possible only because

(p. 58)

the bus and the sociotechnological system in which it operated were terribly inefficient. The bus driver asked Parks to move only because he couldn't anticipate how many people would need to be seated in the white-only section at the front; as the bus got full, the driver had to adjust the sections in real time, and Parks happened to be sitting in an area that suddenly became 'white-only'.

(2013: 204)

However, if the bus and the bus stops had been technologically enabled, this situation simply would not have arisen—Parks would either have been denied entry to the bus or she would have been sitting in the allocated section for black people. In short, technological management disrupts the assumption made by liberal legal theorists who count on acts of direct civil disobedience being available as an expression of responsible moral citizenship (Hart 1961).

That said, this line of thinking needs more work to see just how significant it really is. In some cases, it might be possible to ‘circumvent’ the technology; and this might allow for some acts of protest before patches are applied to the technology to make it more resilient. Regulators might also tackle circumvention by creating new criminal offences that are targeted at those who try to design round technological management—indeed, in the context of copyright, Article 6 of Directive 2001/29/EC already requires member states to provide adequate legal protection against the circumvention of technological measures (such as DRM).⁵ In other words, technological management might not always be counter-technology proof and there might remain opportunities for civil disobedients to express their opposition to the background regulatory purposes by indirect means (such as illegal occupation or sit-ins), by breaking anti-circumvention laws or by initiating well-publicized ‘hacks’, or ‘denial-of-service’ attacks or their analogues.

Nevertheless, if the general effect of technological management is to squeeze the opportunities for acts of direct civil disobedience, ways need to be found to compensate for any resulting diminution in responsible moral citizenship. By the time that technological management is in place, it is too late; for most citizens, non-compliance is no longer an option. This suggests that the compensating adjustment needs to be *ex ante*: that is to say, it suggests that responsible moral citizens need to be able to air their objections before technological management has been authorized for a particular purpose; and, what is more, the opportunity needs to be there to challenge both an immoral regulatory purpose and the use of (morality corroding) technological management.

4.2.2 Technological management of risks to health, safety, and the environment

Even if there are concerns about the use of technological management where it is employed in the heartland of the criminal law, it surely cannot be right to condemn all applications of technological management as illegitimate. For example, should we object to raised pavements that prevent pedestrians being struck into by vehicles? (p. 59) Or, more generally, should we object to modern transport systems on the ground that they incorporate safety features that are intended to design out the possibility of human error or carelessness (as well as intentionally malign acts) (Wolff 2010)? Or, should we object to the proposal that we might turn to the use of regulating technologies to replace a failed normative strategy for securing the safety of patients who are taking medicines or being treated in hospitals (Brownsword 2014b)?

Where technological management is employed within, so to speak, the health and safety risk management track, there might be very real concerns of a prudential kind. For example, if the technology is irreversible, or if the costs of disabling the technology are very high, or if there are plausible catastrophe concerns, precaution indicates that regulators should go slowly with this strategy (Bostrom 2014). However, setting to one side prudential concerns, are there any reasons for thinking that measures of technological management are illegitimate? If we assume that the measures taken are transparent and that, if necessary, regulators can be held to account for taking the relevant measures, the legiti-

macy issue centres on the reduction of the practical options that are available to regulatees.

To clarify our thinking about this issue, we might start by noting that, in principle, technological management might be introduced by A in order to protect or to advance:

- (i) A's own interests;
- (ii) the interests of some specific other, B; or
- (iii) the general interest of some group of agents.

We can consider whether the reduction of real options gives rise to any legitimacy concerns in any of these cases.

First, there is the case of A adopting technological management with a view to protecting or promoting A's own interests. For example, A, wishing to reduce his home energy bills, adopts a system of technological management of his energy use. This seems entirely unproblematic. However, what if A's adoption of technological management impacts on others—for example, on A's neighbour B? Suppose that the particular form of energy capture, conversion, or conservation that A employs is noisy or unsightly. In such circumstances, B's complaint is not that A is using technological management per se but that the particular kind of technological management adopted by A is unreasonable relative to B's interest in peaceful enjoyment of his property (or some such interest). This is nothing new. In the days before clean energy, B would have made similar complaints about industrial emissions, smoke, dust, soot, and so on. Given the conflicting interests of A and B, it will be necessary to determine which set of interests should prevail; but the use of technological management itself is not in issue.

In the second case, A employs technological management in the interests of B. For example, if technological management is used to create a safe zone within (p. 60) which people with dementia can wander or young children can play, this is arguably a legitimate enforcement of paternalism (cf Simester and von Hirsch, 2014: chs 9–10). The fact that technological management rather than a rule (that prohibits leaving the safe zone) is used does mean that there is an additional level of reduction in B's real options (let us assume that some Bs do have a sense of their options): the use of technological management means that B has no practical liberty to leave the safe zone. However, in such a case, the paternalistic argument that would support the use of a rule that is designed to confine B to the safe zone would also seem to reach through to the use of technological management. Once it is determined that B lacks the capacity to make reasonable self-interested judgements about staying within or leaving the safe zone, paternalists will surely prefer to use technological management (which guarantees that B stays in the safe zone) rather than a rule (which cannot guarantee that B stays in the safe zone).

By contrast, if B is a competent agent, A's paternalism—whether articulated as a rule or in the use of measures of technological management—is problematic. Quite simply, even if A correctly judges that exercising some option is not in B's best interest (whether 'physical', 'financial', or 'moral'), or that the risks of exercising the option outweigh its benefit,

how is A to justify this kind of interference with B's freedom (Brownsword 2013c)? For example, how might A justify the application of some technological fix to B's computer so that B is unable to access web sites that A judges to be contrary to B's interests? Or, how might A justify implanting a chip in B so that, for B's own health and well-being, B is unable to consume alcohol? If B consents to A's interference, that is another matter. However, in the absence of B's consent, and if A cannot justify such paternalism, then A certainly will not be able to justify his intervention. In this sense—or, so we might surmise—there is nothing special about A's use of technological management rather than A's use of a rule: in neither case does A's paternalistic reasoning justify the intervention. On the other hand, there is a sense in which technological management deepens the wrong done to B. When B is faced with a rule of the criminal law that is backed by unjustified paternalistic reasoning, this is a serious matter, 'coercively eliminating [B's paper] options' in a systematic and permanent way (Simester and von Hirsch 2014: 148). Nevertheless, B retains the real option of breaching the rule and directly protesting against this illegitimate restriction of his liberty. By contrast, when B's liberty is illegitimately restricted by technological management, there is no such option—neither to break the rule nor to protest directly. In such a case, technological management is not only more effective than other forms of intervention; it exacerbates A's reliance on paternalistic reasoning and intensifies the wrong done to B.

In the third case, the use of technological management (in the general health and safety interests of the group) might eliminate real options that are left open when rules are used for that purpose. For example, the rules might limit the number of hours that a lorry driver may work in any 24-hour period; but, in practice, the rules can be broken and there will continue to be fatalities as truck drivers fall (p. 61) asleep at the wheel. Preserving such a practical liberty is not obviously an unqualified (indeed, any kind of) good. Similarly, employers might require their drivers to take modafinil. Again, in practice, this rule might be broken and, moreover, such an initiative might prove to be controversial where the community is uncomfortable about the use of drugs or other technologies in order to 'enhance' human capacities (Harris 2007; Sandel 2007; Dublijevic 2012). Let us suppose that, faced with such ineffective or unacceptable options, the employers (with regulatory support) decide to replace their lorries with new generation driverless vehicles. If, in the real world, driverless trucks were designed so that humans were taken out of the equation, the American Truckers Association estimates that some 8.7 million trucking-related jobs could face some form of displacement (Thomas 2015; and see Chapter 43 in this volume). In the absence of consent by all those affected by the measure, technological disruption of this kind and on this scale is a cause for concern (Lanier 2013). Against the increment in human health and safety, we have to set the loss of livelihood of the truckers. Possibly, in some contexts, regulators might be able to accommodate the legitimate preferences of their regulatees—for example, for some time at least, it should be possible to accommodate the preferences of those who wish to drive their cars (rather than be transported in driverless vehicles) or their lorries and, in the same way, it should be possible to accommodate the preferences of those who wish to have human rather than robot carers (as well as the preferences of those humans who wish to take on caring roles and respon-

sibilities). However, if the preservation of such options comes at a cost, or if the preferred options present a heightened risk to human health and safety, we might wonder how long governments and majorities will tolerate the maintenance of such practical liberty. In this context, it will be for the community to decide whether, all things considered, the terms and conditions of a proposed risk management package that contains measures of technological management are fair and reasonable and whether the adoption of the package is acceptable.

While we should never discount the impact of technological management on the complexion of the regulatory environment, what we see in the cases discussed is more a matter of its impact on the practical liberties, the real options and the preferences and particular interests of individuals and groups of human agents. To some extent, the questions raised are familiar ones about how to resolve competing or conflicting interests. Nevertheless, before eliminating particular options that might be valued and before eliminating options that might cumulatively be significant (cf Simester and von Hirsch 2014: 167–168), some regulatory hesitation is in order. Crucially, it needs to be appreciated that the more that technological management is used to secure and to improve the conditions for human health and safety, the less reliant we will be on background laws—particularly so-called regulatory criminal laws and some torts law—that have sought to encourage health and safety and to provide for compensation where accidents happen at work. The loss of these laws, and their possible replacement with some kind of compensatory scheme where (exceptionally) (p. 62) the technology fails, will have some impact on both the complexity of the regulatory regime (Leenes and Lucivero 2014; Weaver 2014) and the complexion of the regulatory environment. Certainly, the use of technological management, rather than the use of legal rules and regulations, has implications for not only the health and safety but also the autonomy of agents; but, it is far less clear how seriously, if at all, this impacts on the conditions for moral community. To be sure, regulators need to anticipate ‘emergency’ scenarios where some kind of human override becomes available (Weaver 2014); but, other things being equal, it is tempting to think that the adoption of technological management in order to improve human health and safety, even when disruptive of settled interests, is potentially progressive.

4.2.3 Privacy by design

According to Article 23.1 of the proposed (and recently agreed) text of the EU General Regulation on Data Protection

Having regard to the state of the art and the cost of implementation, the controller shall, both at the time of the determination of the means for processing and at the time of the processing itself, implement appropriate technical and organisational measures and procedures in such a way that the processing will meet the requirements of this Regulation and ensure the protection of the rights of the data subject.⁶

This provision requires data controllers to take a much more systematic, preventive, and embedded approach to the protection of the subject's data rights in line with the so-called 'privacy by design' principles (as first developed some time ago by Ontario's Information and Privacy Commissioner, Dr Ann Cavoukian). For advocates of privacy by design, it is axiomatic that privacy should be the default setting; that privacy should not be merely a 'bolt on' but, rather, it should be 'mainstreamed'; and that respect for privacy should not be merely a matter of compliance but a matter to be fully internalized (Cavoukian 2009). Such a strategy might implicate some kind of technological intervention, such as the deployment of so-called Privacy Enhancing Technologies (PETs); but the designed-in privacy protections might not amount to full-scale technological management. Nevertheless, let us suppose that it were possible to employ measures of technological management to design out some (or all) forms of violation of human informational interests—particularly, the unauthorized accessing of information that is 'private', the unauthorized transmission of information that is 'confidential', and the unauthorized collection, processing, retention, or misuse of personal data. With such measures of technological management, whether incorporated in products or processes or places, it simply would not be possible to violate the protected privacy interests of another person. In the light of what has been said above, and in particular in relation to the impact of such measures on practical liberty, what should we make of this form of privacy by design? What reasons might there be for a degree of regulatory hesitation?

First, there is the concern that, by eliminating the practical option of doing the wrong thing, there is no longer any moral virtue in 'respecting' the privacy interests (p. 63) of others. To this extent, the context for moral community is diminished. But, of course, the community might judge that the privacy gain is more important than whatever harm is done to the conditions for moral community.

Second, given that the nature, scope, and weight of the privacy interest is hotly contested—there is surely no more protean idea in both ethics and jurisprudence (Laurie 2002: 1–2 and the notes thereto)—there is a real risk that agents will find themselves either being compelled to act against their conscience or being constrained from doing what they judge to be the right thing. For example, where researchers receive health-related data in an irreversibly anonymized form, this might be a well-intended strategy to protect the informational interests of the data subjects; however, if the researchers find during the course of analysing the data that a particular data subject (whoever he or she is) has a life-threatening but treatable condition of which they are probably unaware, then technological management prevents the researchers from communicating this to the person at risk.

Third, even if there has been broad public engagement before the measures of technological management are adopted as standard, we might question whether the option of self-regulation needs to be preserved. In those areas of law, such as tort and contract, upon which we otherwise rely (in the absence of technological management), we are not merely trying to protect privacy, we are constantly negotiating the extent of our protected informational interests. Typically, the existence and extent of those particular interests is

disputed and adjudicated by reference to what, in the relevant context, we might 'reasonably expect'. Of course, where the reference point for the reasonableness of one's expectations is what in practice we can expect, there is a risk that the lines of reasonableness will be redrawn so that the scope and strength of our privacy protection is diminished (Koops and Leenes 2005)—indeed, some already see this as the route to the end of privacy. Nevertheless, some might see value in the processes of negotiation that determine what is judged to be reasonable in our interactions and transactions with others; in other words, the freedom to negotiate what is reasonable is a practical liberty to be preserved. On this view, the risk with privacy by design is not so much that it might freeze our informational interests in a particular technological design, or entrench a controversial settlement of competing interests, but that it eliminates the practical option of constant norm-negotiation and adjustment. While this third point might seem to be a restatement of the first two points, the concern is not so much for moral community as for retaining the option of self-governing communities and relational adjustments.

Fourth, and in a somewhat similar vein, liberals might value reserving the option to 'local' groups and to particular communities to set their own standards (provided that this is consistent with the public interest). For example, where the rules of the law of contract operate as defaults, there is an invitation to contracting communities to set their own standards; and the law is then geared to reflect the working norms of such a community, not to impose standards extraneously. Or, again, where a local group sets its own standards of 'neighbourliness' rather than acting on the standards set by the national law of torts, this might be seen as a valuable fine-tuning of the (p. 64) social order (Ellickson 1991)—at any rate, so long as the local norms do not reduce the non-negotiable interests of 'outsiders' or, because of serious power imbalances, reduce the protected interests of 'insiders'. If the standards of respect for privacy are embedded by technological management, there is no room for groups or communities to set their own standards or to agree on working norms that mesh with the background laws. While technologically managed privacy might be seen as having the virtue of eliminating any problems arising from friction between national and local normative orders, for liberals this might not be an unqualified good.

Finally, liberals might be concerned that privacy by design becomes a vehicle for (no opt-out) paternalistic technological management. For example, some individuals might wish to experiment with their information by posting on line their own fully sequenced genomes—but they find themselves frustrated by technological management that, in the supposed interests of their privacy, either precludes the information being posted in the first place or prevents others accessing it (cf Cohen 2012). Of course, if instead of paternalistic technological management, we have paternalistic privacy-protecting *default* settings, this might ease some liberal concerns—or, at any rate, it might do so provided that the defaults are not too 'sticky' (such that, while there is a normative liberty to opt out, or to switch the default, in practice this is not a real option—another example of the gap between normative and practical liberty) and provided that this is not a matter in

which liberals judge that agents really need actively to make their own choices (cf Sunstein 2015).⁷

5. Conclusion

At the start of this chapter, a paradox was noted: while the development of more technologies implies an expansion in our options, nevertheless, we might wonder whether, in the longer run, the effect will be to diminish our liberty. In other words, we might wonder whether our technological destiny is to gain from some new options today only to find that we lose other options tomorrow. By employing an umbrella conception of liberty, we can now see that the impact of new technologies might be felt in relation to both our normative and our practical liberty, both our paper options and our real options.

Accordingly, if the technologies of this century are going to bring about some diminution of our liberty, this will involve a negative impact (quantitatively or qualitatively) on our normative liberties—or on the normative claim rights that protect our basic liberties; or, it will involve a negative impact on our practical liberties (in the sense that the range of our real options is reduced or more significant real options are replaced by less significant ones). In some places, new technologies (p. 65) will have little penetration and will have little impact on practical liberty; but, in others, the availability of the technologies and their rapid take-up will be disruptive in ways that are difficult to chart, measure, and evaluate. While, as indicated in this chapter, there are several lines of inquiry that can be pursued in order to improve our understanding of the relationship between liberty and technology, there is no simple answer to the question of how the latter impacts on the former.

That said, the central point of the chapter is that our appreciation of the relationship between liberty and today's emerging technologies needs to focus on the impact of such technologies on our real options. Crucially, technological management, whether employed for crime control purposes or for the purpose of human health and safety or environmental protection, bears in on our practical liberty, creating regulatory environments that are quite different to those constructed around rules. This is not to say that the expansion or contraction of our normative liberties is no longer relevant. Rather, it is to say that we should not neglect to monitor and debate the impact on our practical liberty of the increasingly technological mediation of our transactions and interactions coupled with the use of technological management for regulatory purposes.

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Notes:

(1.) Case C-34/10, *Oliver Brüstle v. Greenpeace e.V.* (Grand Chamber, 18 October 2011).

(2.) (2009) 48 EHRR 50. For the domestic UK proceedings, see [2002] EWCA Civ 1275 (Court of Appeal), and [2004] UKHL 39 (House of Lords).

(3.) According to Article 8(1), 'Everyone has the right to respect for his private and family life, his home and his correspondence.'

(4.) See, further, <https://en.wikipedia.org/wiki/The_Mosquito> (accessed 21.10.16).

(5.) Directive 2001/29/EC on the harmonization of certain aspects of copyright and related rights in the information society, OJ L 167, 22.06.2001, 0010-0019.

(6.) COM (2012) 11 final, Brussels 25.1.2012. For the equivalent, but not identically worded, final version of this provision for 'technical and organisational measures', see Article 25.1 of the GDPR.

(7.) Quaere: is there a thread of connection in these last three points with Hayek's (1983: 94ff.) idea that the rule of law is associated with spontaneous ordering?

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Equality: Old Debates, New Technologies

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Abstract and Keywords

This chapter discusses the role that equality plays within liberal theory. We show how the concept of treating citizens as equals is integral to the legitimization of the state and its regulations, including those involving new technologies. We suggest that equality is a fundamental value when exploring the scope of relevant freedoms with respect to new technologies. However, understanding the role of equality for such issues requires sensitivity to important differences in the way in which it can be theorized. We explain how equality can be valued intrinsically, instrumentally, or constitutively. We also explain three different accounts of what egalitarian justice demands that are particularly relevant to framing policy involving new technology.

Keywords: equality, rights, fairness, egalitarianism, biotechnology, dignity, respect

1. Introduction

A fundamental characteristic of liberal political democracies is the respect accorded to certain core values and the obligation on state actors to protect, and promote, those central values. This chapter focuses on one particular value, that of equality. It considers how notions of equality may serve to strengthen, or undermine, claims of regulatory legitimacy when policy makers respond to new or evolving technologies.

Modern technological advances such as digital technology, neuro-technology, and biotechnology in particular, have brought about radical transformations in human lives globally. These advances are likely to be especially transformative for some sectors of society. For example, access to the World Wide Web, sophisticated reading and recognition devices, voice-activated hands-free devices, and other biomedical technologies have enhanced the capacities of persons with impairments such as blindness or paralysis as well as enabling them to participate in the new information society—at least in developed countries (Toboso 2011). However, not all technological advances are considered to be morally neutral, and some may even be thought to have morally ‘transgressive’ potential.

(p. 70) Often debates about new technology are polarized with issues of equality keenly contested. On one hand, it may be claimed that advances in technology should be restrained or even prohibited because certain technological advances may threaten important values such as individual human worth and equality (Kass 2002). A paradigmatic example of this involved the reproductive genetic technology introduced in the 1990s, preimplantation genetic diagnosis (PGD), which enables the selection of *ex vivo* embryos based on genetic characteristics. The prospect of PGD triggered widespread fears that selective reproductive technologies will reduce human diversity, potentially diminish the value of certain lives, and will intensify pressure on prospective parents to use selective technologies—all of which speak to conceptions of individual human worth and equality. However, it is also apparent that once a technology obtains a degree of social acceptance (or even before that point) much of the debate focuses on equality of access and the political obligation to enable equal access to such technologies (Brownsword and Goodwin 2012: 215). For example, the explosion of Information and Communications Technology initially triggered concerns regarding a ‘digital divide’ and more recently concerns regarding the ‘second level’ or ‘deepening’ divide (van Dijk 2012). Similarly, the prospect of human gene therapy and/or genetic enhancement (were it to become feasible) has resulted in anxiety regarding the potential for such technologies to create a societal division between the gene ‘rich’ and gene ‘poor’ (Green 2007). At the other end of the spectrum, commentators focus on the capacity for new technology to radically transform humanity for the better and the sociopolitical imperative to facilitate technological innovation (Savulescu 2001). Given the wide spectrum of claims made, new technologies can pose considerable challenges for regulators in determining an appropriate regulatory, or non-regulatory, response.

This chapter examines notions of equality and legitimacy in the context of regulatory responses to new technology. In this context, regulatory legitimacy concerns, not only the procedural aspects of implementing a legal rule or regulatory policy, but whether its substantive content is justified according to important liberal values. Ultimately, the theoretical question is whether, in relation to a new technology, a regulatory decision may claim liberal egalitarian credentials that render it worthy of respect and compliance.¹

This chapter begins by describing the relationship between legitimacy and equality. It considers several accounts of equality and its importance when determining the validity, or acceptability, of regulatory interventions. This discussion highlights the close association between egalitarianism and concepts of dignity and rights within liberal political theory. However, there is no single account of egalitarianism. Consequently, the main contemporary egalitarian theories, each of which are premised on different conceptions of equality and its foundational value in a just society, are outlined. These different perspectives impact upon normative views as to how technology should be governed and the resulting regulatory environment (Farrelly 2004). Furthermore, the reason why equality is valued influences another (p. 71) major aspect of equality, which is the question of distributive justice (Farrelly 2004). Issues of distributive justice generally entail a threefold inquiry: will the technology plausibly introduce new, or reinforce existing, inequalities in society? If this is likely, what, if anything, might justify the particular inequality? Lastly, if no

reasonable justification is available for that particular type of inequality, what does its avoidance, mitigation, or rectification, require of regulators?

2. The Relationship between Legitimacy and Equality

The relationship between legitimacy and equality is based on the notion that in a liberal political society equality constitutes a legitimacy-conferring value; in order to achieve legitimacy, a government must, to the greatest extent reasonably possible, protect, and promote equality among its citizens.

The necessary connection between legitimacy and equality has a long history. When seventeenth century political philosopher John Locke challenged the feudal system by urging that all men are free and equal, he directly associated the concept of legitimate government with notions of equality. Locke argued that governments only existed because of the will of the people who conditionally trade some of their individual rights to freedom to enable those in power to protect the rights of citizens and promote the public good. On this account, failure to respect citizens' rights, including the right to equality, undermines the legitimacy of that government. Similarly, equality (or *égalité*) was a core value associated with the eighteenth-century French Revolution alongside *liberté*, and *fraternité* (Feinberg 1990: 82). In more recent times, the global civil rights movement of the twentieth century challenged differential treatment on the basis of characteristics such as race, religion, sex, or disability and resulted in the emergence of contemporary liberal egalitarianism. These historical examples demonstrate equality's universal status as a classic liberal value, and its close association with the notion of legitimate government. More recently, legal and political philosopher Ronald Dworkin reiterated the interdependence of legitimacy with what he dubs 'equal concern'. Dworkin states:

[N]o government is legitimate that does not show *equal* concern for the fate of all those citizens over whom it claims dominion and from whom it claims allegiance. Equal concern is the sovereign virtue of political community.

(2000: 1)

Equality clearly impacts upon various dimensions of citizenship. These include the political and legal spheres, as well as the social and economic. New technologies (p. 72) may impact on any, or all, of these domains depending upon which aspects of life it affects.

There are various ways in which the 'legitimacy' of law may be measured. First, a law is endowed with legitimacy if it results from a proper democratic process. On this approach, it is the democratic process that confers legitimacy and obliges citizens to observe legal rules. The obligation on states to take measures to ensure that *all* of its citizens enjoy civil and political rights is recognized at the global level; the right to equal concern is reiterated in multiple international human rights instruments.² In the political sphere, equality requires that all competent individuals are free to participate fully in the democratic

process and are able to make their views known. Another fundamental tenet of liberal political theory, and particularly relevant for criminal justice, is that everyone is equal before the law. The obligation to protect citizens' civil and political liberties imposes (at least theoretically) restrictions on the exercise of state power. This is highly relevant to the way that some new technologies are developed and operationalized—such as policing technologies (Neyroud and Disley 2008: 228).³

However, another more substantive conception of legitimacy requires that law may be *justified* by reference to established principles. Contemporary discussions of legitimacy are more frequently concerned with substantive liberal values, rather than procedural matters. Jeff Spinner Halev notes:

Traditional liberal arguments about legitimacy of government focus on consent: if people consent to a government then it is legitimate, and the people are then obligated to obey it ... The best arguments for legitimacy focus on individual rights, and how citizens are treated and heard ... These recent liberal arguments about legitimacy focus on rights and *equal concern* for all citizens. Political authority, it is commonly argued, is justified when it upholds individual rights, and when the state shows *equal regard for all citizens*.

(2012: 133)

Although the law is required to promote and protect the equal rights of all citizens, it is clear that this has not always been achieved. In some historical instances (and arguably not so historical ones)⁴ the law has served to oppress certain minorities⁵ either as a direct or indirect result of political action. For example, the introduction of in vitro fertilization (IVF) in the United Kingdom in the late 1970s was considered a groundbreaking event because it provided infertile couples an equal opportunity to become genetic parents. However, when the UK Human Fertilisation and Embryology Bill was subsequently debated concerns were raised regarding single women or lesbian couples accessing IVF. This resulted in the Act containing a welfare provision that potentially restricted access to IVF. Section 13(5) provides that a woman 'shall not' be provided with fertility services unless the future child's welfare has been taken into account, 'including the need of that child for a father'. This qualifier that was tagged onto the welfare provision attracted criticism for discriminating against non-traditional family forms while masquerading as concerns for the welfare of the child (Kennedy and Grubb 2000: 1272; Jackson 2002).

(p. 73) While the concept of equal moral worth imposes duties on liberal states to treat its citizens with equal concern, the egalitarian project goes beyond the civil and political aspects of law. It is also concerned with equality of social opportunity (ensuring that equally gifted and motivated citizens have approximately the same chances at offices and positions, regardless of their socio-economic class and natural endowments) and economic equality (securing equality of social conditions via various political measures to redistribute wealth). However, the precise way in which these objectives should be achieved is a matter of debate, even within liberal circles. This difficulty is compounded by different accounts of why equality is important (Dworkin 2000). Given this, the following section con-

siders various notions of why equality matters before considering what those different conceptions require of political actors and the challenge of distributive justice.

3. What Is Equality?

While equality has a variety of theoretical justifications and can be applied to many different things, its essence is that it is unjust and unfair for individuals to be treated differently, in some relevant respect when they in fact possess the same morally relevant properties. In this sense, equality is intricately linked with notions of fairness, justice, and individual human worth.

Liberal rights theorist, Jeremy Waldron, argues that the commitment to equality underpins rights theory in general (Waldron 2007). He claims that

though people differ in their virtues and abilities, the idea of rights attaches an unconditional *worth* to the existence of each person, irrespective of her particular value to others. Traditionally, this was given a theological interpretation: since God has invested His creative love in each of us, it behoves us to treat all others in a way that reflects that status (Locke [1689] 1988, pp. 270–271). In a more secular framework, the assumption of unconditional worth is based on the importance of each life to the person whose life it is, irrespective of her wealth, power or social status. *People try to make lives for themselves, each on their own terms. A theory of rights maintains that that enterprise is to be respected, equally, in each person, and that all forms of power, organization, authority and exclusion are to be evaluated on the basis of how they serve these individual undertakings.*

(Waldron 2007: 752) (emphasis added)

Waldron also draws on legal philosophy to make direct links between equality and the account of dignity presented in his Tanner lectures ‘Dignity, Rank and Rights’. Waldron claims that in jurisprudential terms, ‘dignity’ indicates an elevated legal, political, and social status (which he dubs legal citizenship) that is assigned to *all* human beings. He explains:

(p. 74)

the modern notion of *human* dignity involves an upwards equalization of rank, so that we now try to accord to every human being something of the dignity, rank, and expectation of respect that was formerly accorded to nobility.

(Waldron 2009: 229)

Consequently, Waldron argues that this status-based concept of dignity is the underlying basis for laws that protect individuals from degrading treatment, insult (hate speech), and discrimination (Waldron 2009: 232). On Waldron’s account ‘dignity and equality are interdependent’ (Waldron 2009: 240).

Alan Gewirth (1971) argues for a similarly strong connection between equality and rights. The normative vehicle for his account of morality and rights is the Principle of Categorical Consistency (PCC), which is the idea that persons should 'apply to your recipient the same categorical features of action that you apply to yourself' (Gewirth 1971: 339). The PCC draws upon the idea that all persons carry out actions, or in other words, voluntary and purposive behaviours. Gewirth argues that the fact that all persons perform actions implies that agents should not coerce or harm others: all persons should respect the freedom and welfare of other persons as much as they do their own. He thinks that the PCC is essentially an egalitarian principle because:

it requires of every agent that he be impartial as between himself and his recipients when the latter's freedom and welfare are at stake, so that the agent must respect his recipients' freedom and welfare as well as his own. To violate the PCC is to establish an inequality or disparity between oneself and one's recipients with respect to the categorical features of action and hence with respect to whatever purposes or goods are attainable by action.

(Gewirth 1971: 340)

So, for Gewirth the centrality of action for persons, and that performing purposive and voluntary behaviour is a defining feature of agency, generate an egalitarian principle (the PCC) from which other rights and duties can be derived. While Gewirth provides a different account of why equality is linked so inextricably to rights and citizenship from Waldron, what they do agree upon, and what is common ground for most theories of justice or rights, is that equality, or 'us all having the same morally relevant properties' is at the heart of these accounts.

However, there is no single account of equality—indeed, its underlying theoretical principle is contested—which is whether a society should be concerned with achieving formal, versus proportional, equality. Some liberals would limit the scope of equality to achieving *formal* equality, which is accomplished by treating all individuals alike.⁶

Perhaps the most well-known articulation of formal equality is by Aristotle who claimed that we should treat like cases as like (Aristotle 2000: 1131a10). We can consider this a formal principle that does not admit of exceptions, although it is important to note that there is scope for arguing about whether or not cases are 'like'. If we consider the society Aristotle was addressing, slaves were not considered to have the same morally relevant properties as citizens so they were not the recipients of equal rights even under this formal principle of equality.

(p. 75) However, many contemporary egalitarian liberals consider that promoting equality sometimes requires treating groups differently (Kymlicka 1989: 136; Schwartzman 2006: 5). Sidney Hook gives the following explanation for why we should eschew formal equality:

The principle of equality is not a description of fact about men's physical or intellectual natures. It is a prescription or policy of treating men. It is not a prescription to treat in identical ways men who are unequal in their physical or intellectual nature. It is a policy of equality or concern or consideration for men whose different needs may require differential treatment.

(1959: 38)

In the case of those who think it is *unfair* that some people, through no fault or choice of their own are worse off than others and the state has an obligation to correct this, a concern for equality may mean actively correcting for the effect of misfortune upon that person's life. On this approach, rectification is justified because such inequality is, comparatively speaking, *undeserved* (Temkin 2003: 767). Conversely, libertarians such as Locke or Robert Nozick would emphasize the importance of individuals being treated equally with respect to their *rights* and this implies any redistribution for the purposes of correcting misfortune would *violate* an equal concern for rights. (Although some would argue that this approach 'might just as well be viewed as a rejection of egalitarianism than as a version of it' (Arneson 2013).)

What such divergent accounts have in common is the realization that equality is important for living a good life, and liberal accounts of equality claim that this means equal respect for an individual's life prospects and circumstances. Consequently, it is a corollary of the concept of equality that, at least in a liberal western society, *inequalities* must be capable of being justified. In the absence of an adequate justification(s) there is a political and social obligation to rectify, or at least mitigate the worst cases of, inequality.

The reason equality is valued differs among egalitarian liberals due to the different ideas regarding the underlying purpose of 'equality'. The following section considers the three principal ways in which equality could be of value.

4. Accounts of Why Equality Is Valuable

4.1 Pure Egalitarianism

A 'pure' egalitarian claims that equality is an *intrinsic* good; that is equality is valued as an end in itself. On this account, inequality is a moral evil per se because it is bad (p. 76) if some people are worse off than others with respect to something of value. For a pure egalitarian the goal of equality is overriding and requires that inequality be rectified *even* if it means reducing the life prospects or circumstances of *all* those parties affected in the process (Gosepath 2011).

Pure egalitarianism can have counter-intuitive consequences; take for example a group of people born with congenital, irreversible hearing loss. While those individuals arguably suffer relative disadvantage compared to those who do not have a hearing impairment, a pure egalitarian seems committed to the view that if we cannot correct their hearing so

as to create equality, then it would be better if everyone else became hearing impaired. Even though 'equality' is achieved, no one's life actually goes better, and indeed some individuals may fare worse than they could have and that is an implication that most would find counter-intuitive. This is an example of what has been called the 'levelling-down objection' to pure egalitarianism. If pursuing equality requires bringing everyone down to the same level (when there are other better and acceptable egalitarian alternatives) there is no value associated with achieving equality because it is not good for *anyone*. The levelling-down objection claims that there is no value in making no one better off and making others worse off than they might otherwise have been.

Consequently, many (non-pure) egalitarians do not consider that inequality resulting from technological advances is necessarily unjust. Rather, some residual inequality may not be problematic if, via trickle-down effects or redistribution, it ultimately improves social and economic conditions for those who are worst off (Loi 2012). For example in *Sovereign Virtue*, Dworkin argues that:

We should not ... seek to improve equality by leveling down, and, as in the case of more orthodox genetic medicine, techniques available for a time only to the very rich often produce discoveries of much more general value for everyone. The remedy for injustice is redistribution, not denial of benefits to some with no corresponding gain to others.

(2000: 440)

4.2 Pluralistic (Non-Intrinsic/Instrumental) Egalitarianism

A pluralist egalitarian considers that the value of equality lies in its *instrumental capacity* to enable individuals to realize broader liberal ideals. These broader ideals include: universal freedom; full development of human capacities and the human personality; or the mitigation of suffering due to an individual's inferior status including the harmful effects of domination and stigmatization. On this account, fundamental liberal ideals are the drivers behind equality; and equality is the means by which those liberal end-goals are realized. Consequently a 'pluralistic egalitarian' accepts that inequality is not *always* a moral evil. Pluralistic egalitarians place importance on other values besides equality, such as welfare. Temkin claims that

(p. 77)

any reasonable egalitarian will be a pluralist. Equality is not all that matters to the egalitarian. It may not even be the ideal that matters most. But it is one ideal, among others, that has independent normative significance.

(2003: 769)

On this approach, some inequalities are justified *if* they achieve a higher quality of life or welfare for individuals overall. We might view John Rawls as defending a pluralist egalitarian principle in *A Theory of Justice*:

All social values—liberty and opportunity, income and wealth, and the bases of self-respect—are to be distributed equally *unless* an unequal distribution of any, or all, of these values is to everyone's advantage. [emphasis added].

(1971: 62)

The qualification regarding unequal distribution constitutes Rawls' famous 'difference principle'. This posits that inequality (of opportunity, resources, welfare, etc) is only just if that state of affairs results in achieving the greatest possible advantage to those least advantaged. To the extent it fails to do so, economic order should be revised (Rawls 1971: 75).

4.3 Constitutive Egalitarianism

While equality may be valued for its instrumental qualities to promote good outcomes such as human health or well-being (Moss 2015), another way to value equality is by reference to its *relationship* to something else, which itself has intrinsic value. An egalitarian that perceives equality's value as derived from it being a constituent of another higher principle/intrinsic good to which we aspire (e.g. human dignity) might be described as a 'constitutive' egalitarian.

However, not all (instrumental) goods that contribute to achieving the intrinsic good are intrinsically valuable themselves (Moss 2009). *Instrumental* egalitarians hold that equality's value is completely derived from the value accrued by its promotion of other ideal goods. On this account, equality is not a fundamental concept. In contrast, *non-instrumental* egalitarians consider equality is 'intrinsically' valuable because it possesses value that may, in some circumstances, be additional to its capacity to promote other ideals. Moss explains 'constitutive goods ... contribute to the value of the intrinsic good in the sense that they are one of the reasons why the good has the value that it does' (Moss 2009: 4).

What makes a constitutive good *intrinsically* valuable therefore is that, without it, the intrinsic good would fail to have the value that it does. Consequently, it is the constitutive role played by goods such as equality that confers its intrinsic (not merely instrumental) value. For example, a constitutive egalitarian may value equality because of its relationship with the intrinsic good of fairness. Moss illustrates this concept:

For example, if fairness is an intrinsic good, and part of what it is to be fair is that equal states of affairs obtain (for instance because people have equal claims to some good), then equality (p. 78) is a constitutive *part* of fairness. As such, it is not merely instrumentally valuable because it does not just contribute to some set of good consequences without having any value itself.

(2009: 5)

An attraction of constitutive egalitarianism is that it attributes intrinsic value to equality in a way that is not vulnerable to the levelling-down objection. For example, a Rawlsian might claim that equality only has intrinsic value when it is a constitutive element of fairness/justice. Levelling-down cases are arguably not fair because they do not advance anyone's interests therefore we should not, for egalitarian reasons, level down. Consequently, constitutive egalitarians will consider that some inequalities are not always unjust and some inequalities, or other social harms, are unavoidable.

It is uncontroversial, for example, that governments must ration scarce resources. Unfettered state-funded access to the latest medical technology or pharmaceuticals is beyond the financial capacity of most countries and could conceivably cause great harm to a nation. In this context Dworkin argues that, in the absence of bad faith, inequalities will not render a regulatory framework illegitimate. He distinguishes between the concepts of justice and legitimacy stating:

Governments have a sovereign responsibility to treat each person with equal concern and respect. They achieve justice to the extent they succeed ... Governments may be legitimate, however—their citizens may have, in principle, an obligation to obey their laws—even though they are not fully, or even largely, just. *They can be legitimate if their laws and policies can nevertheless reasonably be interpreted as recognizing that the fate of each citizen is of equal importance and each has a responsibility to create his own life.*

(Dworkin 2011: 321–322) [emphasis added]

On this account, equal concern appears, arguably, to be a constitutive part of the intrinsic good of justice. What Dworkin suggests is that fairness and justice exist on a spectrum and legislators enjoy a margin of discretion as to what may be reasonably required of governments in circumstances where resources are limited. Dworkin states:

justice is, of course, a matter of degree. No state is fully just, but several satisfy reasonably well most of the conditions I defend [equality, liberty, democracy] ... Is legitimacy also a matter of degree? Yes, because though a state's laws and policy may in the main show a good-faith attempt to protect citizens' dignity, according to some good-faith understanding of what that means, it may be impossible to reconcile some discreet laws and policies with that understanding.

(2011: 322)

It is clear that Dworkin does not consider that all inequality is unjust, although equal respect and concern requires *valuing* every individual the same. Consequently, the important issue in this context is the general political attitude toward a political community, measured against the principle that each individual is entitled to equal concern and respect. What is vital on this account is that a government endeavours to respect the equal human worth/dignity of its citizens and to allow them to realize their own conception of

the life they wish to lead. This is so even if some individuals (p. 79) do not have access to the goods that they may need by virtue of resource constraints. When legislators fall short in terms of creating legal or economic inequality they may 'stain' that state's legitimacy, without obliterating it completely (Dworkin 2011: 323). So, while some inegalitarian measures might impair a state's legitimacy and warrant activism and opposition, it is only when such inequality *permeates* a political system (such as in apartheid) that it becomes wholly illegitimate.

In addition to valuing equality differently, egalitarians can also value different things. A major issue for egalitarians is determining exactly what equal concern requires and exactly what should be equalized in a just society. Contenders for equalization or redistribution include equal opportunity for access to resources; welfare; and human capabilities. These accounts matter for debates about new technology because they have different implications for their permissibility and the associated obligations on political actors.

5. Equality of What? Theories of Distributive Justice

John Rawls' *Theory of Justice* and its account of justice as fairness was the catalyst for contemporary egalitarian theories of distributive justice. Rawls claimed that political institutions in a democratic society should be underpinned by the principle that: 'all social primary goods are to be distributed equally unless an unequal distribution of any or all of these goods is to the advantage of the least favoured' (Rawls 1971: 62). Central to Rawls liberal political theory is the claim that an individual's share of social primary goods, i.e. 'rights, liberties and opportunities, income and wealth, and the bases of self-respect' (Rawls 1971: 60–65), should not depend on factors that are, from a moral point of view, arbitrary—such as one's good or bad fortune in the social or natural lotteries of life. Such good or bad fortune, on this account, cannot be justified on the basis of individual merit or desert (Rawls 1971: 7). It is this concept of 'moral arbitrariness' that informs the predominant egalitarian theories of distributive justice.

However, it is plausible that, in the face of new technologies, an account of distributive justice may extend beyond redistribution of resources or wealth or other social primary goods. Indeed, technology itself may be utilized as a tool, rather than a target, for equalization. Eric Parens demonstrates how such reasoning could be invoked in relation to human gene therapy:

If we ought to use social means to equalize opportunities, and if there were no moral difference between using social and medical means, then one might well think that, if it were (p. 80) feasible, we ought to use medical means to equalize opportunities. Indeed, one might conclude that it is senseless to treat social disadvantages without treating natural ones, if both are unchosen and both have the same undesirable effects.

(2004: S28)

Colin Farrelly also observes that interventions like somatic or germline therapies and enhancements have the potential to rectify what may sometimes be the pernicious consequences of the natural genetic lottery of life.⁷ He asks what the concept of distributive justice will demand in the postgenomic society stating:

we must take seriously the question of what constitutes a just regulation of such technologies ... What values and principles should inform the regulation of these new genetic technologies? To adequately answer these questions we need an account of *genetic justice*, that is, an account of what constitutes a fair distribution of genetic endowments that influence our expected lifetime acquisition of natural primary goods (health and vigor, intelligence, and imagination).

(Farrelly 2008: 45) [emphasis in original]

Farrelly claims that approaches to issues of equality and distributive justice must be guided by two concerns: first the effect of new technologies on the least advantaged in society and second the competing claims on limited fiscal resources. He argues:

a determination of the impact different regulatory frameworks of genetic interventions are likely to have on the least advantaged requires egalitarians to consider a number of diverse issues beyond those they typically consider, such as the current situation of the least advantaged, the fiscal realities behind genetic intervention the budget constraints on other social programmes egalitarians believe should also receive scarce public funds, and the interconnected nature of genetic information. These considerations might lead egalitarians to abandon what they take to be the obvious policy recommendations for them to endorse regarding the regulation of gene therapies and enhancements.

(Farrelly 2004: 587)

While Farrelly appears to accept that equality plays a part in the sociopolitical picture, it cannot be considered in isolation from other important factors in the context of scarce resources. He subsequently argues in favour of what he calls the 'lax genetic difference' principle as a guide to regulating in the context of genetic inequalities. He claims, 'genetic inequalities are to be arranged so that they are to the greatest *reasonable* benefit of the least advantaged' (Farrelly 2008: 50).⁸ While this still leaves open the questions of what is reasonable, Farrelly makes a strong argument that egalitarian challenges raised by new technologies should be considered in the context of real-world societies, rather than in the abstract.

The following section considers two of the main theories of distributive justice that have been debated since the publication of *A Theory of Justice*: luck egalitarianism and the capabilities approach. Thereafter, we consider a third recent answer to the 'equality of what' question offered by 'relational egalitarians'.

5.1 Luck Egalitarianism

A luck egalitarian considers that people who experience disadvantage because of bad or 'brute' luck have a claim upon the state for the effects of that bad luck to be corrected.

(p. 81) Simple luck egalitarianism has been refined by the addition of the 'option' luck distinction, which is based on the concept of individual responsibility. On this luck egalitarian account individuals are responsible for the bad results that occur as a result of their choices (option luck) but not for the bad results that occur as a result of 'brute luck'. This distinction is based on the view that only disadvantages that are not deserved have a claim to be corrected. Luck egalitarians focus on different objects of distribution including: equal opportunity, welfare, and resources.

Some egalitarians are critical of luck egalitarianism. Elizabeth Anderson contends that the option luck distinction is overly harsh in its treatment of those who are considered personally responsible for their bad luck. Conversely, she argues that compensating others for their bad luck implicitly suggests that they are inferior, thereby potentially stigmatizing individuals and constitutes inappropriate state interference (Anderson 1999: 289). For these reasons, Anderson claims that luck egalitarianism fails to express equal concern and respect for citizens (Anderson 1999: 301). In Anderson's view the proper object of egalitarianism is to eradicate oppressive social or class-based structures.

However, luck egalitarians might reply by claiming that society has obligations to those who are less able to 'pursue a decent life' and that this obligation need not be patronizing (Hevia and Colon-Rios 2005: 146). Nancy Fraser also argues that adopting a 'transformative' approach that addresses the factors that perpetuate disadvantage and inequality, thereby empowering individuals/communities rather than solely providing compensation, may have the dual effect of remedying both social injustice as well as issues of cultural or class-based marginalization.⁹

5.2 Equality of Capability

The capability approach developed by Amartya Sen and Martha Nussbaum is also concerned with justice in the form of equal opportunities and equal rights. However, instead of focusing on the equal distribution of goods, it attaches central importance to the achievement of individual human capabilities (or functionings) that are required to lead a good life. Maria Toboso explains:

The essence of Sen's proposal lies in his argument that a theory of justice as equity must incorporate real freedoms that all kinds of people, possibly with quite different objectives, can enjoy. This is why the true degree of freedom people have to consider various possible lifestyles for themselves must be taken into account. In applying the capability approach, the point of interest is the evaluation of people's advantages or disadvantages with regard to their capability to achieve valuable functionings that they believe are elements essential to their lifestyle.

(2011: 110).

Martha Nussbaum (1992) has defended a list of ten capabilities that she thinks are essential for human flourishing or individual agency. These are the capacity to: live to the end of a complete human life, have good health, avoid unnecessary and non-beneficial pain, use five senses, have attachments to things and persons, form a (p. 82) conception of the good, live for and with others, live for and in relation to nature, laugh, play, and enjoy recreation and live one's own life.

It is tempting to view the capabilities that Nussbaum lists as intrinsic and instrumental goods: having the ability to do these things is both good in itself and they all have value partly because of what they enable. However, it is important to not confuse capabilities with the intrinsic goods that are defended by 'objective list' theorists (Crisp 1997). For an objective list theorist any life that has more objective goods such as friendship, happiness, and religion in it is a better life for that person than a life that does not. Capabilities have value primarily because of the things that they enable persons to do, so it is radically different approach from those that seek to redistribute goods for egalitarian purposes.

Nonetheless, Nussbaum is an egalitarian; she claims that

all should get above a certain threshold level of combined capability, in the sense of ... substantial freedom to choose and act ... In the case of people with cognitive disabilities, the goal should be for them to have the same capabilities as 'normal' people, even though some of these opportunities may have to be exercised through a surrogate.

(2011: 24)

So, for Nussbaum, citizens in a nation state have a claim to combined capabilities sufficient for having the positive freedom to form and pursue a good life. That goal is one that should be aimed at for all citizens, and accorded equal value, hence Nussbaum can be considered an egalitarian about the threshold for sufficient capabilities.

5.3 Relational Equality

Relational egalitarians, champions of the so-called 'second' wave of egalitarian thought, allege that distributive theories have failed to appreciate the distinctively political aims of egalitarianism (Hevia and Colón-Ríos 2005; Anderson 1999: 288). A relational egalitarian is concerned more with the 'recognition claims' of cultural, racial, and gender inequality than with what should be equalized in society. A relational egalitarian thinks we should try to achieve social solidarity and respect, rather than ensure an equal distribution of goods. Anderson who defends what she describes as a theory of 'democratic equality' claims that

the proper negative aim of egalitarian justice is not to eliminate the impact of brute luck from human affairs, but to end oppression, which by definition is socially imposed.

(Anderson 1999: 288)

Nancy Fraser (1995) claims the distinction between redistribution and recognition is problematic when some groups experience both cultural (or class) and economic injustices. Further injustice may be argued to occur on a spectrum that, depending where it falls on the spectrum presupposes different regulatory responses. (p. 83) For example, injustice resulting from low socio-economic status may best fit the redistribution model, while recognition is the ideal response for sexually differentiated groups (Fraser 1995: 74). However, it is plausible that redistribution and recognition are not mutually exclusive, even on Anderson's account:

Democratic equality regards two people as equal when each accepts the obligation to justify their actions by principles acceptable to the other, and in which they take mutual consultation, reciprocation, and recognition for granted. Certain patterns in the distribution of goods may be instrumental to securing such relationships, follow from them, or even be constitutive of them. But democratic egalitarians are fundamentally concerned with the relationships within which goods are distributed, not only with the distribution of goods themselves. This implies, third, that democratic equality is sensitive to the need to integrate the demands of equal recognition with those of equal distribution.

(1999: 313)

What is notable is that all of these egalitarian conceptions of justice discussed identify different political objectives and vehicles for the egalitarian project. Significantly these can implicate the nature of the analysis undertaken and the resulting normative conclusions made. Genetic technology provides a prime example of the kinds of anxieties about equality that new technology evinces.

6. Looking through Different Egalitarian 'Lens': the Case of Genetic Technology

Prior to the completion of the Human Genome Project, Mehlman and Botkin claimed:

with the possible exception of slavery, [genetic technologies] represent the most profound challenge to cherished notions of social equality ever encountered. Decisions over who will have access to what genetic technologies will likely determine the kind of society and political system that will prevail in the future.

(1998: 6)

As already indicated above, egalitarians may see genetic technologies as an appropriate object for equalization—although the necessary means for achieving egalitarian endpoints are not homogeneous. Luck egalitarians might seek to mitigate any unfair inequality in genetic profiles, given that they are unchosen features of our character. In their seminal book *From Chance to Choice*, Buchanan and others suggest that justice not only requires compensating for natural inequalities, but may require more interventionist re-

sponses. They invoke both brute luck conceptions of equal opportunity and resource egalitarianism to justify pursuing (p. 84) what they describe as a 'genetic decent minimum' for all, but this does not necessarily extend to the elimination of all genetic inequalities. They claim that there is a societal commitment to use genetic technology to prevent or treat serious impairment that would limit individuals' life opportunities (Buchanan and others 2001: 81–82). Buchanan and others formulate two principles to guide public policy in the genetics era. First a 'principled presumption' that justice requires genetic intervention to prevent or ameliorate serious limitations on opportunities as a result of disease. Second, that justice may require *restricting access* to genetic enhancements to prevent exacerbations of existing unjust inequalities (Buchanan and others 2001: 101).

However, the issue of genetic enhancement is strongly contested. Dworkin claims that no other field of science has been 'more exciting in recent decades than genetics, and none has been remotely as portentous for the character of the lives our descendants will lead' (Dworkin 2000: 427). He notes the commonly articulated concern that 'we can easily imagine genetic engineerings' becoming a perquisite of the rich, and therefore as exacerbating the already savage injustice of both prosperous and impoverished societies' (Dworkin 2000: 440). Philosopher Walter Glannon has argued that genetic enhancements should be prohibited as unequal access could threaten the fundamental equality of all people (Glannon 2002). A similar concern was articulated by the Nuffield Council on Bioethics (Nuffield Council 2002: para 13.48):

We believe that equality of opportunity is a fundamental social value which is especially damaged where a society is divided into groups that are likely to perpetuate inequalities across generations. We recommend, therefore, that any genetic interventions to enhance traits in the normal range should be evaluated with this consideration in mind.

Clearly genetic enhancement technology triggers two major regulatory concerns: safety and justice. The narratives of fairness, equal access, and concerns regarding social stratification are frequent factors within this debate. However, some commentators challenge the common assumption that enhancements only benefit the individual recipient and not the wider community (Buchanan 2008, 2011). For example, Buchanan argues that social benefits may accrue as a result of increased productivity in the enhanced individual (i.e. the trickle-down effect). Indeed, he claims that analogous individual enhancements have occurred over history as a result of advances in education or improvement in manufacturing techniques (a paradigmatic example being the printing press).

An egalitarian capacities approach to the same issue would focus upon what genetic enhancement could do to create conditions under which all met a threshold for living freely and in accordance with a conception of a good life. But, the emphasis upon meeting a threshold suggests that anything that went beyond this, perhaps by enhancing the capability of some to live lives of extraordinary length or to have exceptional abilities at practical reason would have no claim upon society. Whether or not a capabilities egalitarian

would agree with the concerns of Glannon, that (p. 85) genetic enhancements should be banned because they went beyond the standard set of capabilities, is unclear.

In contrast, a relational egalitarian would likely be concerned about the potential of genetic enhancement to build upon and perpetuate social inequality that exist because of past injustices and social structures that impact upon ethnic, gender, and cultural groups. Regions of the world or groups who have been disadvantaged because of unfair social structures are likely to be worse off if genetic engineering is available primarily to those who are in already privileged positions.

What we can take from this is that the egalitarian lens through which a technology is viewed can impact our normative theorizing. However, to fully grasp the role of equality in these debates we need to take a broader look at the kinds of claims that are frequently made when there is a new technology on the horizon.

7. Equality, Technology, and the Broader Debate

While some of the concerns triggered by new technology involve issues of safety, efficacy, and equality others may indicate concerns at an even more fundamental level—such as the potential for some technologies to destabilize the very fabric of our moral community. For example, procreative liberty in a liberal society is generally something that we hold to be important. However, the possibility of being able to control or alter the genetic constitution of a future child, clearly changes the boundaries between what we may ‘choose’, and what is fixed by nature. The reallocation of responsibility for genetic identity—the move from chance/nature to individual choice—has the capacity, in Dworkin’s words, to destabilize ‘much of our conventional morality’ (Dworkin 2000: 448). Such technological advances can challenge everyday concepts such as reproductive freedom, a concept that is clearly put under pressure in the face of cloning or genetic modification.

For regulators, considering new technology the principles of equality and egalitarianism are relevant to two distinct realms of inquiry: the implications at the individual level of engagement, as well as a consideration of the broader social dimension in which the technology exists. In this respect, Dworkin distinguishes between two sets of values that are often appealed to when evaluating how a new technology should be used or regulated. First, the interests of the particular individuals who are impacted by regulation or prohibition of a particular technology and who will consequently be made better, or worse off are considered. This essentially involves a ‘cost-benefit’ exercise that includes asking whether it is fair or just that (p. 86) some individuals should gain or others lose in such a way (Dworkin 2000: 428). The second sets of values invoked constitute more general ones that are not related to the interests of particular people, but rather involve appeals to intrinsic values and speak to the *kind* of society one wishes to live in. This is a much broad-

er debate—one that is often triggered by new potentially ‘transgressive’ technologies that are thought by some to pose a threat to the moral fabric of society.

To illustrate this using Dworkin’s example, a claim that cloning or genetic engineering is illegitimate because it constitutes ‘playing God’ is arguably an appeal to a certain idea as to how society should conduct its relationships and business. However, there are as many different views as to how society should function, as there are regarding the acceptability of ‘playing God’. For some, ‘playing God’ may be a transgression, for others it may be a moral imperative and not much different from what science and medicine have enabled society to do for centuries and from which we have derived great benefit. The point is that sometimes the arguments made about new technologies involve social values that are contested, such as the ‘goodness’ or ‘badness’ of playing God. It is here that the concept of a ‘critical morality’ comes into play. When regulators are required to respond to technology that challenges, existing moral norms they must identify and draw on a set of core principles to guide, and justify, their decisions. Contenders derived from political liberalism would include liberty, justice, dignity, and the protection from harm. The important point is that notions of equality and equal concern are arguably constitutive components of all of these liberal end-points.

8. Conclusion

While some of the concerns triggered by new technology involve issues of safety and efficacy, others involve fears that new technologies might violate important values including ideas of social justice and equality. A common theme in debates about new technologies is whether they are illegitimate or indeed harmful, because they will either increase existing, or introduce new, inequalities. These debates are often marked by two polarized narratives: pro-technologists argue that the particular technology will bring great benefits to humankind and should therefore be embraced by society. Against this are less optimistic counter-claims that technology is rarely neutral and, if not regulated, will compound social stratification and encourage an undesirable technology ‘arms race’. Concern regarding equality of access to new technologies is arguably one of the most commonly articulated issues in the technology context. In addition to this, the possibilities created by technological advances often threaten ordinary assumptions about what is socially ‘acceptable’.

(p. 87) This chapter has shown how equality is valuable because of its role in anticipating the likely effects of a given technology and how inequalities that may result at the individual level may be mitigated, as well as its role in the broader egalitarian project. That is, we have shown how equality is valuable because of its role as a constitutive component of liberal endpoints and goals that include liberty, justice, and dignity. It has also been argued that, when it comes to equality, the concept of legitimacy does not demand a policy of perfection. Rather, legitimacy requires that a government attempts, in good faith, to show equal concern and respect for its citizens’ equal worth and status. This would include taking into account individual concepts of the good life of those most closely affect-

ed by new technology, as well as those social values that appear to be threatened by new technologies. While it is not possible to eradicate all inequality in a society (nor is such a goal necessarily always desirable) the concept of equality remains a vital political concept. It is one that aspires to demonstrate equal concern and respect for all citizens. We suggest, in a Dworkinian manner, that equality is, and should remain, central to the legitimacy of revisions to the scope of our freedom when expanded by such new technologies.

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Notes:

(1.) Timothy Jones (1989: 410) explains how legitimacy can be used as an evaluative concept: 'one may describe a particular regulation or procedure as lacking legitimacy and be arguing that it really is morally wrong and not worthy of support'. Legitimacy extends beyond simply fulfilling a statutory mandate: 'Selznick has described how the idea of legitimacy in modern legal culture has increasingly come to require not merely formal legal justification, but "legitimacy in depth". That is, rather than the regulator's decision being in accordance with a valid legal rule, promulgated by lawfully appointed officials, the contention would be that the decision, or at least the rule itself, must be substantively justified.'

(2.) See, among many other instruments, the UNESCO Universal Declaration on Bioethics and Human Rights 2005, Article 10.

(3.) The authors argue 'factual questions about the *effectiveness* of new technologies (such as DNA evidence, mobile identification technologies and computer databases) in detecting and preventing crime should not, and cannot, be separated from ethical and social questions surrounding the impact which these technologies might have upon civil liberties'. This is due to the close interrelationship between *the effectiveness of the police and public perceptions of police legitimacy*—which may potentially be damaged if new technologies are not deployed carefully. See also Neyroud and Disley (2008: 228).

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(4.) Some would argue, for example, that section 13(9) of the United Kingdom Human Fertilisation and Embryology Act 1990 (as amended) which prohibits the preferential transfer of embryos with a gene abnormality when embryos are available that do not have that abnormality, mandates and even requires discrimination based on genetic status.

(5.) Take, for example, laws criminalizing homosexuality. Another paradigmatic example was the US Supreme Court case of *Plessy v Ferguson*, 163 US 537 (1896). The Court held that state laws requiring racial segregation in state-sponsored institutions were constitutional under the doctrine of 'separate but equal'. However, the decision was subsequently overturned by the Supreme Court in *Brown v Board of Education*, 7 US 483 (1954). The Court used the Equal Protection clause of the Fourteenth Amendment of the US Constitution to strike down the laws, declaring that 'separate educational facilities are inherently unequal'.

(6.) For example Nozick would restrict any equality claims to those involving formal equality. Nozick considers that a just society merely requires permitting all individuals the same negative rights (to liberty, property, etc) regardless of the fact that many individuals are unable, by virtue of their position in society, to exercise such rights. See Meyerson (2007: 198).

(7.) Buchanan et al. (2001) make a similar claim.

(8.) Farrelly describes his theoretical approach as based on prioritarianism—but it resonates with some versions of egalitarianism.

(9.) 'Transformative remedies reduce social inequality without, however, creating stigmatized classes of vulnerable people perceived as beneficiaries of special largesse. They tend therefore to promote reciprocity and solidarity in the relations of recognition' (see, Nancy Fraser 1995: 85–86).

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Equality: Old Debates, New Technologies

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Abstract and Keywords

This chapter discusses the role that equality plays within liberal theory. We show how the concept of treating citizens as equals is integral to the legitimization of the state and its regulations, including those involving new technologies. We suggest that equality is a fundamental value when exploring the scope of relevant freedoms with respect to new technologies. However, understanding the role of equality for such issues requires sensitivity to important differences in the way in which it can be theorized. We explain how equality can be valued intrinsically, instrumentally, or constitutively. We also explain three different accounts of what egalitarian justice demands that are particularly relevant to framing policy involving new technology.

Keywords: equality, rights, fairness, egalitarianism, biotechnology, dignity, respect

1. Introduction

A fundamental characteristic of liberal political democracies is the respect accorded to certain core values and the obligation on state actors to protect, and promote, those central values. This chapter focuses on one particular value, that of equality. It considers how notions of equality may serve to strengthen, or undermine, claims of regulatory legitimacy when policy makers respond to new or evolving technologies.

Modern technological advances such as digital technology, neuro-technology, and biotechnology in particular, have brought about radical transformations in human lives globally. These advances are likely to be especially transformative for some sectors of society. For example, access to the World Wide Web, sophisticated reading and recognition devices, voice-activated hands-free devices, and other biomedical technologies have enhanced the capacities of persons with impairments such as blindness or paralysis as well as enabling them to participate in the new information society—at least in developed countries (Toboso 2011). However, not all technological advances are considered to be morally neutral, and some may even be thought to have morally ‘transgressive’ potential.

(p. 70) Often debates about new technology are polarized with issues of equality keenly contested. On one hand, it may be claimed that advances in technology should be restrained or even prohibited because certain technological advances may threaten important values such as individual human worth and equality (Kass 2002). A paradigmatic example of this involved the reproductive genetic technology introduced in the 1990s, preimplantation genetic diagnosis (PGD), which enables the selection of *ex vivo* embryos based on genetic characteristics. The prospect of PGD triggered widespread fears that selective reproductive technologies will reduce human diversity, potentially diminish the value of certain lives, and will intensify pressure on prospective parents to use selective technologies—all of which speak to conceptions of individual human worth and equality. However, it is also apparent that once a technology obtains a degree of social acceptance (or even before that point) much of the debate focuses on equality of access and the political obligation to enable equal access to such technologies (Brownsword and Goodwin 2012: 215). For example, the explosion of Information and Communications Technology initially triggered concerns regarding a ‘digital divide’ and more recently concerns regarding the ‘second level’ or ‘deepening’ divide (van Dijk 2012). Similarly, the prospect of human gene therapy and/or genetic enhancement (were it to become feasible) has resulted in anxiety regarding the potential for such technologies to create a societal division between the gene ‘rich’ and gene ‘poor’ (Green 2007). At the other end of the spectrum, commentators focus on the capacity for new technology to radically transform humanity for the better and the sociopolitical imperative to facilitate technological innovation (Savulescu 2001). Given the wide spectrum of claims made, new technologies can pose considerable challenges for regulators in determining an appropriate regulatory, or non-regulatory, response.

This chapter examines notions of equality and legitimacy in the context of regulatory responses to new technology. In this context, regulatory legitimacy concerns, not only the procedural aspects of implementing a legal rule or regulatory policy, but whether its substantive content is justified according to important liberal values. Ultimately, the theoretical question is whether, in relation to a new technology, a regulatory decision may claim liberal egalitarian credentials that render it worthy of respect and compliance.¹

This chapter begins by describing the relationship between legitimacy and equality. It considers several accounts of equality and its importance when determining the validity, or acceptability, of regulatory interventions. This discussion highlights the close association between egalitarianism and concepts of dignity and rights within liberal political theory. However, there is no single account of egalitarianism. Consequently, the main contemporary egalitarian theories, each of which are premised on different conceptions of equality and its foundational value in a just society, are outlined. These different perspectives impact upon normative views as to how technology should be governed and the resulting regulatory environment (Farrelly 2004). Furthermore, the reason why equality is valued influences another (p. 71) major aspect of equality, which is the question of distributive justice (Farrelly 2004). Issues of distributive justice generally entail a threefold inquiry: will the technology plausibly introduce new, or reinforce existing, inequalities in society? If this is likely, what, if anything, might justify the particular inequality? Lastly, if no

reasonable justification is available for that particular type of inequality, what does its avoidance, mitigation, or rectification, require of regulators?

2. The Relationship between Legitimacy and Equality

The relationship between legitimacy and equality is based on the notion that in a liberal political society equality constitutes a legitimacy-conferring value; in order to achieve legitimacy, a government must, to the greatest extent reasonably possible, protect, and promote equality among its citizens.

The necessary connection between legitimacy and equality has a long history. When seventeenth century political philosopher John Locke challenged the feudal system by urging that all men are free and equal, he directly associated the concept of legitimate government with notions of equality. Locke argued that governments only existed because of the will of the people who conditionally trade some of their individual rights to freedom to enable those in power to protect the rights of citizens and promote the public good. On this account, failure to respect citizens' rights, including the right to equality, undermines the legitimacy of that government. Similarly, equality (or *égalité*) was a core value associated with the eighteenth-century French Revolution alongside *liberté*, and *fraternité* (Feinberg 1990: 82). In more recent times, the global civil rights movement of the twentieth century challenged differential treatment on the basis of characteristics such as race, religion, sex, or disability and resulted in the emergence of contemporary liberal egalitarianism. These historical examples demonstrate equality's universal status as a classic liberal value, and its close association with the notion of legitimate government. More recently, legal and political philosopher Ronald Dworkin reiterated the interdependence of legitimacy with what he dubs 'equal concern'. Dworkin states:

[N]o government is legitimate that does not show *equal* concern for the fate of all those citizens over whom it claims dominion and from whom it claims allegiance. Equal concern is the sovereign virtue of political community.

(2000: 1)

Equality clearly impacts upon various dimensions of citizenship. These include the political and legal spheres, as well as the social and economic. New technologies (p. 72) may impact on any, or all, of these domains depending upon which aspects of life it affects.

There are various ways in which the 'legitimacy' of law may be measured. First, a law is endowed with legitimacy if it results from a proper democratic process. On this approach, it is the democratic process that confers legitimacy and obliges citizens to observe legal rules. The obligation on states to take measures to ensure that *all* of its citizens enjoy civil and political rights is recognized at the global level; the right to equal concern is reiterated in multiple international human rights instruments.² In the political sphere, equality requires that all competent individuals are free to participate fully in the democratic

process and are able to make their views known. Another fundamental tenet of liberal political theory, and particularly relevant for criminal justice, is that everyone is equal before the law. The obligation to protect citizens' civil and political liberties imposes (at least theoretically) restrictions on the exercise of state power. This is highly relevant to the way that some new technologies are developed and operationalized—such as policing technologies (Neyroud and Disley 2008: 228).³

However, another more substantive conception of legitimacy requires that law may be *justified* by reference to established principles. Contemporary discussions of legitimacy are more frequently concerned with substantive liberal values, rather than procedural matters. Jeff Spinner Halev notes:

Traditional liberal arguments about legitimacy of government focus on consent: if people consent to a government then it is legitimate, and the people are then obligated to obey it ... The best arguments for legitimacy focus on individual rights, and how citizens are treated and heard ... These recent liberal arguments about legitimacy focus on rights and *equal concern* for all citizens. Political authority, it is commonly argued, is justified when it upholds individual rights, and when the state shows *equal regard for all citizens*.

(2012: 133)

Although the law is required to promote and protect the equal rights of all citizens, it is clear that this has not always been achieved. In some historical instances (and arguably not so historical ones)⁴ the law has served to oppress certain minorities⁵ either as a direct or indirect result of political action. For example, the introduction of in vitro fertilization (IVF) in the United Kingdom in the late 1970s was considered a groundbreaking event because it provided infertile couples an equal opportunity to become genetic parents. However, when the UK Human Fertilisation and Embryology Bill was subsequently debated concerns were raised regarding single women or lesbian couples accessing IVF. This resulted in the Act containing a welfare provision that potentially restricted access to IVF. Section 13(5) provides that a woman 'shall not' be provided with fertility services unless the future child's welfare has been taken into account, 'including the need of that child for a father'. This qualifier that was tagged onto the welfare provision attracted criticism for discriminating against non-traditional family forms while masquerading as concerns for the welfare of the child (Kennedy and Grubb 2000: 1272; Jackson 2002).

(p. 73) While the concept of equal moral worth imposes duties on liberal states to treat its citizens with equal concern, the egalitarian project goes beyond the civil and political aspects of law. It is also concerned with equality of social opportunity (ensuring that equally gifted and motivated citizens have approximately the same chances at offices and positions, regardless of their socio-economic class and natural endowments) and economic equality (securing equality of social conditions via various political measures to redistribute wealth). However, the precise way in which these objectives should be achieved is a matter of debate, even within liberal circles. This difficulty is compounded by different accounts of why equality is important (Dworkin 2000). Given this, the following section con-

siders various notions of why equality matters before considering what those different conceptions require of political actors and the challenge of distributive justice.

3. What Is Equality?

While equality has a variety of theoretical justifications and can be applied to many different things, its essence is that it is unjust and unfair for individuals to be treated differently, in some relevant respect when they in fact possess the same morally relevant properties. In this sense, equality is intricately linked with notions of fairness, justice, and individual human worth.

Liberal rights theorist, Jeremy Waldron, argues that the commitment to equality underpins rights theory in general (Waldron 2007). He claims that

though people differ in their virtues and abilities, the idea of rights attaches an unconditional *worth* to the existence of each person, irrespective of her particular value to others. Traditionally, this was given a theological interpretation: since God has invested His creative love in each of us, it behoves us to treat all others in a way that reflects that status (Locke [1689] 1988, pp. 270–271). In a more secular framework, the assumption of unconditional worth is based on the importance of each life to the person whose life it is, irrespective of her wealth, power or social status. *People try to make lives for themselves, each on their own terms. A theory of rights maintains that that enterprise is to be respected, equally, in each person, and that all forms of power, organization, authority and exclusion are to be evaluated on the basis of how they serve these individual undertakings.*

(Waldron 2007: 752) (emphasis added)

Waldron also draws on legal philosophy to make direct links between equality and the account of dignity presented in his Tanner lectures ‘Dignity, Rank and Rights’. Waldron claims that in jurisprudential terms, ‘dignity’ indicates an elevated legal, political, and social status (which he dubs legal citizenship) that is assigned to *all* human beings. He explains:

(p. 74)

the modern notion of *human* dignity involves an upwards equalization of rank, so that we now try to accord to every human being something of the dignity, rank, and expectation of respect that was formerly accorded to nobility.

(Waldron 2009: 229)

Consequently, Waldron argues that this status-based concept of dignity is the underlying basis for laws that protect individuals from degrading treatment, insult (hate speech), and discrimination (Waldron 2009: 232). On Waldron’s account ‘dignity and equality are interdependent’ (Waldron 2009: 240).

Alan Gewirth (1971) argues for a similarly strong connection between equality and rights. The normative vehicle for his account of morality and rights is the Principle of Categorical Consistency (PCC), which is the idea that persons should 'apply to your recipient the same categorical features of action that you apply to yourself' (Gewirth 1971: 339). The PCC draws upon the idea that all persons carry out actions, or in other words, voluntary and purposive behaviours. Gewirth argues that the fact that all persons perform actions implies that agents should not coerce or harm others: all persons should respect the freedom and welfare of other persons as much as they do their own. He thinks that the PCC is essentially an egalitarian principle because:

it requires of every agent that he be impartial as between himself and his recipients when the latter's freedom and welfare are at stake, so that the agent must respect his recipients' freedom and welfare as well as his own. To violate the PCC is to establish an inequality or disparity between oneself and one's recipients with respect to the categorical features of action and hence with respect to whatever purposes or goods are attainable by action.

(Gewirth 1971: 340)

So, for Gewirth the centrality of action for persons, and that performing purposive and voluntary behaviour is a defining feature of agency, generate an egalitarian principle (the PCC) from which other rights and duties can be derived. While Gewirth provides a different account of why equality is linked so inextricably to rights and citizenship from Waldron, what they do agree upon, and what is common ground for most theories of justice or rights, is that equality, or 'us all having the same morally relevant properties' is at the heart of these accounts.

However, there is no single account of equality—indeed, its underlying theoretical principle is contested—which is whether a society should be concerned with achieving formal, versus proportional, equality. Some liberals would limit the scope of equality to achieving *formal* equality, which is accomplished by treating all individuals alike.⁶

Perhaps the most well-known articulation of formal equality is by Aristotle who claimed that we should treat like cases as like (Aristotle 2000: 1131a10). We can consider this a formal principle that does not admit of exceptions, although it is important to note that there is scope for arguing about whether or not cases are 'like'. If we consider the society Aristotle was addressing, slaves were not considered to have the same morally relevant properties as citizens so they were not the recipients of equal rights even under this formal principle of equality.

(p. 75) However, many contemporary egalitarian liberals consider that promoting equality sometimes requires treating groups differently (Kymlicka 1989: 136; Schwartzman 2006: 5). Sidney Hook gives the following explanation for why we should eschew formal equality:

The principle of equality is not a description of fact about men's physical or intellectual natures. It is a prescription or policy of treating men. It is not a prescription to treat in identical ways men who are unequal in their physical or intellectual nature. It is a policy of equality or concern or consideration for men whose different needs may require differential treatment.

(1959: 38)

In the case of those who think it is *unfair* that some people, through no fault or choice of their own are worse off than others and the state has an obligation to correct this, a concern for equality may mean actively correcting for the effect of misfortune upon that person's life. On this approach, rectification is justified because such inequality is, comparatively speaking, *undeserved* (Temkin 2003: 767). Conversely, libertarians such as Locke or Robert Nozick would emphasize the importance of individuals being treated equally with respect to their *rights* and this implies any redistribution for the purposes of correcting misfortune would *violate* an equal concern for rights. (Although some would argue that this approach 'might just as well be viewed as a rejection of egalitarianism than as a version of it' (Arneson 2013).)

What such divergent accounts have in common is the realization that equality is important for living a good life, and liberal accounts of equality claim that this means equal respect for an individual's life prospects and circumstances. Consequently, it is a corollary of the concept of equality that, at least in a liberal western society, *inequalities* must be capable of being justified. In the absence of an adequate justification(s) there is a political and social obligation to rectify, or at least mitigate the worst cases of, inequality.

The reason equality is valued differs among egalitarian liberals due to the different ideas regarding the underlying purpose of 'equality'. The following section considers the three principal ways in which equality could be of value.

4. Accounts of Why Equality Is Valuable

4.1 Pure Egalitarianism

A 'pure' egalitarian claims that equality is an *intrinsic* good; that is equality is valued as an end in itself. On this account, inequality is a moral evil per se because it is bad (p. 76) if some people are worse off than others with respect to something of value. For a pure egalitarian the goal of equality is overriding and requires that inequality be rectified *even* if it means reducing the life prospects or circumstances of *all* those parties affected in the process (Gosepath 2011).

Pure egalitarianism can have counter-intuitive consequences; take for example a group of people born with congenital, irreversible hearing loss. While those individuals arguably suffer relative disadvantage compared to those who do not have a hearing impairment, a pure egalitarian seems committed to the view that if we cannot correct their hearing so

as to create equality, then it would be better if everyone else became hearing impaired. Even though 'equality' is achieved, no one's life actually goes better, and indeed some individuals may fare worse than they could have and that is an implication that most would find counter-intuitive. This is an example of what has been called the 'levelling-down objection' to pure egalitarianism. If pursuing equality requires bringing everyone down to the same level (when there are other better and acceptable egalitarian alternatives) there is no value associated with achieving equality because it is not good for *anyone*. The levelling-down objection claims that there is no value in making no one better off and making others worse off than they might otherwise have been.

Consequently, many (non-pure) egalitarians do not consider that inequality resulting from technological advances is necessarily unjust. Rather, some residual inequality may not be problematic if, via trickle-down effects or redistribution, it ultimately improves social and economic conditions for those who are worst off (Loi 2012). For example in *Sovereign Virtue*, Dworkin argues that:

We should not ... seek to improve equality by leveling down, and, as in the case of more orthodox genetic medicine, techniques available for a time only to the very rich often produce discoveries of much more general value for everyone. The remedy for injustice is redistribution, not denial of benefits to some with no corresponding gain to others.

(2000: 440)

4.2 Pluralistic (Non-Intrinsic/Instrumental) Egalitarianism

A pluralist egalitarian considers that the value of equality lies in its *instrumental capacity* to enable individuals to realize broader liberal ideals. These broader ideals include: universal freedom; full development of human capacities and the human personality; or the mitigation of suffering due to an individual's inferior status including the harmful effects of domination and stigmatization. On this account, fundamental liberal ideals are the drivers behind equality; and equality is the means by which those liberal end-goals are realized. Consequently a 'pluralistic egalitarian' accepts that inequality is not *always* a moral evil. Pluralistic egalitarians place importance on other values besides equality, such as welfare. Temkin claims that

(p. 77)

any reasonable egalitarian will be a pluralist. Equality is not all that matters to the egalitarian. It may not even be the ideal that matters most. But it is one ideal, among others, that has independent normative significance.

(2003: 769)

On this approach, some inequalities are justified *if* they achieve a higher quality of life or welfare for individuals overall. We might view John Rawls as defending a pluralist egalitarian principle in *A Theory of Justice*:

All social values—liberty and opportunity, income and wealth, and the bases of self-respect—are to be distributed equally *unless* an unequal distribution of any, or all, of these values is to everyone's advantage. [emphasis added].

(1971: 62)

The qualification regarding unequal distribution constitutes Rawls' famous 'difference principle'. This posits that inequality (of opportunity, resources, welfare, etc) is only just if that state of affairs results in achieving the greatest possible advantage to those least advantaged. To the extent it fails to do so, economic order should be revised (Rawls 1971: 75).

4.3 Constitutive Egalitarianism

While equality may be valued for its instrumental qualities to promote good outcomes such as human health or well-being (Moss 2015), another way to value equality is by reference to its *relationship* to something else, which itself has intrinsic value. An egalitarian that perceives equality's value as derived from it being a constituent of another higher principle/intrinsic good to which we aspire (e.g. human dignity) might be described as a 'constitutive' egalitarian.

However, not all (instrumental) goods that contribute to achieving the intrinsic good are intrinsically valuable themselves (Moss 2009). *Instrumental* egalitarians hold that equality's value is completely derived from the value accrued by its promotion of other ideal goods. On this account, equality is not a fundamental concept. In contrast, *non-instrumental* egalitarians consider equality is 'intrinsically' valuable because it possesses value that may, in some circumstances, be additional to its capacity to promote other ideals. Moss explains 'constitutive goods ... contribute to the value of the intrinsic good in the sense that they are one of the reasons why the good has the value that it does' (Moss 2009: 4).

What makes a constitutive good *intrinsically* valuable therefore is that, without it, the intrinsic good would fail to have the value that it does. Consequently, it is the constitutive role played by goods such as equality that confers its intrinsic (not merely instrumental) value. For example, a constitutive egalitarian may value equality because of its relationship with the intrinsic good of fairness. Moss illustrates this concept:

For example, if fairness is an intrinsic good, and part of what it is to be fair is that equal states of affairs obtain (for instance because people have equal claims to some good), then equality (p. 78) is a constitutive *part* of fairness. As such, it is not merely instrumentally valuable because it does not just contribute to some set of good consequences without having any value itself.

(2009: 5)

An attraction of constitutive egalitarianism is that it attributes intrinsic value to equality in a way that is not vulnerable to the levelling-down objection. For example, a Rawlsian might claim that equality only has intrinsic value when it is a constitutive element of fairness/justice. Levelling-down cases are arguably not fair because they do not advance anyone's interests therefore we should not, for egalitarian reasons, level down. Consequently, constitutive egalitarians will consider that some inequalities are not always unjust and some inequalities, or other social harms, are unavoidable.

It is uncontroversial, for example, that governments must ration scarce resources. Unfettered state-funded access to the latest medical technology or pharmaceuticals is beyond the financial capacity of most countries and could conceivably cause great harm to a nation. In this context Dworkin argues that, in the absence of bad faith, inequalities will not render a regulatory framework illegitimate. He distinguishes between the concepts of justice and legitimacy stating:

Governments have a sovereign responsibility to treat each person with equal concern and respect. They achieve justice to the extent they succeed ... Governments may be legitimate, however—their citizens may have, in principle, an obligation to obey their laws—even though they are not fully, or even largely, just. *They can be legitimate if their laws and policies can nevertheless reasonably be interpreted as recognizing that the fate of each citizen is of equal importance and each has a responsibility to create his own life.*

(Dworkin 2011: 321–322) [emphasis added]

On this account, equal concern appears, arguably, to be a constitutive part of the intrinsic good of justice. What Dworkin suggests is that fairness and justice exist on a spectrum and legislators enjoy a margin of discretion as to what may be reasonably required of governments in circumstances where resources are limited. Dworkin states:

justice is, of course, a matter of degree. No state is fully just, but several satisfy reasonably well most of the conditions I defend [equality, liberty, democracy] ... Is legitimacy also a matter of degree? Yes, because though a state's laws and policy may in the main show a good-faith attempt to protect citizens' dignity, according to some good-faith understanding of what that means, it may be impossible to reconcile some discreet laws and policies with that understanding.

(2011: 322)

It is clear that Dworkin does not consider that all inequality is unjust, although equal respect and concern requires *valuing* every individual the same. Consequently, the important issue in this context is the general political attitude toward a political community, measured against the principle that each individual is entitled to equal concern and respect. What is vital on this account is that a government endeavours to respect the equal human worth/dignity of its citizens and to allow them to realize their own conception of

the life they wish to lead. This is so even if some individuals (p. 79) do not have access to the goods that they may need by virtue of resource constraints. When legislators fall short in terms of creating legal or economic inequality they may 'stain' that state's legitimacy, without obliterating it completely (Dworkin 2011: 323). So, while some inegalitarian measures might impair a state's legitimacy and warrant activism and opposition, it is only when such inequality *permeates* a political system (such as in apartheid) that it becomes wholly illegitimate.

In addition to valuing equality differently, egalitarians can also value different things. A major issue for egalitarians is determining exactly what equal concern requires and exactly what should be equalized in a just society. Contenders for equalization or redistribution include equal opportunity for access to resources; welfare; and human capabilities. These accounts matter for debates about new technology because they have different implications for their permissibility and the associated obligations on political actors.

5. Equality of What? Theories of Distributive Justice

John Rawls' *Theory of Justice* and its account of justice as fairness was the catalyst for contemporary egalitarian theories of distributive justice. Rawls claimed that political institutions in a democratic society should be underpinned by the principle that: 'all social primary goods are to be distributed equally unless an unequal distribution of any or all of these goods is to the advantage of the least favoured' (Rawls 1971: 62). Central to Rawls liberal political theory is the claim that an individual's share of social primary goods, i.e. 'rights, liberties and opportunities, income and wealth, and the bases of self-respect' (Rawls 1971: 60–65), should not depend on factors that are, from a moral point of view, arbitrary—such as one's good or bad fortune in the social or natural lotteries of life. Such good or bad fortune, on this account, cannot be justified on the basis of individual merit or desert (Rawls 1971: 7). It is this concept of 'moral arbitrariness' that informs the predominant egalitarian theories of distributive justice.

However, it is plausible that, in the face of new technologies, an account of distributive justice may extend beyond redistribution of resources or wealth or other social primary goods. Indeed, technology itself may be utilized as a tool, rather than a target, for equalization. Eric Parens demonstrates how such reasoning could be invoked in relation to human gene therapy:

If we ought to use social means to equalize opportunities, and if there were no moral difference between using social and medical means, then one might well think that, if it were (p. 80) feasible, we ought to use medical means to equalize opportunities. Indeed, one might conclude that it is senseless to treat social disadvantages without treating natural ones, if both are unchosen and both have the same undesirable effects.

(2004: S28)

Colin Farrelly also observes that interventions like somatic or germline therapies and enhancements have the potential to rectify what may sometimes be the pernicious consequences of the natural genetic lottery of life.⁷ He asks what the concept of distributive justice will demand in the postgenomic society stating:

we must take seriously the question of what constitutes a just regulation of such technologies ... What values and principles should inform the regulation of these new genetic technologies? To adequately answer these questions we need an account of *genetic justice*, that is, an account of what constitutes a fair distribution of genetic endowments that influence our expected lifetime acquisition of natural primary goods (health and vigor, intelligence, and imagination).

(Farrelly 2008: 45) [emphasis in original]

Farrelly claims that approaches to issues of equality and distributive justice must be guided by two concerns: first the effect of new technologies on the least advantaged in society and second the competing claims on limited fiscal resources. He argues:

a determination of the impact different regulatory frameworks of genetic interventions are likely to have on the least advantaged requires egalitarians to consider a number of diverse issues beyond those they typically consider, such as the current situation of the least advantaged, the fiscal realities behind genetic intervention the budget constraints on other social programmes egalitarians believe should also receive scarce public funds, and the interconnected nature of genetic information. These considerations might lead egalitarians to abandon what they take to be the obvious policy recommendations for them to endorse regarding the regulation of gene therapies and enhancements.

(Farrelly 2004: 587)

While Farrelly appears to accept that equality plays a part in the sociopolitical picture, it cannot be considered in isolation from other important factors in the context of scarce resources. He subsequently argues in favour of what he calls the 'lax genetic difference' principle as a guide to regulating in the context of genetic inequalities. He claims, 'genetic inequalities are to be arranged so that they are to the greatest *reasonable* benefit of the least advantaged' (Farrelly 2008: 50).⁸ While this still leaves open the questions of what is reasonable, Farrelly makes a strong argument that egalitarian challenges raised by new technologies should be considered in the context of real-world societies, rather than in the abstract.

The following section considers two of the main theories of distributive justice that have been debated since the publication of *A Theory of Justice*: luck egalitarianism and the capabilities approach. Thereafter, we consider a third recent answer to the 'equality of what' question offered by 'relational egalitarians'.

5.1 Luck Egalitarianism

A luck egalitarian considers that people who experience disadvantage because of bad or 'brute' luck have a claim upon the state for the effects of that bad luck to be corrected.

(p. 81) Simple luck egalitarianism has been refined by the addition of the 'option' luck distinction, which is based on the concept of individual responsibility. On this luck egalitarian account individuals are responsible for the bad results that occur as a result of their choices (option luck) but not for the bad results that occur as a result of 'brute luck'. This distinction is based on the view that only disadvantages that are not deserved have a claim to be corrected. Luck egalitarians focus on different objects of distribution including: equal opportunity, welfare, and resources.

Some egalitarians are critical of luck egalitarianism. Elizabeth Anderson contends that the option luck distinction is overly harsh in its treatment of those who are considered personally responsible for their bad luck. Conversely, she argues that compensating others for their bad luck implicitly suggests that they are inferior, thereby potentially stigmatizing individuals and constitutes inappropriate state interference (Anderson 1999: 289). For these reasons, Anderson claims that luck egalitarianism fails to express equal concern and respect for citizens (Anderson 1999: 301). In Anderson's view the proper object of egalitarianism is to eradicate oppressive social or class-based structures.

However, luck egalitarians might reply by claiming that society has obligations to those who are less able to 'pursue a decent life' and that this obligation need not be patronizing (Hevia and Colon-Rios 2005: 146). Nancy Fraser also argues that adopting a 'transformative' approach that addresses the factors that perpetuate disadvantage and inequality, thereby empowering individuals/communities rather than solely providing compensation, may have the dual effect of remedying both social injustice as well as issues of cultural or class-based marginalization.⁹

5.2 Equality of Capability

The capability approach developed by Amartya Sen and Martha Nussbaum is also concerned with justice in the form of equal opportunities and equal rights. However, instead of focusing on the equal distribution of goods, it attaches central importance to the achievement of individual human capabilities (or functionings) that are required to lead a good life. Maria Toboso explains:

The essence of Sen's proposal lies in his argument that a theory of justice as equity must incorporate real freedoms that all kinds of people, possibly with quite different objectives, can enjoy. This is why the true degree of freedom people have to consider various possible lifestyles for themselves must be taken into account. In applying the capability approach, the point of interest is the evaluation of people's advantages or disadvantages with regard to their capability to achieve valuable functionings that they believe are elements essential to their lifestyle.

(2011: 110).

Martha Nussbaum (1992) has defended a list of ten capabilities that she thinks are essential for human flourishing or individual agency. These are the capacity to: live to the end of a complete human life, have good health, avoid unnecessary and non-beneficial pain, use five senses, have attachments to things and persons, form a (p. 82) conception of the good, live for and with others, live for and in relation to nature, laugh, play, and enjoy recreation and live one's own life.

It is tempting to view the capabilities that Nussbaum lists as intrinsic and instrumental goods: having the ability to do these things is both good in itself and they all have value partly because of what they enable. However, it is important to not confuse capabilities with the intrinsic goods that are defended by 'objective list' theorists (Crisp 1997). For an objective list theorist any life that has more objective goods such as friendship, happiness, and religion in it is a better life for that person than a life that does not. Capabilities have value primarily because of the things that they enable persons to do, so it is radically different approach from those that seek to redistribute goods for egalitarian purposes.

Nonetheless, Nussbaum is an egalitarian; she claims that

all should get above a certain threshold level of combined capability, in the sense of ... substantial freedom to choose and act ... In the case of people with cognitive disabilities, the goal should be for them to have the same capabilities as 'normal' people, even though some of these opportunities may have to be exercised through a surrogate.

(2011: 24)

So, for Nussbaum, citizens in a nation state have a claim to combined capabilities sufficient for having the positive freedom to form and pursue a good life. That goal is one that should be aimed at for all citizens, and accorded equal value, hence Nussbaum can be considered an egalitarian about the threshold for sufficient capabilities.

5.3 Relational Equality

Relational egalitarians, champions of the so-called 'second' wave of egalitarian thought, allege that distributive theories have failed to appreciate the distinctively political aims of egalitarianism (Hevia and Colón-Ríos 2005; Anderson 1999: 288). A relational egalitarian is concerned more with the 'recognition claims' of cultural, racial, and gender inequality than with what should be equalized in society. A relational egalitarian thinks we should try to achieve social solidarity and respect, rather than ensure an equal distribution of goods. Anderson who defends what she describes as a theory of 'democratic equality' claims that

the proper negative aim of egalitarian justice is not to eliminate the impact of brute luck from human affairs, but to end oppression, which by definition is socially imposed.

(Anderson 1999: 288)

Nancy Fraser (1995) claims the distinction between redistribution and recognition is problematic when some groups experience both cultural (or class) and economic injustices. Further injustice may be argued to occur on a spectrum that, depending where it falls on the spectrum presupposes different regulatory responses. (p. 83) For example, injustice resulting from low socio-economic status may best fit the redistribution model, while recognition is the ideal response for sexually differentiated groups (Fraser 1995: 74). However, it is plausible that redistribution and recognition are not mutually exclusive, even on Anderson's account:

Democratic equality regards two people as equal when each accepts the obligation to justify their actions by principles acceptable to the other, and in which they take mutual consultation, reciprocation, and recognition for granted. Certain patterns in the distribution of goods may be instrumental to securing such relationships, follow from them, or even be constitutive of them. But democratic egalitarians are fundamentally concerned with the relationships within which goods are distributed, not only with the distribution of goods themselves. This implies, third, that democratic equality is sensitive to the need to integrate the demands of equal recognition with those of equal distribution.

(1999: 313)

What is notable is that all of these egalitarian conceptions of justice discussed identify different political objectives and vehicles for the egalitarian project. Significantly these can implicate the nature of the analysis undertaken and the resulting normative conclusions made. Genetic technology provides a prime example of the kinds of anxieties about equality that new technology evinces.

6. Looking through Different Egalitarian 'Lens': the Case of Genetic Technology

Prior to the completion of the Human Genome Project, Mehlman and Botkin claimed:

with the possible exception of slavery, [genetic technologies] represent the most profound challenge to cherished notions of social equality ever encountered. Decisions over who will have access to what genetic technologies will likely determine the kind of society and political system that will prevail in the future.

(1998: 6)

As already indicated above, egalitarians may see genetic technologies as an appropriate object for equalization—although the necessary means for achieving egalitarian endpoints are not homogeneous. Luck egalitarians might seek to mitigate any unfair inequality in genetic profiles, given that they are unchosen features of our character. In their seminal book *From Chance to Choice*, Buchanan and others suggest that justice not only requires compensating for natural inequalities, but may require more interventionist re-

sponses. They invoke both brute luck conceptions of equal opportunity and resource egalitarianism to justify pursuing (p. 84) what they describe as a 'genetic decent minimum' for all, but this does not necessarily extend to the elimination of all genetic inequalities. They claim that there is a societal commitment to use genetic technology to prevent or treat serious impairment that would limit individuals' life opportunities (Buchanan and others 2001: 81–82). Buchanan and others formulate two principles to guide public policy in the genetics era. First a 'principled presumption' that justice requires genetic intervention to prevent or ameliorate serious limitations on opportunities as a result of disease. Second, that justice may require *restricting access* to genetic enhancements to prevent exacerbations of existing unjust inequalities (Buchanan and others 2001: 101).

However, the issue of genetic enhancement is strongly contested. Dworkin claims that no other field of science has been 'more exciting in recent decades than genetics, and none has been remotely as portentous for the character of the lives our descendants will lead' (Dworkin 2000: 427). He notes the commonly articulated concern that 'we can easily imagine genetic engineerings' becoming a perquisite of the rich, and therefore as exacerbating the already savage injustice of both prosperous and impoverished societies' (Dworkin 2000: 440). Philosopher Walter Glannon has argued that genetic enhancements should be prohibited as unequal access could threaten the fundamental equality of all people (Glannon 2002). A similar concern was articulated by the Nuffield Council on Bioethics (Nuffield Council 2002: para 13.48):

We believe that equality of opportunity is a fundamental social value which is especially damaged where a society is divided into groups that are likely to perpetuate inequalities across generations. We recommend, therefore, that any genetic interventions to enhance traits in the normal range should be evaluated with this consideration in mind.

Clearly genetic enhancement technology triggers two major regulatory concerns: safety and justice. The narratives of fairness, equal access, and concerns regarding social stratification are frequent factors within this debate. However, some commentators challenge the common assumption that enhancements only benefit the individual recipient and not the wider community (Buchanan 2008, 2011). For example, Buchanan argues that social benefits may accrue as a result of increased productivity in the enhanced individual (i.e. the trickle-down effect). Indeed, he claims that analogous individual enhancements have occurred over history as a result of advances in education or improvement in manufacturing techniques (a paradigmatic example being the printing press).

An egalitarian capacities approach to the same issue would focus upon what genetic enhancement could do to create conditions under which all met a threshold for living freely and in accordance with a conception of a good life. But, the emphasis upon meeting a threshold suggests that anything that went beyond this, perhaps by enhancing the capability of some to live lives of extraordinary length or to have exceptional abilities at practical reason would have no claim upon society. Whether or not a capabilities egalitarian

would agree with the concerns of Glannon, that (p. 85) genetic enhancements should be banned because they went beyond the standard set of capabilities, is unclear.

In contrast, a relational egalitarian would likely be concerned about the potential of genetic enhancement to build upon and perpetuate social inequality that exist because of past injustices and social structures that impact upon ethnic, gender, and cultural groups. Regions of the world or groups who have been disadvantaged because of unfair social structures are likely to be worse off if genetic engineering is available primarily to those who are in already privileged positions.

What we can take from this is that the egalitarian lens through which a technology is viewed can impact our normative theorizing. However, to fully grasp the role of equality in these debates we need to take a broader look at the kinds of claims that are frequently made when there is a new technology on the horizon.

7. Equality, Technology, and the Broader Debate

While some of the concerns triggered by new technology involve issues of safety, efficacy, and equality others may indicate concerns at an even more fundamental level—such as the potential for some technologies to destabilize the very fabric of our moral community. For example, procreative liberty in a liberal society is generally something that we hold to be important. However, the possibility of being able to control or alter the genetic constitution of a future child, clearly changes the boundaries between what we may ‘choose’, and what is fixed by nature. The reallocation of responsibility for genetic identity—the move from chance/nature to individual choice—has the capacity, in Dworkin’s words, to destabilize ‘much of our conventional morality’ (Dworkin 2000: 448). Such technological advances can challenge everyday concepts such as reproductive freedom, a concept that is clearly put under pressure in the face of cloning or genetic modification.

For regulators, considering new technology the principles of equality and egalitarianism are relevant to two distinct realms of inquiry: the implications at the individual level of engagement, as well as a consideration of the broader social dimension in which the technology exists. In this respect, Dworkin distinguishes between two sets of values that are often appealed to when evaluating how a new technology should be used or regulated. First, the interests of the particular individuals who are impacted by regulation or prohibition of a particular technology and who will consequently be made better, or worse off are considered. This essentially involves a ‘cost-benefit’ exercise that includes asking whether it is fair or just that (p. 86) some individuals should gain or others lose in such a way (Dworkin 2000: 428). The second sets of values invoked constitute more general ones that are not related to the interests of particular people, but rather involve appeals to intrinsic values and speak to the *kind* of society one wishes to live in. This is a much broad-

er debate—one that is often triggered by new potentially ‘transgressive’ technologies that are thought by some to pose a threat to the moral fabric of society.

To illustrate this using Dworkin’s example, a claim that cloning or genetic engineering is illegitimate because it constitutes ‘playing God’ is arguably an appeal to a certain idea as to how society should conduct its relationships and business. However, there are as many different views as to how society should function, as there are regarding the acceptability of ‘playing God’. For some, ‘playing God’ may be a transgression, for others it may be a moral imperative and not much different from what science and medicine have enabled society to do for centuries and from which we have derived great benefit. The point is that sometimes the arguments made about new technologies involve social values that are contested, such as the ‘goodness’ or ‘badness’ of playing God. It is here that the concept of a ‘critical morality’ comes into play. When regulators are required to respond to technology that challenges, existing moral norms they must identify and draw on a set of core principles to guide, and justify, their decisions. Contenders derived from political liberalism would include liberty, justice, dignity, and the protection from harm. The important point is that notions of equality and equal concern are arguably constitutive components of all of these liberal end-points.

8. Conclusion

While some of the concerns triggered by new technology involve issues of safety and efficacy, others involve fears that new technologies might violate important values including ideas of social justice and equality. A common theme in debates about new technologies is whether they are illegitimate or indeed harmful, because they will either increase existing, or introduce new, inequalities. These debates are often marked by two polarized narratives: pro-technologists argue that the particular technology will bring great benefits to humankind and should therefore be embraced by society. Against this are less optimistic counter-claims that technology is rarely neutral and, if not regulated, will compound social stratification and encourage an undesirable technology ‘arms race’. Concern regarding equality of access to new technologies is arguably one of the most commonly articulated issues in the technology context. In addition to this, the possibilities created by technological advances often threaten ordinary assumptions about what is socially ‘acceptable’.

(p. 87) This chapter has shown how equality is valuable because of its role in anticipating the likely effects of a given technology and how inequalities that may result at the individual level may be mitigated, as well as its role in the broader egalitarian project. That is, we have shown how equality is valuable because of its role as a constitutive component of liberal endpoints and goals that include liberty, justice, and dignity. It has also been argued that, when it comes to equality, the concept of legitimacy does not demand a policy of perfection. Rather, legitimacy requires that a government attempts, in good faith, to show equal concern and respect for its citizens’ equal worth and status. This would include taking into account individual concepts of the good life of those most closely affect-

ed by new technology, as well as those social values that appear to be threatened by new technologies. While it is not possible to eradicate all inequality in a society (nor is such a goal necessarily always desirable) the concept of equality remains a vital political concept. It is one that aspires to demonstrate equal concern and respect for all citizens. We suggest, in a Dworkinian manner, that equality is, and should remain, central to the legitimacy of revisions to the scope of our freedom when expanded by such new technologies.

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Notes:

(1.) Timothy Jones (1989: 410) explains how legitimacy can be used as an evaluative concept: 'one may describe a particular regulation or procedure as lacking legitimacy and be arguing that it really is morally wrong and not worthy of support'. Legitimacy extends beyond simply fulfilling a statutory mandate: 'Selznick has described how the idea of legitimacy in modern legal culture has increasingly come to require not merely formal legal justification, but "legitimacy in depth". That is, rather than the regulator's decision being in accordance with a valid legal rule, promulgated by lawfully appointed officials, the contention would be that the decision, or at least the rule itself, must be substantively justified.'

(2.) See, among many other instruments, the UNESCO Universal Declaration on Bioethics and Human Rights 2005, Article 10.

(3.) The authors argue 'factual questions about the *effectiveness* of new technologies (such as DNA evidence, mobile identification technologies and computer databases) in detecting and preventing crime should not, and cannot, be separated from ethical and social questions surrounding the impact which these technologies might have upon civil liberties'. This is due to the close interrelationship between *the effectiveness of the police and public perceptions of police legitimacy*—which may potentially be damaged if new technologies are not deployed carefully. See also Neyroud and Disley (2008: 228).

Equality: Old Debates, New Technologies

(4.) Some would argue, for example, that section 13(9) of the United Kingdom Human Fertilisation and Embryology Act 1990 (as amended) which prohibits the preferential transfer of embryos with a gene abnormality when embryos are available that do not have that abnormality, mandates and even requires discrimination based on genetic status.

(5.) Take, for example, laws criminalizing homosexuality. Another paradigmatic example was the US Supreme Court case of *Plessy v Ferguson*, 163 US 537 (1896). The Court held that state laws requiring racial segregation in state-sponsored institutions were constitutional under the doctrine of 'separate but equal'. However, the decision was subsequently overturned by the Supreme Court in *Brown v Board of Education*, 7 US 483 (1954). The Court used the Equal Protection clause of the Fourteenth Amendment of the US Constitution to strike down the laws, declaring that 'separate educational facilities are inherently unequal'.

(6.) For example Nozick would restrict any equality claims to those involving formal equality. Nozick considers that a just society merely requires permitting all individuals the same negative rights (to liberty, property, etc) regardless of the fact that many individuals are unable, by virtue of their position in society, to exercise such rights. See Meyerson (2007: 198).

(7.) Buchanan et al. (2001) make a similar claim.

(8.) Farrelly describes his theoretical approach as based on prioritarianism—but it resonates with some versions of egalitarianism.

(9.) 'Transformative remedies reduce social inequality without, however, creating stigmatized classes of vulnerable people perceived as beneficiaries of special largesse. They tend therefore to promote reciprocity and solidarity in the relations of recognition' (see, Nancy Fraser 1995: 85–86).

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Liberal Democratic Regulation and Technological Advance

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Abstract and Keywords

This chapter considers an array of new technologies developed for bulk collection and data analysis that are sometimes connected by critics with mass surveillance. While the use of such technologies can be compatible with democratic principles, the NSA's system of bulk collection has been likened to that practised by the Stasi in the former German Democratic Republic. Drawing on Pettit's concept of domination, we dispute the comparison, conceding nevertheless that bulk collection carries risks of intrusion, error, and damage to trust. Allowing that some surveillance is bound to be secret, we insist that secrecy must be limited, and subject to democratic oversight. Even if NSA-type surveillance is not a modern reincarnation of Stasi oppression failures of oversight make it objectionable from the perspective of democratic theory. More generally, surveillance technologies interfere with individual autonomy, which liberal democratic states are committed to protecting, whether the agent making use of them is a state or private company.

Keywords: democratic theory, oversight, secrecy, privacy, surveillance, mass surveillance, surveillance ethics, accountability, autonomy, big data

1. Introduction

Under what conditions can a government or law enforcement agency target citizens for surveillance? Where one *individual* watches another e.g. to protect himself from the hostile future actions of the other, self-defence in some broad sense might justify the surveillance. But *governments*—at least liberal democratic ones—do not have a right to maintain themselves in the face of the non-violent hostility of citizens, or to take steps to pre-empt the effects of non-violent, lawful hostility. Still less do liberal democratic governments have prerogatives to watch people who are peacefully minding their own business, which is probably most of a citizenry, most of the time. Governments do not have these prerogatives even if it would make government more efficient, or even if it would help governments to win re-election. The reason is that it is in the interests of citizens not to be observed by the state when pursuing lawful personal projects. It is in the interests of citi-

zens to have portions of life and of civil society that operate independently of the state, and, in particular, (p. 91) independently of opportunities for the state to exert control. The interests that governments are supposed to protect are not their own, but those of citizens they represent, where citizens are taken to be the best judges of their own interests.

So if the surveillance of citizens is to be *prima facie* permissible by the norms of democracy, the surveillance must be carried out by governments either with the direct informed consent of citizens, or with citizens' consent to the use by governments of lawful means of preventing the encroachments on the interests of citizens. Surveillance programmes are not often made subject to direct democratic votes, though citizens in European jurisdictions are regularly polled about open camera surveillance.¹ Even if direct votes were held, however, it is not clear that support for these would always be informed. The costs and benefits are hard to demonstrate uncontroversially, and therefore hard for electorates to take into account in their deliberations. Moral theory allows the question of the justifiability of surveillance to be detached from informed consent. We can ask if what motivates a specific policy and practice of surveillance is the protection of widely acknowledged and genuine vital interests of citizens, and if surveillance is effective in protecting those vital interests.

All citizens, indeed all human beings, have a vital interest, other things being equal, in survival and in being free from significant pain, illness, and hunger: if, in certain unusual situations, these vital interests could only be served by measures that were morally distasteful, governments would have reasons, though perhaps not decisive reasons, for implementing these measures. In a war, for example, a government might commandeer valuable real estate and transport for military purposes, and if these assets were necessary for defending a citizenry from attack, commandeering them might be justified, notwithstanding the interference with the property rights of those whose assets are seized. Might this also be true of surveillance, understood as a counter-terrorism measure, or as a tactic in the fight against organized crime?

Counter-terrorism and the fight against serious and organized crime have very strong *prima facie* claims to be areas of government activity where there are vital interests of citizens to protect. It is true that both liberal democratic and autocratic governments have been known to define 'terrorism' opportunistically and tendentiously, so that in those cases it can be doubted whether counter-terrorism *does* protect vital interests of citizens, as opposed to the interests of the powerful in retaining power (Schmid 2004). But that does not mean that there is not an acceptable definition of terrorism under which counter-terrorism efforts *do* protect vital interests (Primoratz 2004; Goodin 2006). For such purposes, 'terrorism' could be acceptably defined as 'violent action on the part of armed groups and individuals aimed at civilians for the purpose of compelling a change in government policy irrespective of a democratic mandate'. Under this definition, terrorism threatens an interest in individual bodily security and survival, not to mention an interest in non-violent collective self-determination. These are genuine vital interests, and in principle

(p. 92) governments are justified in taking a wide range of measures against individuals and groups who genuinely threaten those interests.

The fight against serious and organized crime can similarly be related to the protection of genuine vital interests. Much of this sort of crime is violent, and victimizes people, sometimes by, in effect, enslaving them (trafficking), or contributing to a debilitating addiction, or by taking or threatening to take lives. Here there are clear vital interests at stake, corresponding to not being enslaved, addicted, or having one's life put at risk. Then there is the way that organized crime infiltrates and corrupts institutions, including law enforcement and the judiciary. This can give organized crime impunity in more than one jurisdiction, and can create undemocratic centres of power capable of intimidating small populations of people, and even forcing them into crime, with its attendant coercion and violence (Ashworth 2010: ch 6.4). Once again, certain vital interests of citizens—in liberty and in bodily security—are engaged.

If counter-terrorism and the fight against organized crime can genuinely be justified by reference to the vital interests that they protect, and if surveillance is an effective and sometimes necessary measure in counter-terrorism and the fight against serious and organized crime, is surveillance also morally justified? This question does not admit of a general answer, because so many different law enforcement operations, involving different forms of surveillance, with different degrees of intrusion, could be described as contributing to counter-terrorism or to the fight against serious and organized crime. Even where surveillance is justified, all things considered, it can be morally costly, because violations of privacy are *prima facie* wrong, and because surveillance often violates privacy and the general norms of democracy.

In this chapter we consider an array of new technologies developed for bulk collection and data analysis, in particular examining their use by the American NSA for mass surveillance. Many new surveillance technologies are supposed to be in tension with liberal principles because of the threat they pose to individual privacy and the control of governments by electorates. However, it is important to distinguish between technologies: many are justifiable in the investigation of serious crime so long as they are subject to adequate oversight.

We begin with a discussion of the moral risks posed by surveillance technologies. In liberal jurisdictions these risks are usually restricted to intrusions into privacy, risks of error and discrimination and damage to valuable relations of trust. The NSA's development of a system of bulk collection has been compared to the mass surveillance of East Germany under the Stasi. While we think the claim is overblown, the comparison is worth examining in order to specify what is objectionable about the NSA's system. We characterize the use of surveillance technology in the former GDR as a kind of systematic attack on liberty—negative liberty in Berlin's sense. Bulk collection is not an attack on that sort of liberty, but on liberty as non-domination. Bulk collection *enables* a government to interfere

(p. 93) with negative liberty even if by good luck it chooses not to do so. To achieve liberty as non-domination, the discretion of so far benign governments to behave oppressively

needs to be addressed with robust institutions of oversight. Here we draw on Pettit's use of the concept of domination (Pettit 1996), and treat the risk of domination as distinct from the risk of wide interference with negative liberty and different from the moral risks of intrusion, error, and damage to trust. These latter moral risks can be justified in a liberal democracy in prevention of sufficiently serious crime, but domination is straightforwardly inconsistent with liberal democratic principles. A further source of conflict with democratic principles is the secrecy of much surveillance. We accept that some surveillance must be secret, but we insist that, to be consistent with democracy, the secrecy must be limited, and be subject to oversight by representatives of the people. The bulk collection of the NSA is not a modern reincarnation of Stasi restrictions on negative liberties, but failures to regulate its activities and hold it accountable are serious departures from the requirements of liberal democracy and morality in general. Bulk collection technologies interfere with individual autonomy, which liberal democratic states are committed to protecting, whether the agent making use of them is a state or private company.

2. Moral Risks of Surveillance Technologies

The problems posed by the bulk collection technologies can be seen as a special case of problems posed by surveillance technologies. Innovations in surveillance technology give access to new sources of audio or visual information. Often, these technologies target private places such as homes and private information, because private places are often used as the sites for furthering criminal plots, and identification of suspects is often carried out on the basis of personal information about e.g. whom they associate with, or whom they are connected to by financial transactions.

Privacy—the state of not being exposed to observation and of having certain kinds of information about one safely out of circulation—is valuable for a number of different reasons, many of which have nothing to do with politics. For example, most people find privacy indispensable to intimacy, or sleep. However, a number of the most important benefits of privacy relate directly to moral and political autonomy—arriving through one's own reflection at beliefs and choices—as opposed to unreflectively adopting the views and way of life of one's parents, religious leaders, or other influential authorities.

(p. 94) Privacy facilitates autonomy in at least two ways. First, it allows people to develop their personal attachments. Second, it establishes normatively protected spaces in which individuals can think through, or experiment with, different ideas. A person who thinks through ideas and experiments with new ideas often requires freedom from the scrutiny of others. If one could only present or explore ideas before public audiences, it would be much harder to depart from established norms of behaviour and thought. Privacy also promotes intimacy and a space away from others to perform functions that might otherwise attract disgust or prurient interest. Privacy is violated when spaces widely understood as private—homes, toilets, changing rooms—or when information widely understood as private—sexual, health, conscience—is subjected to the scrutiny of another person.

The violation of privacy is not the only risk of surveillance technology employed by officials, especially police. Another is the danger of pointing suspicion at the wrong person. Surveillance technologies that are most likely to produce these kinds of false positives include data analysis programmes that make use of overbroad profiling algorithms (see for example Lichtblau 2008; Traviat 2009; ACLU 2015). Prominent among these are technologies associated with the infamous German Rasterfahndung (or Dragnet) from the 1970s and the period shortly after 9/11 (on a range of other counter-terrorism data mining, see Moeckli and Thurman 2009). Then there are smart camera technologies. These can depend on algorithms that controversially and sometimes arbitrarily distinguish normal from 'abnormal' behaviour, and that bring abnormal behaviour under critical inspection and sometimes police intervention.² New biometric technologies, whether they identify individuals on the basis of fingerprints, faces, or gait, can go wrong if the underlying algorithms are too crude. Related to the risk of error is the distinct issue of discrimination—here the concern is not only that the use of technology will point suspicion at the wrong person, but will do so in a way that disproportionately implicates people belonging to particular groups, often relatively vulnerable or powerless groups. Sometimes these technologies make use of a very crude profile. This was the case with the German Rasterfahndung programme, which searched for potential Jihadi sleepers on the basis of 'being from an Islamic country', 'being registered as a student', and being a male between 18 and 40 years of age. The system identified 300,000 individuals, and resulted in no arrests or prosecutions (Moeckli and Thurman 2009).

The misuse (and perception of misuse) of surveillance technology creates a further moral risk, which is that of damage to valuable relations of trust. Two kinds of valuable trust are involved here. First, trust in policing and intelligence authorities: relations of trust between these authorities and the governed is particularly important to countering terrorism and certain kinds of serious organized crime, as these are most effectively countered with human intelligence. The flow of human intelligence to policing authorities can easily dry up if the police are perceived as hostile. The second kind of trust is that damaged by what is commonly called 'the chilling effect'. This is when the perception is created that legitimate activities such (p. 95) as taking part in political protests, or reading anti-government literature may make one a target for surveillance oneself, so that such activity is avoided.

The public discussion of the moral justifiability of new surveillance technology, especially bulk collection systems, often makes reference to the surveillance of East Germany under the Stasi. It is instructive to consider the distinct wrongs of the use of surveillance there beyond the risks we have mentioned so far. We characterize the use of surveillance technology in East Germany as straight interference with negative liberty. Decisions about whom to associate with, what to read, whom to associate with, whom to marry, whether and where to travel, whether and how to disagree with others or express dissent, what career to adopt—all of these were subject to official interference. In East Germany intelligence was not just used to prevent crime, but to stifle political dissent and indeed any open signs of interest in the culture and politics of the West. This is comparable to 'the chilling effect' already described, but the sanctions a citizen might plausibly fear were

greater. Significantly, rather than emerging as an unintended by-product, the regime actually aimed at social conformity and meekness among the East German population. The chilling effect was also achieved by relentless targeting of anyone considered a political dissident for tactics of domination and intimidation, which often would involve overt and egregious invasions of privacy. For example, Ulrike Poppe, an activist with 'Women for Peace', was watched often, and subjected to ongoing state scrutiny (arrested 14 times between 1974 and 1989). Not only was she subjected to surveillance; she was subjected to *obvious* surveillance, surveillance she could not help but notice, such as men following her as she walked down the street, driving 6 feet behind her (Willis 2013). After reunification when it became possible to read the file the Stasi were maintaining on her, she was to discover not only further surveillance she was not aware of (such as the camera installed across the road to record everyone coming to or from her home) but also the existence of plans to 'destroy' her by the means of discrediting her reputation (Deutsche Welle 2012).

3. Justified Use of Surveillance Technology in a Liberal Democracy

Despite the extremes of the Stasi regime, the state—even the liberal democratic state—can be morally justified in conducting surveillance because a function of government is keeping peace and protecting citizens. Normally, the protection of people against life-threatening attack and general violence is used to justify the use of force. The state can take actions that would be unjustified if done by private (p. 96) citizens because of its unique responsibility to protect the public, and the fact that the public democratically endorses coercive laws. However, even force subject to democratic control and endorsement cannot be used as the authorities see fit—it has to be morally proportionate to the imminence of violence and the scale of its ill effects, and it must be in keeping with norms of due process. Furthermore, this perspective makes room for rights against the use of some coercive means—torture, for example—that might never be justified.

Earlier we outlined the main moral risks of surveillance technology: intrusion, error, damage to trust, and domination. Can these risks ever be justified? We argue that the first three can be justified in certain rare circumstances. But the fourth is inconsistent with the concept of liberal democracy itself, and technological developments that make domination possible require measures to ensure that state authorities do not use technologies in this way.

Moral and political autonomy is a requirement of citizenship in a liberal democratic society. It is not merely *desirable* that citizens think through moral and political principles for themselves—the liberal state is committed to facilitate that kind of autonomy. We have outlined the ways in which privacy is indispensable to this sort of autonomy. Departing from majority opinion on a moral issue like homosexuality, or a political question like who to vote for, is easier when such departures do not have to be immediately subject to public scrutiny. This does not mean that every encroachment on privacy is proscribed out-

right. Encroachments may be acceptable in the prevention of crime, for example. But any encroachment must be morally proportionate. The most serious invasions of privacy can only be justified in prevention of the most serious, life-threatening crime.

Error is a common enough risk of the policing of public order. It is significant where it may lead to wrongful convictions, arrests, or surveillance. Taking the risk that innocent people are wrongly suspected of crimes can again be justified, particularly in the most serious, life-threatening cases. However, liberal democratic governments cannot be indifferent to this risk. They have obligations to uphold the rights of all citizens, including those suspected of even very serious crimes, and an obligation to ensure innocent mistakes do not lead to injustice.

Some risks to trust are probably inevitable—it would be unreasonable to expect an entire population to reach consensus on when taking the risks of surveillance are acceptable, and when not. Furthermore, regardless of transparency there is always likely to be a measure of information asymmetry between police and the wider public being policed. Government cannot be indifferent to the damage to trust policing policies may do, but neither can the need to avoid such risk always trump operational considerations—rather the risk must be recognized and managed.

The use of surveillance in a liberal democracy, by contrast, is not inevitable and is *prima facie* objectionable. This is because the control of government by a people is at odds with the kind of control that surveillance can facilitate: namely the control of a people by a government. Surveillance can produce intelligence about exercises (p. 97) of freedom that are unwelcome to a government and that it may want to anticipate and discourage, or even outlaw. Technology intended for controlling crime or pre-empting terrorism may lend itself to keeping a government in power or collecting information to discredit opponents. The fact that there is sometimes discretion for governments in using technologies temporarily for new purposes creates the potential for ‘domination’ in a special sense. There is a potential for domination even in democracies, if there are no institutional obstacles in the way.

The concept of domination is deployed by Pettit (1996) in his ‘Freedom as Antipower’, where he argues for a conception of freedom distinct from both negative and positive freedom in Berlin’s sense. ‘The true antonym of freedom’, he argues, ‘is subjugation’. We take no stance on his characterization of freedom, but think his comments on domination are useful in identifying the potential for threats to liberty in a state that resorts to sophisticated bulk collection and surveillance technologies. A dominates B when:

- A can interfere,
- with impunity,
- in certain choices that B makes,

where what counts as interference is broad: it could be actual physical restraint, or direct, coercive threats, but might also consist in subtler forms of manipulation. The formu-

lation is ‘*can* interfere’, not ‘*does* interfere’. Even if there are in fact no misuses of bulk collection or other technologies, any institutional or other *risks* that misuses will occur are factors favouring domination. In the case of bulk collection of telephone data, network analysis can sometimes suggest communication links to terrorists or terrorist suspects that are very indirect or innocently explicable; yet these *may* lead to stigmatizing investigations or black-listing in ways that are hard to control. There are risks of error when investigation, arrest or detention are triggered by network analysis. As we shall now see, these may be far more important than the potential privacy violation of bulk-collection, and they are made more serious and hard to control by official secrecy that impedes oversight by politicians and courts.

4. NSA operations in the light of Snowden

We now consider the ethical risks posed by the systems Edward Snowden exposed. Snowden revealed a system which incorporated several technologies in combination: the tapping of fibre-optic cables, de-encryption technologies, cyberattacks, (p. 98) telephone metadata collection, as well as bugging and tapping technology applied to even friendly embassies and officials’ personal telephones. We have already mentioned some of the moral risks posed by the use of traditional spying methods. Furthermore, the risks surrounding certain cyberattacks will resemble those of phone tapping or audio bugging—for example the use of spyware to activate the microphones and cameras on the target’s computer or smartphone. These are highly intrusive and could only be justified on the basis of specific evidence against a targeted subject.

However, the controversy surrounding the system has not, on the whole, attached to these maximally intrusive measures. Rather, the main controversy has pertained to *mass* surveillance, surveillance targeting the whole population and gathering all the data produced by use of telecommunications technology. Because nearly everyone uses this technology gathering data on all use makes everyone a target of this surveillance in some sense. The use of these technologies has been condemned as intrusive. However, it is worth considering exactly how great an intrusion they pose in comparison to traditional methods.

The system uncovered by Snowden’s revelations involves tapping fibre-optic cables through which telecommunications travel around the world. All of the data passing through this cable are collected and stored for a brief period of time. While in this storage, metadata—usually to do with the identities of the machines that have handled the data and the times of transmission—is systematically extracted for a further period of time. Relevant metadata might consist of information like which phone is contacting which other phone, and when. This metadata is analysed in conjunction with other intelligence sources, to attempt to uncover useful patterns (perhaps the metadata about a person’s emails and text messages reveal that they are in regular contact with someone already known to the intelligence services as a person under suspicion).

Huge quantities of telecommunications metadata are collected and analysed. Metadata concerns the majority of the population, nearly all of whom are innocent of any crime, let alone suspected of the sort of serious criminality that might in theory justify seriously intrusive measures. Does the mere collection of telecommunications data represent an intrusion in and of itself? Some answer 'yes', or at least make use of arguments that assume that collection is intrusion.

However, it is not obvious that collection always represents an invasion of privacy. Consider a teacher who notices a note being passed between students in her class. Assume that the content of the note is highly personal. If she intercepts it, has she thereby affected the student's privacy? Not necessarily. If she reads the note, the student clearly does suffer some kind of loss of privacy (though, we will leave the question open as to whether such an action might nevertheless be justified). But if the teacher tears it up and throws it away without reading it, it isn't clear that the student could complain that their privacy had been intruded upon. This example suggests there is good reason to insist that an invasion of privacy only takes place when something is either read or listened to. This principle would not be restricted to content (p. 99) data—reading an email or listening to a call—but would extend to metadata—reading the details of who was emailing whom and when, or looking at their movements by way of examining their GPS data. The key proposed distinction concerns the conscious engagement with the information by an actual person.

Does this proposed distinction stand up to scrutiny? Yes, but only up to a point. The student that has their note taken may not have their privacy invaded, but they are likely to worry that it will be. Right up until the teacher visibly tears the note up and puts it in the bin, the student is likely to experience some of the same feelings of embarrassment and vulnerability they would feel if the teacher reads it. The student is at the very least at risk of having correspondence read by an unwanted audience.

A student in a classroom arguably has no right to carry on private correspondence during a lesson. Adults communicating with one another via channels which are understood to be private are in a very different position. Consider writing a letter. Unlike the student, when I put a letter in a post box I cannot see the many people who will handle it on its way to the recipient, and I cannot know very much about them as individuals. However, I can know that they are very likely to share an understanding that letters are private and not to be read by anyone they are not addressed to. Nevertheless, it is possible to steam open a letter and read its contents. It is even possible to do so, seal it again and pass it on to its recipient with neither sender nor addressee any the wiser. Cases like this resemble in relevant respects reading intercepted emails or listening in to a telephone conversation by way of a wiretap—there is widespread agreement that this is highly intrusive and will require strong and specific evidence. However, most of the telecommunications data intercepted by the NSA is never inspected by anybody—it is more like a case where the writer's letter is steamed open but then sent on to the recipient without being read. Does a privacy intrusion take place here?

One might infer from the example of the teacher with the note that the only people who have their privacy invaded are the people whose correspondence is actually read. But recall the anxiety of the student wondering whether or not her note is going to be read once the teacher has intercepted it: letter writers whose mail is steamed open seem to be in a similar position to the student whose note is in the teacher's hand. The situation seems to be this: because copies are made and metadata extracted, the risk that my privacy will be invaded continues to hang over me. The student caught passing notes at least is able to know that the risk of their note being read has passed. In the case of NSA-style bulk collection, I cannot obtain the same relief that any risk of exposure has passed. The best I can hope for is that a reliable system of oversight will minimize my risk of exposure.

Although most of the data is not read, it is used in other ways. Metadata is extracted and analysed to look for significant patterns of communication in attempts to find connections to established suspects. Is this any more intrusive than mere collection? There is a sense in which analysis by a machine resembles that of a human. But a machine sorting, deducing, and categorizing people on the basis of their most personal information does raise further ethical problems. This is not because it is (p. 100) invasive in itself: crucially there remains a lack of anything like a human consciousness scrutinizing the information. Part of the reason why it raises additional ethical difficulty is that it may further raise the risk of an actual human looking at my data (though this will be an empirical question). The other—arguably more pressing—source of risk here is that related to error and discrimination. The analysis of the vast troves of data initially collected has to proceed on the basis of some kind of hypothesis about what the target is like or how they behave. The hypotheses on which intelligence services rely might be more or less well evidentially supported. It is all too easy to imagine that the keywords used to sift through the vast quantities of data might be overbroad or simply mistaken stereotypes. And one can look at the concrete examples of crude discriminators used in cases such as the German *Rasterfahndung*. But even when less crude and more evidence-based discriminators are used, inevitably many if not most of those identified through the filter will be completely innocent. Furthermore, innocents wrongly identified by the sifting process for further scrutiny may be identified in a way that tracks a characteristic like race or religion. This need not be intentional to be culpable discrimination.

Ultimately, the privacy risks of data analysis techniques cash out in the same way as the moral risks of data collection. These techniques create risks of conscious scrutiny invading an individual's privacy. But the proneness to error of these technologies adds extra risks of casting suspicion on innocent people and doing so in a discriminatory way. These risks are not just restricted to an 'unjust distribution' of intrusive surveillance, but could lead to the wrongful coercion or detention of the innocent.

Some claim the case of the NSA is analogous to Stasi-style methods. Taken literally such claims are exaggerated—a much smaller proportion of the population are actually having their communications read, and there aren't the same widespread tactics of blackmail and intimidation. Nor is surveillance being carried out by paid spies among the population who betray their friends and acquaintances to the authorities. Nevertheless, the two

cases have something in common: namely, the absence of consent from those surveilled and even, in many cases, their representatives. In the next section, we consider attempts to fit the practices of the NSA within American structures of oversight and accountability, arguing that in practice the NSA's mass surveillance programme has avoided normal democratic checks of accountability.

5. Secrecy and the Tension with Democracy

Democratic control of the use of mass telecommunications monitoring seems to be in tension with secrecy. Secrecy is difficult to reconcile with democratic control because

(p. 101) people cannot control activity they do not know about. But much of the most invasive surveillance has to be carried out covertly if it is to be effective. If targeted surveillance like the use of audio bugging or phone tapping equipment is to be effective, the subjects of the surveillance cannot know it is going on. We accept the need for operational secrecy in relation to particular, targeted uses of surveillance. Getting access to private spaces being used to plan serious crime through the use of bugs or phone taps can only be effective if it is done covertly. This has a (slight) cost in transparency, but the accountability required by democratic principle is still possible.

However, there is an important distinction between norms of operational secrecy and norms of programme secrecy. For example, it is consistent with operational secrecy for some operational details to be made public, after the event. It is also possible for democratically elected and security-cleared representatives to be briefed in advance about an operation. Furthermore, it can be made public that people who are reasonably suspected of conspiracy to commit serious crime are liable to intrusive, targeted surveillance. So general facts about a surveillance regime can be widely publicized even though operational details are not. And even operational details can be released to members of a legislature.

Some will go further and insist that still more is needed than mere operational secrecy. According to exponents of programme secrecy, the most effective surveillance of conspiracy to commit serious crime will keep the suspect guessing. On this view, the suspect should not be able to know what intelligence services are able to do, and should have no hint as to where their interactions could be monitored or what information policing authorities could piece together about them. We reject programme secrecy as impossible to reconcile with democratic principle. Dennis Thompson (1999) argues persuasively that for certain kinds of task there may be an irresolvable tension between democracy and secrecy, because certain tasks can only be effectively carried out without public knowledge. The source of the conflict, however, is not simply a matter of taking two different values—democracy and secrecy—and deciding which is more important, but rather is internal to the concept of democracy itself.

In setting up the conflict Thompson describes democratic principle as requiring at a minimum that citizens be able to hold public officials accountable. On Thompson's view, the dilemma arises only for those policies which the public would accept if it was possible for

them to know about and evaluate the policy without critically undermining it. But policies the public would accept if they were able to consider them can only be justified if at least some information can be made public:

in any balancing of these values, there should be enough publicity about the policy in question so that citizens can judge whether the right balance has been struck. Publicity is the pre-condition of deciding democratically to what extent (if at all) publicity itself should be sacrificed.

(Thompson 1999: 183)

Thompson considers two different approaches to moderating secrecy. One can moderate secrecy temporally—by enabling actions to be pursued in secret and (p. 102) only publicized after the fact—or by publicizing only part of the policy. Either way, resolving secrets with democratic principle requires accountability with regard to decisions over what legitimately can be kept secret.

a secret is justified only if it promotes the democratic discussion of the merits of a public policy; and if citizens and their accountable representatives are able to deliberate about whether it does so.

The first part of the principle is simply a restatement of the value of accountability. The second part is more likely to be overlooked but is no less essential. Secrecy is justifiable only if it is actually justified in a process that itself is not secret. First-order secrecy (in a process or about a policy) requires second-order publicity (about the decision to make the process or policy secret).

(Thompson 1999: 185)

Total secrecy is unjustifiable. At least second-order publicity about the policy is required for democratic accountability.

We shall now consider a key body in the US that ought to be well placed to conduct effective oversight: The Senate Intelligence Committee. This 15-member congressional body was established in the 1970s in the aftermath of another scandal caused by revelations of the NSA's and CIA's spying activities, such as project SHAMROCK, a programme for intercepting telegraphic communications leaving or entering the United States (Bamford 1982). The Committee was set up in the aftermath of the Frank Church Committee investigations, also setting up the Foreign Intelligence Surveillance Court. Its mission is to conduct 'vigilant legislative oversight' of America's intelligence gathering agencies. Membership of this committee is temporary and rotated. Eight of the 15 senators are majority and minority members on other relevant committees—Appropriations, Armed Services, Foreign Relations, and Judiciary—and the other seven are made up of another four members of the majority and three of the minority.

In principle this body should be well equipped to resolve the tension between the needs of security and the requirements of democracy. First, the fact that its membership is drawn from elected senators and that it contains representatives of both parties means that these men and women have a very strong claim to legitimacy. Senators have a stronger claim to representativeness than many MPs, because the party system is so much more decentralized than the UK.

Congressional committees in general have far more resources to draw upon than their counterparts in the UK Parliament. They have formal powers to subpoena witnesses and call members of the executive to account for themselves. They are also far better resourced financially, and are able to employ teams of lawyers to scrutinize legislation or reports. However, the record of American congressional oversight of the NSA has been disappointing. And a large part of the explanation can be found in the secrecy of the programme, achieved through a combination of security classification and outright deception. Before discussing the active efforts that have been made by intelligence services to resist oversight it is also important to consider some of the constraints that interfere with the senators serving on this committee succeeding in the role.

(p. 103) Congressional committees are better able to hold the executive to account than equivalent parliamentary structures. However, the act of holding members of an agency to account is a skilled enterprise, and one that requires detailed understanding of how that agency operates. The potency of congressional oversight to a large extent resides in the incisiveness of the questions it is able to ask, based on expertise in the areas they are overseeing. Where is this expertise to come from? Amy Zegart (2011) lists three different sources: first, the already existing knowledge that the senator brings to the role from their previous work; second, directly learning on the job; and, third, making use of bodies such as the Government Accountability Office (GAO), the Congressional Budget Office, or Congressional Research Service. However, she goes on to point out forces that weigh against all three of these sources of knowledge when it comes to the world of intelligence.

First, consider the likelihood of any particular senator having detailed knowledge of the workings of the intelligence services unaided. Senators seeking election benefit enormously from a detailed working knowledge of whatever industries are important to the senator's home district—these are the issues which are important to their voters, and the issues on which they are most inclined to select their preferred candidate. Home-grown knowledge from direct intelligence experience is highly unusual, as contrasted for example with experience of the armed services, so while nearly a third of the members of the armed services committee have direct experience of the military, only two members out of 535 congressmen in the 111th congress had direct experience of an intelligence service.

Second, consider the likelihood of congressmen acquiring the relevant knowledge while on the job. Senators have a range of competing concerns, potential areas where they could pursue legislative improvement: why would they choose intelligence? Certainly they are unlikely to be rewarded for gaining such knowledge by their voters: intelligence poli-

cy ranks low on the lists of the priorities of voters, who are far more moved by local, domestic concerns. And learning the technical detail of the intelligence services is extremely time consuming: Zegart quotes former Senate Intelligence Committee chairman Bob Graham's estimate that 'learning the basics' usually takes up half of a member's eight-year term on the intelligence committee. Zegart also argues that interest groups in this area are much weaker than those in domestic policy, though she argues for this by categorizing intelligence oversight as foreign rather than domestic policy. On this basis, she points to the *Encyclopedia of Association's* listing of a mere 1,101 interest groups concerned with foreign policy out of 25,189 interest groups listed in total.

Again, voters who do have a strong concern with intelligence or foreign policy are likely to be dispersed over a wide area, because it is a national issue, whereas voters concerned overwhelmingly with particular domestic policies, like agriculture, for example, are likely to be clustered in a particular area. Term limits compound the limitation in the ability of senators to build up expertise, but are the only way to fairly share out an unattractive duty with little use for re-election, so most senators spend less than four years on the committee, and the longest serving member had served (p. 104) for 12 years, as opposed to the 30 years of the Armed Services Committee. Now consider the effect of secrecy, which means the initial basis on which any expertise could be built is likely to be meagre. Secrecy also means that any actual good results which a senator might parade before an electorate are unlikely to be publicized—although large amounts of public spending may be involved—estimated at \$1.5 billion. A senator from Utah could hardly boast of the building of the NSA data storage centre at camp Bluffdale in the way he might boast about the building of a bridge.

Secrecy also undermines one of the key weapons at Congress's disposal—control over the purse strings. Congressional committees divide the labour of oversight between authorization committees which engage in oversight of policy, and 12 House and Senate appropriations committees, which develop fiscal expertise to prevent uncontrolled government spending. This system, although compromised by the sophistication of professionalized lobbying, largely works as intended in the domestic arena, with authorizations committees able to effectively criticize programmes—publicly—as offering poor value for money, and appropriations committees able to defund them.

In the world of intelligence, on the other hand, secrecy diminishes the power of the purse strings. For a start, budgetary information is largely classified. For decades the executive would make no information available at all. Often only the top line figure on a programme's spending is declassified. Gaining access even to this information is challenging as members of the intelligence authorizations and defence appropriations subcommittees can view these figures, but can only view them on site at a secure location—as a result, only about 50 per cent actually do. The secrecy of the programmes and their cost makes it much harder for congressmen to resist the will of the executive—the objections of one committee are not common knowledge in the way that the objections of the Agriculture Committee would be.

The fact that so much detail of the programmes that members of the Intelligence Committee are voting on remains classified severely undermines the meaningfulness of their consent on behalf of the public. Take for example the 2008 vote taken by the Committee on the Foreign Intelligence Surveillance Amendments Act. This legislation curtailed the role of Foreign Intelligence Surveillance Act (FISA) itself. It reduced the requirement for FISA approval to the overall system being used by the NSA, rather than needing to approve surveillance on a target by target basis (Lizza 2013). This Act also created the basis for the monitoring of phone and Internet content. However, very few of the senators on the Committee had been fully briefed about the operation of the warrantless wiretapping programme, a point emphasized by Senator Feingold, one of the few who had been briefed. The other senators would regret passing this legislation in the future as information about the NSA's activities were declassified, he insisted. Whether or not he proves to be correct, it seems democratically unacceptable that pertinent information could remain inaccessible to the senators charged with providing democratic oversight. The reasons for keeping the details of surveillance programmes secret from the public simply do not apply to senators. Classification of information should be waived in their case.

(p. 105) Classification has not been the only way that senators have been kept relatively uninformed. In a number of instances executive authorities have been deceptive about the functioning of intelligence programmes. For example, one might look at the statement of the director of national intelligence before a Senate hearing in March 2013. Asked whether the NSA collects 'any type of data at all on millions or even hundreds of millions of Americans?', his hesitant response at the time—'No sir ... not wittingly'—was then undermined completely by the Snowden leaks showing that phone metadata had indeed been deliberately gathered on hundreds of millions of American nationals (James Clapper subsequently explained this discrepancy as his attempt to respond in the 'least untruthful manner'). Likewise, in 2012 the NSA director Keith Alexander publicly denied that data on Americans was being gathered, indeed pointing out that such a programme would be illegal. And, in 2004, the then President Bush made public statements that with regard to phone tapping 'nothing has changed' and that every time wiretapping took place this could only happen on the basis of a court order.

Are there alternatives to oversight by Congressional Committees? Congress's budgetary bodies, such as the General Accounting Office (GAO), the Congressional Budget Office, and the Congressional Research Service are possibilities. These exert great influence in other areas of policy, enhancing one of Congress's strongest sources of power—the purse strings. The GAO, a particularly useful congressional tool, has authority to recommend managerial changes to federal agencies on the basis of thorough oversight and empirical investigation of their effectiveness. The GAO has over 1,000 employees with top secret clearance; yet it has been forbidden from auditing the work of the CIA and other agencies for more than 40 years.

It is illiberally arbitrary to implement such an elaborate and intrusive a system as the NSA's with so modest a security benefit. In the wake of the Snowden revelations, the NSA volunteered 50 cases where attacks had been prevented by the intelligence gathering

that this system makes possible. However, on closer scrutiny, the cases involved a good enough basis for suspicion for the needed warrants to have been granted. Bulk collection did not play a necessary role, as traditional surveillance methods would have been sufficient. The inability of the NSA to provide more persuasive cases means that the security benefit of bulk collection has yet to be established as far as the wider public is concerned.³

6. Mass Surveillance and Domination

As it has actually been overseen, the NSA's system has been a threat to liberty as non-domination. Admittedly, it has not been as direct a violation of freedom as the (p. 106) operation of the Stasi. The constant harassment of political activists in the GDR unambiguously represented an interference with their choices by the exercise of arbitrary and unaccountable power, both by individual members of the Stasi—in some cases pursuing personal vendettas—and plausibly by the state as a group agent. This goes beyond the supposed chilling effect of having telephone records mined for patterns of interaction between telephone users, as is common under NSA programmes.

However, the weakness of oversight of the NSA shares some of its objectionable features, and helps to make sense of overblown comparisons. In the same paper discussing domination we cited earlier, Pettit (1996) argues that in any situation where his three criteria for domination are met, it will also be likely that both the agent who dominates and the agent that is dominated will exist in a state of common knowledge about the domination relationship—A knows he dominates B, B knows that A is dominating him, A knows that B knows and B knows that A knows this, and so on. This plausibly describes a case such as that of Ulrike Poppe. She knew she was subject to the state's interference—indeed state agents wanted her to know. She did not know everything about the state's monitoring of her; hence her surprise on reading her file. Secret surveillance by contrast may recklessly chill associational activity when details inevitably emerge, but they do not aspire to an ongoing relationship of common knowledge of domination.

How do these considerations apply, if at all, to the NSA? Consider the first and third criteria—the dominator's interference in the life of the dominated choices. Where surveillance is secret, and not intended to be known to the subject, it becomes less straightforward to talk about interference with choices, unless one is prepared to allow talk of 'interference in my choice to communicate with whomever I like without anyone else ever knowing'. There might be a sense in which the NSA, by building this system without explicit congressional approval, has 'dominated' the public: it has exercised power to circumvent the public's own autonomy on the issue. Finally, the third criterion, that A acts with impunity, seems to be fulfilled, as it seems unlikely that anyone will face punishment for the development of this system, even if Congress succeeds in bringing the system into a wider regulatory regime. Even so, NSA bulk collection is a less sweeping restriction of liberty than that achieved by the Stasi regime.

7. Commercial Big Data and Democracy

The NSA's programme for bulk collection is only one way of exploiting the rapid increase in sources of personal data. Mass surveillance may be 'the United States' (p. 107) largest big data enterprise' (Lynch, 2016) but how should the world's democracies respond to all the other big data enterprises? Our analysis of the use of private data considered only the context in which a government might make use of the technology. However, regulation of private entities developing new techniques is something governments are obliged to attempt as a matter of protecting citizens from harm or injustice. Governments have a certain latitude in taking moral risks that other agents do not have. This is because governments have a unique role responsibility for public safety, and they sometimes must decide in a hurry about means.

Private agents are more constrained than governments in the use they can make of data and of metadata. Governments can be morally justified in scrutinizing data in a way that is intrusive—given a genuine and specific security benefit to doing so—but private agents cannot. Although private citizens have less latitude for legitimate intrusion, the fact that the context is usually of less consequence than law enforcement will usually mean that errors are less weighty. That said, commercial big data applications in certain contexts could be argued to have very significant effects. Consider that these technologies can be used to assess credit scores, access to insurance, or even the prices at which a service might be offered to a customer. In each of these cases considerations of justice could be engaged.

Do these technologies threaten privacy? Our answer here is in line with the analysis offered of NSA like bulk collection and data mining programmes. We again insist that genuine threats to privacy can ultimately be cashed out in terms of conscious, human scrutiny of private information or private spaces. On the one hand this principle seems to permit much data collection and analysis because, if anything, it seems even less likely to be scrutinized by real humans—the aim on the whole is to find ways of categorizing large numbers of potential customers quickly, and there is not the same interest in individuals required by intelligence work, and thus little reason to look at an individual's data. Privacy is more likely to be invaded as a result of data insecurity—accidental releases of data or hacking. Private agents holding sensitive data—however consensually acquired—have an obligation to prevent it being acquired by others.

Even if data collection by private firms is not primarily a privacy threat, it may still raise issues of autonomy and consent. A number of responses to the development of big data applications have focused on consent. Solon Boracas and Helen Nissenbaum (2014), for example, have emphasized the meaninglessness of informed consent in the form of customers disclosing their data after ticking a terms-and-conditions box. No matter how complete the description of what the individual's data might be used for, it must necessarily leave out some possibilities, as unforeseen patterns uncovering unexpected knowledge about individuals is integral to big data applications—it is explicitly what the technology offers. Boracas and Nissenbaum distinguish between the 'foreground' and 'background'

of consent in these cases. The usual questions about informed consent—what is included in terms-and-conditions descriptions, how comprehensive and comprehensible they are—they consider ‘foreground’ questions. By comparison ‘background’ questions (p. 108) are under examined. Background considerations are focused on what the licensed party can actually do with the disclosed information. Rather than seeking to construct the perfect set of terms and conditions, they argue, it is more important to determine broad principles for what actors employing this technology ought to be able to do even granted informed consent.

Our position with regard to privacy supports a focus on background conditions. It is not the mere fact of information collection that is morally concerning, but rather its consequences. One important kind of consequence is conscious scrutiny by a person of someone else’s sensitive data. This could take place as a result of someone deliberately looking through data to try to find out about somebody. For example, if someone with official access to a police database used it to check for interesting information held about their annoying neighbour or ex-girlfriend. But it can happen in other more surprising ways as well. For example, the *New York Times* famously reported a case of an angry father whose first hint that his teenage daughter was pregnant was the sudden spate of online adverts for baby clothes and cribs from the retail chain Target (Duhigg 2012). In a case like this, although we might accept that the use of data collection and analysis had not involved privacy invasion ‘on site’ at the company, it had facilitated invasion elsewhere.

Such risks are recurring in the application of big data technology. The same *New York Times* article goes on to explain that companies like Target adjusted their strategy, realizing the public relations risks of similar cases. They decided to conceal targeted adverts for revealing items like baby clothes in among more innocuous adverts so that potential customers would view the adverts the company thought they’d want—indeed adverts for products they didn’t know they needed yet—without realizing just how much personal data the placement of the advert was based upon. By and large our analysis of informational privacy would not condemn this practice. However, this is not to give the green light to all similar practices. There is something that is arguably deceptive and manipulative about the targets of advertising not knowing why they are being contacted in this way. We elaborate on this in our concluding comments.

8. Overruling and Undermining Autonomy

We have argued that the NSA’s system of bulk collection is antidemocratic. We also join others in arguing that technologies of bulk collection pose risks to privacy and autonomy. Michael Patrick Lynch (2016), describing the risk of big data technologies (p. 109) to autonomy, draws a distinction between two different ways autonomy of decision can be infringed: overruling a decision and undermining a decision. Overruling a decision involves direct or indirect control—he gives examples of pointing a gun at someone or brainwashing. Undermining a decision, by contrast, involves behaving in such a way that a person

has no opportunity to exercise their autonomy. Here he gives the example of a doctor giving a drug to a patient without permission (Lynch 2016: 102–103).

Lynch draws this distinction to argue that privacy violations are generally of the second variety—undermining autonomy rather than overruling it. He gives the example of stealing a diary and distributing copies. This kind of intrusion undermines all the decisions I make regarding who I will share this information with, all the while unaware that this decision has already been made for me. Overruling autonomy he thinks requires examples like a man compelled to speak everything that comes into his head against his own will because of a medical condition.

Lynch's distinction highlights the consent issues we have emphasized in this chapter, linking failures to respect consent to individual autonomy. However, steering clear of examples like Lynch's, we think that the worst invasions of privacy share precisely the characteristic of overruling autonomy. And 'overruling' autonomy is something done by one person to another. While untypically extreme, these cases clarify how bulk collection technologies interfere with individual autonomy, as we now explain.

The worst invasions of privacy are those that coercively monopolize the attention of another in a way that is detrimental to the victim's autonomy. Examples featuring this kind of harm are more likely to involve one private individual invading the privacy of another than state intrusion. Consider for example stalking. Stalking involves prolonged, systematic invasions of privacy that coerce the attention of the victim, forcing an attention to the perpetrator that he is often unable to obtain consensually. When stalking is 'successful', the victim's life is ruined by the fact that the object of their own conscious thoughts are directed at the stalker. Even when the stalkers are no longer there, victims are left obsessively wondering where they might appear or what they might do next. Over time, anxious preoccupation can threaten sanity and so autonomy. A victim's capacity for autonomous thought or action is critically shrunk. The most extreme cases of state surveillance also start to resemble this. Think back to the example of the Stasi and the treatment of Ulrike Poppe described earlier: here the totalitarian state replicates some of the tactics of the stalker, with explicit use of agents to follow an individual around public space as well as the use of bugging technology in the home. In both the case of the private stalker and the totalitarian state's use of stalking tactics, we think Lynch's criteria for 'overruling autonomy' could be fulfilled, if the tactics are 'successful'.

These extreme cases are atypical. Much state surveillance seeks to be as covert and unobtrusive as possible, the better to gather intelligence without the subject's knowledge.

(p. 110) Even authoritarian regimes stop short of intruding into every facet of private life and monopolizing the target's thoughts. They deliberately seek to interfere with autonomy, typically by discouraging political activity. They succeed if they drive the dissenter into private life, and they do not have to achieve the stalker's takeover of the victim's mind. Nevertheless, even less drastic effects can serve the state's purposes. A case in point is the chilling effect. This can border on takeover. In his description of the psychological results of repressive legislation—deliberately prohibiting the individual from associating

with others to prevent any kind of political organization—Nelson Mandela identifies the ‘insidious effect ... that at a certain point one began to think that the oppressor was not without but within’ despite the fact that the measures were in practice easy to break (Mandela 1995: 166).

The liberal state is meant to be the opposite of the Stasi or apartheid state, but can nonetheless chill legitimate political behaviour without any need for this to be the result of a deliberate plan. According to the liberal ideal, the state performs best against a background of diverse and open discussion in the public sphere. Those committed to this ideal have a special reason to be concerned with privacy: namely the role of privacy in maintaining moral and political autonomy. Technologies that penetrate zones of privacy are used in both liberal and illiberal states to discourage criminal behaviour—take for example the claimed deterrent effects of CCTV (Mazerolle et al. 2002; Gill and Loveday 2003). The extent to which the criminal justice system successfully deters criminals is disputed, but the legitimacy of the deterrence function of criminal justice is relatively uncontroversial. However, it is important in liberal thought that legitimate political activity should not be discouraged by the state, even inadvertently. The state is not meant to ‘get inside your head’ to affect your political decision making except in so far as that decision making involves serious criminal activity. To the extent that bulk collection techniques chill association, or the reading of ‘dissident’ literature, they are illegitimate.

Do private companies making use of big data technologies interfere with autonomy in anything like this way? At first it might seem that the answer must be ‘no’, unless the individual had reason to fear the abuse or disclosure of their information. Such a fear can be reasonable given the record of company data security, and can draw attention in a way that interferes with life. However, there is a more immediate sense in which the everyday use of these technologies might overrule individual autonomy. This is the sense in which their explicit purpose is to hijack individual attention to direct it at whatever product or service is being marketed. Because the techniques are so sophisticated and operate largely at a subconscious level, the subject marketed to is manipulated. There is another reason to doubt that Lynch should describe such cases as ‘undermining’ autonomy: at least some big data processes—including ones we find objectionable and intrusive—will not involve short circuiting the processes of consent. Some big data applications will make use of data which the subject has consented to being used at least for (p. 111) the purpose of effectively targeting advertisements. Even when the use of data is consented to, however, such advertising could nevertheless be wrong, and wrong because it threatens autonomy.

Of course the use of sophisticated targeting techniques is not the only kind of advertising that faces such an objection. The argument that many kinds of advertising are (ethically) impermissible because they interfere with autonomy is long established and pre-dates the technological developments discussed in this chapter (Crisp 1987). Liberal democracies permit much advertising, including much that plausibly ‘creates desire’ in Roger Crisp’s terms (1987), however, it is permitted subject to regulation. One of the most important factors subject to regulation is the degree to which the regulations can be expected to

override the subject's decision-making processes. Often when advertising is restricted, such as in the case of advertising to children, or the advertising of harmful and highly addictive products, we can assess these as cases where the odds are stacked too greatly in the favour of the advertiser. Such cases are relevantly different from a case where a competent adult buys one car rather than another, or an inexpensive new gadget she does not really need. In these latter, less concerning cases, autonomy, if interfered with at all, is interfered with for a relatively trivial purpose. Again, it is plausible to suppose that if the choice came to seem more important her autonomy would not be so eroded that she could not change her behaviour. Suppose her financial circumstances change and she no longer has the disposable income to spare on unneeded gadgets, or she suddenly has very good objective reasons to choose a different car (maybe she is persuaded on the basis of environmental reasons that she ought to choose an electric car). With much of the advertising we tolerate, we take it that most adults could resist it if they had a stronger motivation to do so. It is where we think advertising techniques genuinely render people helpless that we are inclined to proscribe—children or addicts are much more vulnerable and therefore merit stronger protection. These final considerations do not implicate bulk collection or analysis techniques as inherently intrusive or inevitably unjust. They rather point again to non-domination as an appropriate norm for regulating this technology in a democratic society.

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Notes:

- (1.) See for example EC FP7 Projects RESPECT (2015) <<http://respectproject.eu/>> accessed 4 December 2015; and SURPRISE (2015) <<http://surprise-project.eu/>> accessed 4 December 2015.
- (2.) See, for example EC FP7 Project ADABTS <www.informationssystemsfors.se/?subpage=/projectweb/45f7d623ad7ff/Index.html> accessed 4 December 2015.
- (3.) See Bamford (2013) on both the claim that the revelations contradict previous government statements and that in the 50 or so claimed success cases warrants would easily have been granted.

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Identity

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Abstract and Keywords

Identity is a basic concept which concerns the way in which the world divides up at one time into different things which are then reidentified despite change over the course of time until they cease to exist. Important debates concern the relation between identity and similarity, between something's identity and the kind of thing it is, how far identity is fixed by human interests, and especially whether identity over time is really coherent. But the special focus of philosophical debate has long been the topic of personal identity—how far this is distinct from that of our bodies and how far it is determined by our self-consciousness. Recent discussions have also emphasized the importance of our sense of our own identity, which perhaps gives a narrative unity to our lives.

Keywords: identity, similarity, natural kind, person, self, self-consciousness, Leibniz, Locke, Hume

1. Introduction

WHEN we ask about something's identity, that of an unfamiliar person or a bird, we are asking who or what it is. In the case of a person, we want to know which particular individual it is, Jane Smith perhaps; in the case of an unfamiliar bird we do not usually want to know which particular bird it is, but rather what kind of bird it is, a goldfinch perhaps. Thus, there are two types of question concerning identity: (i) questions concerning the identity of particular individuals, especially concerning the way in which an individual retains its identity over a period of time despite changing in many respects; (ii) questions about the general kinds (species, types, sorts, etc.) that things belong to, including how these kinds are themselves identified. These questions are connected, since the identity of a particular individual is dependent upon the kind of thing it is. An easy way to see the connection here is to notice how things are counted, since it is only when we understand what kinds of thing we are dealing with that we can count them—e.g. as four calling birds or five gold rings. This is especially important when the kinds overlap: thus, a single pack of playing cards is made up of four suits, and comprises 52 different cards. So, in this case the answer to the question 'How many?' depends upon what it is that is to be count-

ed—cards, suits, or packs. Two different things of some one kind can, of course, both belong to the some other kind—as when two cards belong to the same suit. But what is not thereby settled is whether it can be that two different things of some one kind are also one and the same thing of another kind. This sounds (p. 115) incoherent and cases which, supposedly, exemplify this phenomenon of ‘relative’ identity are tendentious, but the issue merits further discussion and I shall come back to it later (the hypothesis that identity is relative is due to Peter Geach; see Geach 1991 for an exposition and defence of the position). Before returning to it, however, some basic points need to be considered.

2. The Basic Structure of Identity

When we say that Dr Jekyll and Mr Hyde ‘are’ identical, the plural verb suggests that ‘they’ are two things which are identical. But if they are identical, they are one and the same; so, the plural verb and pronoun, although required by grammar, are out of place here. There are not two things, but only one, with two names. As a result, since we normally think of relations as holding between different things, one might suppose that identity is not a relation. But since relations such as being the same colour hold not only between different things, but also between a thing and itself, being in this way ‘reflexive’ is compatible with being a relation, and, for this reason, identity itself counts as a relation. What is distinctive about identity is that, unlike being the same colour, it holds only between a thing and itself, though this offers only a circular definition of identity, since the use of the reflexive pronoun ‘itself’ here is to be understood in terms of identity. This point raises the question of whether identity is definable at all, or so fundamental to our way of thinking about the world that it is undefinable.

Identity is to be distinguished from similarity; different things may be the same colour, size, etc. Nonetheless, similarity in some one respect, eg being the same colour, has some of the formal, logical, features of identity: it is reflexive—everything is the same colour as itself; it is transitive—if a is the same colour as b , and b is the same colour as c , then a is the same colour as c ; and it is symmetric—if a is the same colour as b , then b is the same colour as a . As a result, similarity of this kind is said to be an ‘equivalence relation’, and it can be used to divide a collection of objects into equivalence classes, classes of objects which are all of the same colour. Identity is also an equivalence relation, but one which divides a collection of objects into equivalence classes each of which has just one member. This suggests that we might be able to construct identity by combining more and more equivalence relations until we have created a relation of perfect similarity, similarity in all respects, which holds only between an object and itself. So, is identity definable as perfect similarity?

This is the suggestion, originally made by Leibniz, that objects which are ‘indiscernible’, i.e. have all the same properties and relations, are identical (see *Monadology*, (p. 116) proposition 9 in Leibniz 1969: 643). In order to ensure that this suggestion is substantive, one needs to add that these relations do not themselves include identity or relations defined in terms of identity; for it is trivially true that anything which has the property of be-

ing the same thing as x is itself going to be x . The question is whether absolute similarity in respect of all properties and relations other than identity guarantees identity. The answer to this question is disputed, but there are, I think, persuasive reasons for taking it to be negative. The starting point for the negative argument is that it seems legitimate to suppose that for any physical object, such as a round red billiard ball, there could be a perfect duplicate, another round red billiard ball with exactly similar non-relational properties. In the actual world, it is likely that apparent duplicates will never be perfect; but there seems no reason in principle for ruling out the possibility of there being perfect duplicates of this kind. What then needs further discussion are the relational properties of these duplicate billiard balls; in the actual world, they will typically have distinct relational properties, eg perhaps one is now in my left hand while the other is in my right hand. To remove differences of this kind, therefore, we need to think of the balls as symmetrically located in a very simple universe, in which they are the only objects. Even in this simple universe, there will still be relational differences between the balls if one includes properties defined by reference to the balls themselves: for example, suppose that the balls are 10 centimetres apart, then ball x has the property of being 10 centimetres from ball y , whereas ball y lacks this property, since it is not 10 centimetres from itself. But since relational differences of this kind depend on the assumed difference between x and y , which is precisely what is at issue, they should be set aside for the purposes of the argument. One should consider whether in this simple universe there must be other differences between the two balls. Although the issue of their spatial location gives rise to complications, it is, I think, plausible to hold that the relational properties involved can all be coherently envisaged to be shared by the two balls. Thus, the hypothesis that it is possible that for there to be distinct indiscernible objects seems to be coherent—which implies that it is not possible to define identity in terms of perfect similarity (for a recent discussion of this issue, see Hawley 2009).

Despite this result, there is an important insight in the Leibnizian thesis of the identity of indiscernibles; namely, that identity is closely associated with indiscernibility. However, the association goes the other way round—the important truth is the indiscernibility of identicals, that if a is the same as b , then a has all b 's properties and b has all a 's properties. Indeed, going back to the comparison between identity and other equivalence relations, a fundamental feature of identity is precisely that whereas equivalence relations such as being the same colour do not imply indiscernibility, since objects which are the same colour may well differ in other respects, such as height, identity does imply indiscernibility, having the same properties. Does this requirement then provide a definition of identity? Either the shared properties in question include identity, or not: if identity is included, then (p. 117) the definition is circular; but if identity is not included, then, since indiscernibility itself clearly satisfies the suggested definition, the definition is equivalent to the Leibnizian thesis of the identity of indiscernibles, which we have just seen to be mistaken. So, it is plausible to hold that identity is undefinable. Nonetheless, the thesis of the indiscernibility of identicals is an important basic truth about identity.

One important implication of this thesis concerns the suggestion which came up earlier that identity is relative, in the sense that there are cases in which two different things of one kind are also one and the same thing of another kind. One type of case which, it is suggested, exemplifies this situation arises from the following features of the identity of an animal, a dog called 'Fido', let us say: (i) Fido is the same dog at 2 pm on some day as he was at 1 pm; (ii) Fido is a collection of organic cells whose composition changes over time, so that Fido at 2 pm is a different collection of cells from Fido at 1 pm. Hence, Fido's identity at 2 pm is relative to these two kinds of thing which he instantiates, being a dog and being a collection of cells. However, once the thesis of the indiscernibility of identicals is introduced, this conclusion is called into question. For, if Fido is the same dog at 1 pm as he is at 2 pm, then at 2 pm Fido will have all the properties that Fido possessed at 1 pm. It follows, contrary to proposition (ii), that at 2 pm Fido has the property of being the same collection of cells as Fido at 1 pm, since Fido at 1 pm had the reflexive property of being the same collection of cells as Fido at 1 pm. The suggestion that identity is relative is not compatible with the thesis of the indiscernibility of identity (for an extended discussion of this issue, see Wiggins 2001: ch 1).

One might use this conclusion to call into question the indiscernibility of identity; but that would be to abandon the concept of identity, and I do not propose to follow up that sceptical suggestion. Instead, it is the suggestion that identity is relative that should be abandoned. This implies that the case whose description in terms of the propositions (i)–(ii) above was used to exemplify the relativist position needs to be reconsidered. Two strategies are available. The most straightforward is to retain proposition (i) and modify (ii), so that instead of saying that Fido is a collection of cells one says that at each time that Fido exists, he is made up of a collection of cells, although at different times he is made up of different cells. On this strategy, therefore, because one denies that Fido is both a dog and a collection of cells, there is no difficulty in holding that the identity of the animal is not that of the collection of cells. The strategy does have one odd result, which is that at each time that Fido exists, the space which he occupies is also occupied by something else, the collection of cells which at that time makes him up. The one space is then occupied by two things, a dog and a collection of cells. To avoid this result, one can adopt the alternative strategy of holding that what is fundamental about Fido's existence are the temporary collections of cells which can be regarded as temporary stages of Fido, such that at each time there is just one of these which is then Fido, occupying just one space. Fido, the dog who lives for ten years, is then reconceived as a connected series of these temporal stages, connected by the causal links between the (p. 118) different collections of cells each of which is Fido at successive times. This strategy is counterintuitive, since it challenges our ordinary understanding of identity over time. But it turns out that identity over time, persistence, gives rise to deep puzzles anyway, so we will come back to the approach to identity implicit in this alternative strategy.

3. Kinds of Thing as Criteria of Identity

I mentioned earlier the connection between a thing's identity and the kind of thing it is. This connection arises from the way in which kinds provide 'criteria of identity' for particular individual things. What is meant here is that it is the kind of thing that something is which, first, differentiates it from other things of the same or other kinds, and, second, determines what counts as the start and end of its existence, and thus its continued existence despite changes. The first of these points was implicit in the earlier discussion of the fact that in counting things we need to specify what kinds of thing we are counting, for example playing cards, suits, or packs of cards. In this context, questions about the identity of things concern the way in which the world is 'divided up' at a time, and such questions therefore concern synchronic relationships of identity and difference between things. The second point concerns the diachronic identity of a thing and was implicit in the previous discussion of the relationship between Fido's identity and that of the collections of cells of which he is made; being the same dog at different times is not being the same collection of cells at these times. The classification of things by reference to the kind of thing they are determines both synchronic and diachronic relations of identity and difference that hold between things of those kinds; and this is what is meant by saying that kinds provide criteria of identity for particular things.

One might suppose that for physical objects—shoes, ships, and sealing wax—difference in spatial location suffices for synchronic difference whatever kind of thing one is dealing with, while the causal connectedness at successive times of physical states of a thing suffices for its continued existence at these times. However, while the test of spatial location is intuitively plausible, the spatial boundaries of an object clearly depend on the kind of thing one is dealing with, and the discussion of Fido and the cells of which he is made shows that this suggestion leads into very contentious issues. The test of causal connectedness of physical states, though again plausible, leads to different problems, in that it does not by itself distinguish between causal sequences that are relevant to an object's existence and those which are not; (p. 119) in particular, it does not separate causal connections in which an object persists and those in which it does not, as when a person dies. So, although the suggestion is right in pointing to the importance of spatial location and causal connection as considerations which are relevant to synchronic difference and diachronic identity, these considerations are neither necessary nor sufficient by themselves and need to be filled out by reference to the kinds of thing involved. In the case of familiar artefacts, such as houses and cars, we are dealing with things that have been made to satisfy human interests and purposes, and the criteria of identity reflect these interests and purposes. Thus, to take a case of synchronic differentiation, although the division of a building into different flats does involve its spatial separation into private spaces, it also allows for shared spaces, and the division is determined not by the spatial structure of the building alone but by the control of different spaces by different people. Turning now to a case where questions of diachronic identity arise, while the routine service replacements of parts of a car do not affect the car's continuing existence, substantial changes following a crash can raise questions of this kind—e.g. where parts from two seriously

damaged cars that do not work are put together to create a single one which works, we will sometimes judge that both old cars have ceased to exist and that a new car has been created by combining parts from the old ones. We will see that there are further complications in cases of this kind, but the important point here is that there are no causal or physical facts which determine by themselves which judgements are appropriate: instead, they are settled in the light of these facts by our practices.

These cases show that criteria of identity for artefacts include conditions that are specific to the purposes and interests that enter into the creation and use of the things one is dealing with. As a result, there is often a degree of indeterminacy concerning judgements of synchronic difference and diachronic identity, as when we consider, for example, how many houses there are in a terrace or whether substantial repairs to a damaged car imply that it is a new car. A question that arises, therefore, is whether criteria of identity are always anthropocentric and vague in this way, or whether there are cases where the criteria are precise and can be settled without reference to human interests. One type of case where the answer to this is affirmative concerns abstract objects, such as sets and numbers. Sets are the same where they have the same members, and (cardinal) numbers are the same where the sets of which they are the number can be paired up one to one—so that, for example, the number of odd natural numbers turns out to be the same as the number of natural numbers. But these are special cases. The interesting issue here concerns ‘natural’ kinds, the kinds which have an explanatory role in the natural sciences, such as biological species and chemical elements. A position which goes back to Aristotle is that it is precisely the mark of these natural kinds that they ‘carve nature at the joints’, that is, that they provide precise criteria of identity which do not reflect human interests. Whereas human concerns might lead us to regard dolphins as fish, a scientific appreciation of the significance of the fact that dolphins are (p. 120) mammals implies that they are not fish. But it is not clear that nature does have precise ‘joints’. Successful hybridization among some plant and animal species shows that the differences between species are not always a barrier to interbreeding, despite the fact that this is often regarded as a mark of species difference; and the existence of micro species (there are said to be up to 2,000 micro species of dandelion) indicates that other criteria, including DNA, do not always provide clear distinctions. Even among chemical elements, where the Mendeleev table provides a model for thinking of natural kinds which reveal joints in nature, there is more complexity than one might expect. There are, for example, 15 known isotopes of carbon, of which the most well known is carbon-14 (since the fact that it is absorbed by organic processes and has a half-life of 5,730 years makes it possible to use its prevalence in samples of organic material for carbon-dating). The existence of such isotopes is not by itself a major challenge to the traditional conception of natural kinds, but what is challenging is the fact that carbon-11 decays to boron, which is a different chemical element—thus bridging a supposed natural ‘joint’. So, while it is a mark of natural kinds that classifications which make use of them mark important distinctions that are not guided by human purposes, the complexity of natural phenomena undermines the hope that the implied criteria of identity, both synchronic and diachronic, are always precise. (For a thorough treatment of the issues discussed in this section, see Wiggins 2001: chs 2–4.)

4. Persistence and Identity

Our common-sense conception of objects is that despite many changes they persist over time, until at some point they fall apart, decay, or in some other way cease to exist. This is the diachronic identity discussed so far, which is largely constituted by the causal connectedness of the states which are temporal stages in the object's existence, combined with satisfaction of the conditions for the existence at all of an object of the kind. Thus, an acorn grows into a spreading oak tree until, perhaps, it succumbs to an invading disease which prevents the normal processes of respiration and nutrition so that the tree dies and decays. But the very idea of diachronic identity gives rise to puzzles. I mentioned above the challenge posed by repairs to complex manufactured objects such as a car. Although, as I suggested, in ordinary life we accept that an object retains its identity despite small changes of this kind, one can construct a radical challenge to this pragmatic position by linking together a long series of small changes which have the result that no part of the original object, a clock, say, survives in what we take to be the final one. The challenge can be accentuated by imagining that the parts of the original clock which have been (p. 121) discarded one by one have been preserved, and are then reassembled, in such a way that the result is in working order, to make what certainly seems to be the original clock again. Yet, if we accept that in this case it is indeed the original clock that has been reassembled, and thus that the end product of the series of repairs is not after all the original clock, then should we not accept that even minimal changes to the parts of an object imply a loss of identity?

This puzzle can, I think, be resolved. It reflects the tension between two ways of thinking about a clock, and thus two criteria for a clock's identity. One way of thinking of a clock is as a physical artefact, a 'whole' constituted by properly organized parts; the other way is as a device for telling the time. The first way leads one to take it that the reassembled clock is the original one; the second way looks to maintaining the function of telling the time, and in this case the criterion of identity is modelled on that of an organic system, such as that of an oak tree, whose continued existence depends on its ability to take on some new materials as it throws off others (which cannot in this case be gathered together to reconstitute an 'original' tree). When we think of the repairs to a clock as changes which do not undermine its identity we think of it as a device for telling the time with the organic model of persistence, and this way of thinking about the clock and its identity is different from that based on the conception of it as a physical artefact whose identity is based on that of its parts. The situation here is similar to that discussed earlier concerning Fido the dog and the cells of which he is made. Just as the first strategy for dealing with that case was to distinguish between Fido the dog and the cells of which he is made, in this case a similar strategy will be to distinguish between the clock-as-a-device and the clock-as-a-physical-artefact which overlap at the start of their existence, but which then diverge as repairs are made to the clock-as-a-device. Alternatively, one could follow the second strategy of starting from the conception of temporary clock stages which are both physical artefacts at some time and devices for telling the time at that time, and then think of the persisting clock-as-a-physical-artefact as a way of connecting clock stages

which depends on the identity of the physical parts over time and the persisting clock-as-a-device as a way of linking clock stages which preserves the clock's functional role at each time. As before, this second strategy appears strange, but, as we shall see, diachronic identity gives rise to further puzzles which provide reasons for taking it seriously.

One basic challenge to diachronic identity comes from the combination of change and the thesis of the indiscernibility of identicals, that a difference between the properties of objects implies that the objects themselves are different (see Lewis 1986: 202–204). For example, when a tree which was 2 metres high in 2000 is 4 metres high in 2001, the indiscernibility of identicals seems to imply that if the earlier tree is the very same tree as the later tree, then the tree is both 2 metres high and 4 metres high; but this is clearly incoherent. One response to this challenge is to take it that the change in the tree's height implies that the properties in question must be taken to be temporally indexed: the tree has the properties of (p. 122) being 2 metres high in 2000 and of being 4 metres high in 2001, which are consistent. This response, however, comes at a significant cost: for it implies that height, instead of being the intrinsic property of an object it appears to be, is inherently relational, is always height-at-time-*t*. This is certainly odd; and once the point is generalized it will imply that a physical object has few, if any, intrinsic properties. Instead what one might have thought of as its intrinsic nature will be its nature-at-time-*t*. Still, this is not a decisive objection to the position. Alternatively, one can hold that while a tree's height is indeed an intrinsic property of the tree, the fact that the tree changes height shows predication needs to be temporally indexed: the tree has-in-2000 the property of being 2 metres high, but has-in-2001 the property of being 4 metres high. This is, I think, a preferable strategy, but its implementation requires some care; for one can no longer phrase the indiscernibility of identicals as the requirement that if *a* is the same as *b*, then *a* has all the same properties as *b* and vice-versa. Instead, the temporal indexing of predication needs to be made explicit, so that the requirement is that if *a* is the same as *b*, then whatever properties *a* has-at-time-*t* *b* also has-at-time-*t* and vice-versa. More would then need to be said about predication to fill out this proposal, but that would take us further into issues of logic and metaphysics than is appropriate here. Instead, I want to discuss the different response to this challenge which has already come up in the discussion of the identity of things such as Fido the dog.

At the heart of this response is the rejection of diachronic identity as we normally think of it. It is proposed that what we think of as objects which exist for some time are really sequences of temporary bundles of properties which are unified in space and time causally and are causally connected to later similar bundles of properties. What we think of as a single tree which lives for 100 years is to be thought of as a sequence of temporally indexed bundles of tree properties—the tree-in-2000, the tree-in-2001, and so on. On this approach, a property such as height is treated as an intrinsic property, not of the tree itself but of a temporally indexed bundle of properties to which it belongs; similarly, the tree's change in respect of height is a matter of a later bundle of properties, the tree-in-2001, including a height which differs from that which belongs to an earlier bundle, the tree-in-2000, to which it is causally connected. This approach is counterintuitive, since it repudiates genuine diachronic identity; but its supporters observe that whatever

account the supporter of diachronic identity provides of the conditions under which the temporary states of a tree are states of one and the same tree can be taken over and used as the basis for an account of what it is for temporary bundles of tree properties to be connected as if they constituted a single tree, and thus of the diachronic quasi-identity of the tree. So, one can preserve the common-sense talk of persisting objects while sidestepping the problems inherent in a metaphysics of objects that both change in the course of time and remain the same. Furthermore, one can avoid the need to choose between competing accounts of persistence of the kind I discussed earlier in connection with the re-assembled clock; for once persistence is treated, not as (p. 123) the diachronic identity of a single object, but as a sequence of causally connected temporary bundles of properties, the fact that there is one way constructing such a sequence need not exclude there being other ways, so that we can just use whichever way of connecting them is appropriate to the context at hand.

Yet, there are also substantive objections to this approach. We do not just talk as if there were objects which exist for some time; instead, their persisting existence is central to our beliefs and attitudes. Although much of the content of these beliefs can be replicated by reference to there being appropriate sequences of temporary bundles of properties, it is hard to think of our concerns about the identity and preservation of these objects as motivated once they are understood in this way. Think, say, of the importance we attach to the difference between an authentic work of art, an ancient Greek vase, say, and a perfect replica of it: the excitement we feel when viewing and holding the genuine vase, a vase made, say, in 500 BC, is not captured if we think of it as a bundle of presently instantiated properties which, unlike the replica, is causally connected back to a bundle of similar properties that was first unified in 500 BC. This second thought loses the ground of our excitement and wonder, that we have in our hands the very object that was created two and half thousand years ago in Greece. A different point concerns the way in which genuine diachronic identity diverges from diachronic quasi-identity when we consider the possibility that something might have existed for a shorter time than it actually did—that, for example, a tree which lived for 100 years might have been cut down after only ten years. Our normal system of belief allows that as well as having different properties at different times objects can have counterfactual properties which include the possibility of living for a shorter period than they actually did, and hypotheses of this kind can be accommodated in the conception of these objects as capable of genuine diachronic identity. But once one switches across to the conception of them as having only the quasi-identity of a connected sequence of temporary bundles of properties, the hypothesis that such a sequence might have been much shorter than it actually was runs into a serious difficulty. Since sequences are temporally ordered wholes whose identity is constituted by their members, in the right order, a much-abbreviated sequence would not be the same sequence. Although there might have been a much shorter sequence constituted by just the first ten years' worth of actual bundles of tree properties, the actual sequence could not have been that sequence. But it is then unclear how the hypothesis that the tree that actually lived for 100 years might have lived for just ten years is captured within this framework.

These objections are challenges and it has to be recognized there are phenomena which can be accommodated more easily by this approach than by diachronic identity. One such phenomenon is fission, the division of one thing into two or more successors, as exemplified by the cloning of plants. In many cases, there will be no good reason for thinking that one of the successor plants is more suited than the others to be the one which is identical to the original one. In such cases, diachronic (p. 124) identity cannot be maintained, and the supporter of diachronic identity has to accept that a relation weaker than identity obtains between the original plant and its successors—that the original plant ‘survives as’ its successors, as it is said. This conclusion is clearly congenial to the theorist who holds that there is no genuine diachronic identity anyway, since the conception of the quasi-identity of causally connected bundles of properties can be easily modified to accommodate situations of this kind. The defender of diachronic identity can respond that making a concession of this kind to accommodate fission does not show that there is no genuine diachronic identity where fission does not occur. But it is arguable that even the possibility of fission undermines diachronic identity. Let us suppose that a plant which might have divided by cloning on some occasion does not do so (perhaps the weather was not suitable); in a situation of this kind, even though there is only one plant after the point where fission might have occurred, there might have been two, and, had there been, the relation between the original plant and the surviving plant would not have been identity, but just survival. The question that now comes up is the significance of this result for the actual situation, in which fission did not occur. There are arguments which suggest that identity is a ‘necessary’ relation, in the sense that, if *a* is the same as *b*, then it could not have been the case that *a* was different from *b*. These arguments, and their basis, is much disputed, and we cannot go into details here. But if one does accept this thesis of the necessity of identity, it will follow that the mere possibility of fission suffices to block genuine diachronic identity, since, to use a familiar idiom, given that in a possible world in which fission occurs, there is no diachronic identity but only survival as each of the two successors, there cannot be diachronic identity in the actual world in which fission does not occur. This conclusion implies that diachronic identity can obtain only where fission is not possible—which would certainly cut down the range of cases to which it applies significantly; indeed, if one were to be generous in allowing for remote possibilities, it might exclude almost all cases of diachronic identity. But, of course, there is a response which the defender of diachronic identity can adopt—namely to reject the thesis of the necessity of identity, and argue that fission cases of this kind show that identity is contingent. This is certainly a defensible position to take—but it too will have costs in terms of the complications needed to accommodate the contingency of identity in logic and metaphysics.

My main aim in this long discussion of persistence and diachronic identity has not been to argue for one side or the other of this debate between those who defend genuine diachronic identity and those who argue that the quasi-identity of temporary bundles of properties saves most of the appearances while avoiding incoherent metaphysics. As with many deep issues in metaphysics, there are good arguments on both sides. At present, it strikes me that the balance of reasons favours genuine diachronic identity, but the debate remains open, and one of the areas in which it is most vigorously continued is that of per-

sonal identity, to which I now turn (for further discussion of this topic, see Hawley 2001; Haslanger 2003).

(p. 125) 5. Personal Identity

The most contested topic in discussions of identity is personal identity—what constitutes our identity as persons, and what this identity amounts to. In fact, many of the theoretical debates about identity which I have described have been developed in the context of debates concerning personal identity. This applies to the first important discussion of the topic, that by John Locke in the second edition of *An Essay Concerning Human Understanding*. After the first edition of the *Essay*, Locke was asked by his friend William Molyneux to add a discussion of identity, and he added a long chapter on the subject (Book II chapter xxvii) in which he begins with a general discussion of identity before moving on to a discussion of personal identity. In his general discussion, Locke begins by emphasizing that criteria of identity vary from one kind of thing to another: ‘It being one thing to be the same *Substance*, another the same *Man*, and a third to be the same *Person*’ (Locke 1975: 332). He holds that material ‘substances’ are objects such as ‘bodies’ of matter, composed of basic elements, and their diachronic identity consists in their remaining composed of the same elements. Men, like other animals and plants, do not satisfy this condition for their diachronic identity; instead ‘the Identity of the same *Man* consists ... in nothing but a participation of the same continued Life, by constantly fleeting Particles of Matter, in succession vitally united to the same organized Body’ (Locke 1975: 332). Men are ‘organized bodies’ whose composition changes all the time and whose identity consists in their being organized ‘all the time that they exist united in that continued organization, which is fit to convey that Common Life to all the Parts so united’ (Locke 1975: 331). Having set the issue up in this way, Locke turns to the question of personal identity. He begins by saying what a person is, namely

a thinking intelligent Being, that has reason and reflection, and can consider it self as itself, the same thinking thing in different times and places; which it does only by that consciousness, which is inseparable from thinking, and as it seems to me essential to it.

(Locke 1975: 335)

As this passage indicates, for Locke it is in this consciousness of ourselves that personal identity consists, so that ‘as far as this consciousness can be extended backward to any past Action or Thought, so far reaches the Identity of that *Person*; it is the same *self* now as it was then; and ‘tis by the same *self* with this present one that now reflects on it, that that Action was done’ (Locke 1975: 335).

Locke never mentions memory explicitly, but since he writes of consciousness ‘extended backward to any past Action or thought’, it seems clear that this is what he has in mind: it is through our conscious memory of past acts and thoughts that our identity as a person is constituted. As well as his general account of persons as thinking beings whose concep-

tion of themselves rests on their consciousness of (p. 126) themselves as they used to be, Locke provides two further considerations in favour of his position. One starts from the observation that personal identity is essential to the justice of reward and punishment (Locke 1975: 341), in that one is justly punished only for what one has oneself done. Locke then argues that this shows how memory constitutes identity, since ‘This personality extends it self beyond present existence to what is past, only by consciousness, whereby it becomes concerned and accountable, owns and imputes to it *self* past Actions’ (Locke 1975: 346). But he himself acknowledges that the argument is weak, since a lack of memory due to drunkenness does not provide an excuse for misdeeds done when one was drunk (Locke 1975: 343–344). A different line of thought appeals to our intuition as to what we would think about a case in which ‘the Soul of a Prince, carrying with it the consciousness of the Prince’s past Life’ enters and informs the Body of a Cobbler. Concerning this case, Locke maintains that the person who has been a Cobbler ‘would be the same Person with the Prince, accountable only for the Prince’s Actions’ (Locke 1975: 340). Locke now asks ‘But who would say that it was the same Man?’—which suggests at first that he is going to argue that the Cobbler is not the same Man; but in fact Locke argues that since the Cobbler’s body remains the same, the transference of the Prince’s consciousness to the Cobbler ‘would not make another Man’ (Locke 1975: 340). The story is intended to persuade us that personal identity can diverge from human identity, being the same man, even though, as he acknowledges, this conclusion runs contrary to ‘our ordinary way of speaking’ (Locke 1975: 340).

Locke’s thought-experiment is the origin of a host of similar stories. In this case, without some explanation of how the Cobbler has come to have the Prince’s consciousness, including his memories, we are likely to remain as sceptical about this story as we are of other stories of reincarnation. But it is also important to note that Locke’s story, at least as he tells it, gives rise to the difficulty I discussed earlier concerning relativist accounts of identity: if being the same man and being the same person are both genuine instances of identity, and not just similarity, then Locke’s story is incoherent unless one is prepared to accept the relativity of identity and set aside the indiscernibility of identicals. For let us imagine that the Prince’s consciousness enters the Cobbler’s Body on New Year’s Day 1700; then Locke’s story involves the following claims: (i) the Prince in 1699 is not the same man as the Cobbler in 1699; (ii) the Prince in 1699 is the same person as the Cobbler in 1700; (iii) the Cobbler in 1700 is the same man as the Cobbler in 1699. But, given the indiscernibility of identicals, (ii) and (iii) imply: (iv) the Prince in 1699 is the same man as the Cobbler in 1699, i.e. the negation of (i). The problem here is similar to that which I discussed earlier concerning the relation between the dog Fido and the collection of cells of which he is made. In this case let us say that a person is realized by a man, and use prefixes to make it clear whether a person or man is being described, so that we distinguish between the person-Prince and the man-Prince, etc. Once the appropriate prefixes are added proposition (ii) becomes (ii)* the person-Prince (p. 127) in 1699 is the same person as the person-Cobbler in 1700, and (iii) becomes (iii)* the man-Cobbler in 1700 is the same man as the man-Cobbler in 1699, and now it is obvious that there is no legitimate inference to the analogue of (iv), i.e. (iv)* the man-Prince in 1699 is the same man

as the man-Cobbler in 1699, at least as long as one adds that the relation between the person-Prince and the man-Prince is not identity but realization.

It is not clear to me how far this last point, concerning the difference between men and persons, is alien to Locke, or is just a way of clarifying something implicit in his general position. It is, however, a point of general significance to which I shall return later. But I want now to discuss briefly Hume's reaction to Locke in *A Treatise of Human Nature*. Hume anticipates the position discussed earlier which repudiates genuine diachronic identity in favour of an approach according to which the appearance of diachronic identity is constructed from elements that do not themselves persist. Hume's radical version of this position rests on the thesis that identity, properly understood, is incompatible with change (Hume 1888: 254), and since he holds that there are no persisting substances, material, or mental, which do not change, there is no genuine diachronic identity. The only 'distinct existences' which one might call 'substances' are our fleeting perceptions, which have no persistence in time (Hume 1888: 233), and it is resemblances among these which give rise to the 'fiction of a continu'd existence' of material bodies (Hume 1888: 209). Similarly, he maintains, the conception of personal identity is a 'fictitious one' (Hume 1888: 259). But while he holds that memory 'is the source of personal identity' (Hume 1888: 261), it is in fact a 'chain of causes and effects, which constitute our self and person' (Hume 1888: 262). The role of memory is just epistemological, it is to acquaint us with 'the continuation and extent of this succession of perceptions' which constitute our self; but once we are thus acquainted, we can use our general understanding of the world to extend the chain of causes beyond memory and thus extend 'the identity of our persons' to include circumstances and events of which we have no memory (Hume 1888: 262).

Hume offers little by way of argument for his claim that there can be no genuine diachronic identity, and although we have seen above that there are some powerful considerations that can be offered in favour of this position, I do not propose to revisit that issue. Instead, I want to discuss his thesis that memory only 'discovers' personal identity while causation 'produces' it (Hume 1888: 262). While Hume locates this thesis within his account of the 'fiction' of personal identity based on causal connections between perceptions, there seems no good reason why one could not remove it from that context to modify and improve Locke's account of personal identity so that it includes events of which we have no memory, such as events in early childhood. However, this line of thought brings to the surface a central challenge to the whole Lockean project of providing an account of personal identity which is fundamentally different from an account of our human identity, our identity as a 'Man', as Locke puts it. For Locke, human identity is a matter of the (p. 128) 'participation of the same continued Life, by constantly fleeting Particles of Matter, in succession vitally united to the same organized Body' (Locke 1975: 331–332); and it is clear that this is largely a matter of causal processes whereby an organism takes in new materials to replace those which have become exhausted or worn out. As such, this is very different from Locke's account of the basis of personal identity, which does not appeal at all to causation but is instead focused on 'consciousness', via the thesis that 'Nothing but consciousness can unite remote Existences into the same Person' (Locke 1975:

344). Indeed, as we saw earlier, Locke's position implies that it is a mistake to think of ourselves as both persons and men; instead we should think of ourselves as persons who are realized by a man, a particular human body. Once one follows Hume's suggestion and introduces causation into the account of what it is that 'can unite remote Existences into the same Person', however, it makes sense to wonder whether one might not integrate the accounts of human and personal identity. Even though Locke's way of approaching the issue does not start from a metaphysical dualism between body and mind, or thinking subject (he is explicitly agnostic on this issue—see Locke 1975: 540–542), his very different accounts of their criteria of identity lead to the conclusion that nothing can be both a person and a man. But this separation is called into question once we recognize that we are essentially embodied perceivers, speakers, and agents. For, as we recognize that the lives of humans, like those of many other animals, include the exercise of their psychological capacities as well as 'blind' physiological processes, it seems *prima facie* appropriate to frame an enriched account of human identity which, unlike that which Locke offers, takes account of these psychological capacities, including memory, and embeds their exercise in a general account of human-cum-personal identity. On this unified account, therefore, because being the same person includes being the same man there is no need to hold that persons are only realized by men, or human beings. Instead, as seems so natural that it is hard to see how it could be sincerely disbelieved, the central claim is that persons like us just are human beings (perhaps there are other persons who are not humans—Gods or non-human apes, perhaps; but that issue need not be pursued here).

This unified position, sometimes called 'animalism', provides the main challenge to neo-Lockean positions which follow Hume by accepting that it is causal connections which constitute the personal identity that is manifested in memory and self-consciousness, but without the taking the further step of integrating this account of personal identity with that of our identity as humans (for an extended elaboration and defence of this position, see Olson 1997). The main Lockean reply to the unified position is that it fails to provide logical space for our responses to thought-experiments such as Locke's story about the Prince whose consciousness appears to have been transferred to a Cobbler, that the Man-Cobbler remains the same Man despite the fact that the person-Cobbler 'would be the same Person with the Prince, accountable only for the Prince's Actions' (Locke 1975: 340). As I mentioned earlier, because Locke's story does not include any causal ground for supposing that the (p. 129) person-Cobbler has become the person-Prince, it is unconvincing. But that issue can be addressed by supposing that the man-Prince's brain has been transplanted into the man-Cobbler's head, and that after the operation has been completed, with the new brain connected in the all the appropriate ways to the rest of what was the man-Cobbler's body, the person who speaks from what was the man-Cobbler's body speaks as if he were the Prince, with the Prince's memories, motivations, concerns, and projects. While there is a large element of make-believe in this story, it is easy to see the sense in holding that the post-transplant person-Cobbler has now become the person-Prince. But are we persuaded that the person-Prince is now realized in the man-Cobbler given that the man-Cobbler has received the brain-transplant from the man-Prince? It is essential to the Lockean position that this point should be accepted, but the

truth seems to be that the person-Prince is primarily realized in the man-Prince's brain, both before the transplant and after it, and thus that the brain-transplant addition which this Lockean story relies on to vindicate the personal identity of the later person-Cobbler with the earlier person-Prince conflicts with the Lockean's claim that the later person-Prince is realized in the earlier man-Cobbler. For the post-transplant man-Cobbler is a hybrid, and not the same man as the earlier man-Cobbler. Thus, once Locke's story is filled out to make it credible that the person-Cobbler has become the person-Prince, it no longer supports Locke's further claim that the man-Cobbler who now realizes the person-Prince is the same man as the earlier man-Cobbler. Not only does this conclusion undermine the Lockean objection to the unified position which integrates personal with human identity, the story as a whole turns out to give some support to that position, since it suggests that personal identity is bound up with the identity of the core component of one's human identity, namely one's brain.

However, the Lockean is not without further dialectical resource. Instead of filling out Locke's story with a brain-transplant, we are to imagine that the kind of technology that we are familiar with from computers, whereby some of the information and programs on one's old computer can be transferred to a new computer, can be applied to human brains. So, on this new story the Cobbler's brain is progressively 'wiped clean' of all personal contents as it is reprogrammed in such a way that these contents are replaced with the personal contents (memories, beliefs, imaginings, motivations, concerns, etc.) that are copied from the Prince's brain; and once this is over, we are to suppose that as in the previous story the Cobbler manifests the Prince's self-consciousness, but without the physical change inherent in a brain-transplant. So, does this story vindicate the Lockean thesis that the person-Cobbler can become the same person as the person-Prince while remaining the same man-Cobbler as before? In this case, it is more difficult to challenge the claim that the man-Cobbler remains the same; however, it makes sense to challenge the claim that the person-Cobbler has become the same person as the person-Prince. The immediate ground for this challenge is that it is not an essential part of the story that the person-Prince realized in the man-Prince's body ceases to exist when the (p. 130) personal contents of his brain are copied into the man-Cobbler's brain. Hence the story is one of cloning the person-Prince, rather than transplanting him. Of course, one could vary the story so that it does have this feature, but the important point is that this way of thinking about the way in which the person-Cobbler becomes a person-Prince readily permits the cloning of persons. As the earlier discussion of the cloning of plants indicates, cloning is not compatible with identity; so in so far as the revised Prince/Cobbler story involves cloning it leads, not to a Lockean conclusion concerning personal identity, but instead to the conclusion that one person can survive as many different persons. The strangeness of this conclusion, however, makes it all the more important to consider carefully whether this second story is persuasive.

What gives substance to doubt about this is the reprogramming model employed in this story. While computer programs can of course be individuated, they are abstract objects—sequences of instructions—which exist only in so far as they are realized on pieces of paper and then in computers; but persons are not abstract ways of being a person which

can be realized in many different humans; they are thinkers and agents. The Lockean will respond that this objection fails to do justice to the way in which the person-Prince is being imagined to manifest himself in the consciousness of the post-transfer person-Cobbler, as someone who is united by consciousness to earlier parts of the person-Prince's life; so, there is more to the post-transfer person-Cobbler than the fact that he has acquired the Prince's personality, along with his memories and motivations: he consciously identifies himself as the Prince. This response brings out a key issue to which I have not yet given much attention, namely the significance of self-consciousness for one's personal identity. For Locke, this is indeed central, as he emphasizes by his claim that 'Nothing but consciousness can unite remote Existences into the same Person' (Locke 1975: 344). But as Hume recognized, this claim is unpersuasive; consciousness is neither necessary nor sufficient, since, on the one hand, one's personal life includes events of which one has no memory, and, on the other hand, one's consciousness includes both false memories, such as fantasies, anxieties, dreams, and the like which manifest themselves as experiential memories, and along with them some true beliefs about one's past which one is liable to imagine oneself remembering. Hume was right to say that causal connections between events in one's life, one's perceptions of them, beliefs about them and reactions to them, are the basis of personal identity, even if Locke was right to think that it is through the manifestation of these beliefs and other thoughts, including intentions, in self-consciousness that we become persons, beings with the capacity to think of ourselves as 'I'. But what remains to be clarified is the significance for personal identity of this capacity for self-consciousness.

Locke seems to take it that self-consciousness is by itself authoritative. As I have argued, this is not right: it needs a causal underpinning. The issue raised by the second version of Locke's story about the Prince and the Cobbler, however, is whether, once a causal connection is in place, we have to accept the verdict of (p. 131) self-consciousness, such that the post-transfer person-Cobbler who thinks of himself as the pre-transfer person-Prince is indeed right to do so. The problem with this interpretation of the course of events is that it allows that, where the person-Prince remains much as before, we turn out to have two different person-Princes; and we can have as many more as the number of times that the reprogramming procedure is undertaken. This result shows that even where there is an effective causal underpinning to it, self-consciousness cannot be relied on as a criterion of personal identity. There is then the option of drawing the conclusion that what was supposed to be a criterion of identity is only a condition for survival, such that the pre-transfer person-Prince can survive as different persons, the person-Cobbler, the person-Prince, and others as well. While for plants which reproduce by cloning some analogue of this hypothesis is inescapable, for persons this outcome strikes me as deeply counterintuitive in a way which conflicts with the role which the appeal to self-consciousness plays in this story. For the self-consciousness of each of the post-transfer person-Princes faces the radical challenge of coming to terms with the fact that while they are different from each other, they are all correct in identifying with the pre-transfer person-Prince, in thinking of his life as their own past. While the logic of this outcome can be managed by accepting that the relation in question, survival, is not symmetric, the alienated form of self-con-

sciousness that is involved, in thinking of oneself as different from people with whom was once the same, seems to me to undermine the rationale for thinking that one's self-consciousness is decisive in determining who one is in the first place (for a powerful exposition and defence of the thesis that what matters in respect of personal existence is survival, not identity, see Parfit 1984: pt 3).

Instead self-consciousness needs the right kind of causal basis, and the obvious candidate for this role is that provided by the unified theory's integration of personal identity with human identity, which rules out the suggestion that the kind of reprogramming of the man-Cobbler's brain described in the second story could be the basis for concluding that the person-Cobbler's self-consciousness shows that he has become a person-Prince. For the unified theory, the truth is that through the reprogramming procedure the person-Cobbler has been brain-washed: he has suffered the terrible misfortune of having his own genuine memories and concerns wiped out and replaced by false memories and concerns which have been imported from the person-Prince. Even though he has the self-consciousness as of being the person-Prince, this is just an illusion—an internalized copy of someone else's self-consciousness. The conclusion to draw is that a satisfactory account of personal identity can be found only when the account is such that our personal identity is unified with that of our human identity, which would imply that there is no longer any need for the tedious artifice of the 'person'/'man' prefixes which I have employed when discussing the Lockean position which separates these criteria. I shall not try to lay out here the details of such an account, which requires taking sides on many contested questions in the philosophy of mind; instead I conclude (p. 132) this long discussion of personal identity with Locke's acknowledgment that, despite his arguments to the contrary, this is the position of common sense: 'I know that in the ordinary way of speaking, the same Person, and the same Man, stand for one and the same thing' (Locke 1975: 340). (For a very thorough critical treatment of the issues discussed in this section, albeit one that defends a different conclusion, see Noonan 1989.)

6. 'Self'-identity

I have endorsed Locke's thesis that self-consciousness is an essential condition of being a person, being someone who thinks of himself or herself as 'I', while arguing that it is a mistake to take it that this thesis implies that self-consciousness is authoritative concerning one's personal identity. At this late stage in the discussion, however, I want to make a concessive move. What can mislead us here, I think, is a confusion between personal identity and our sense of our own identity, which I shall call our 'self'-identity (I use the quotation marks to distinguish it from straightforward self-identity, the relation everything has to itself). Our 'self'-identity is largely constituted by our beliefs about what matters most to us—our background, our relationships, the central events of our lives, and our concerns and hopes for the future. We often modify this 'self'-identity in the light of our experience of the attitudes to us (eg to our ethnicity) and of our understanding of ourselves. In some cases, people experience radical transformations of this 'self'-identity—a classic case being the conversion of Saul of Tarsus into St Paul the Apostle. Paul speaks of

becoming 'a new man' (Colossians 3.10), as is symbolized by the change of name, from 'Saul' to 'Paul'. Becoming a new self in this sense, however, is not a way of shedding one's personal identity in the sense that I have been discussing: St Paul does not deny that he used to persecute Christians, nor does he seek to escape responsibility for those acts. Instead, the new self is the very same person as before, but someone whose values, concerns, and aspirations are very different, involving new loyalties and beliefs, such that he has a new sense of his own identity.

But what is meant here by this talk of a new 'self' and of 'self'-identity? If it is not one's personal identity in the sense I have been discussing, is there another kind of identity with a different criterion of identity, one more closely connected to our self-consciousness than personal identity proper? One thing that is clear is that one's sense of one's own identity is not just one's understanding of one's personal identity; St Paul's conversion is not a matter of realizing that he was not the person he had believed he was. Instead, what is central to 'self'-identity is one's sense of there being a unity to the course of one's life which both enables one to make sense (p. 133) of the way in which one has lived and provides one with a sense of direction for the future. Sometimes this unity is described as a 'narrative' unity (MacIntyre 1981: ch 15), though this can make it sound as if one finds one's 'self'-identity just by recounting the course of one's life as a story about oneself, which is liable to invite wishful thinking rather than honesty. Indeed, one important question about 'self'-identity is how far it is discovered and how far constructed. Since a central aspect of the course of one's life is contributed by finding activities in which one finds self-fulfilment as opposed to tedium or worse, there is clearly space for what one discovers about oneself in one's 'self'-identity. But, equally, what one makes of oneself is never simply fixed by these discoveries; instead one has to take responsibility for what one has discovered—passions, fears, fantasies, goals, loves, and so on—and then find ways of living that enable one to make the best of oneself. Although allusions to this concept of 'self'-identity are common in works of literature, as in Polonius's famous injunction to his son Laertes 'to thine own self be true' (*Hamlet* Act 1, scene 3), discussions of it in philosophy are not common, and are mainly found in works from the existential tradition of philosophy which are difficult to interpret. A typical passage is that from the start of Heidegger's *Being and Time*, in which Heidegger writes of the way in which 'Dasein has always made some sort of decision as to the way in which it is in each case mine (*je meines*)' such that 'it *can*, in its very Being, "choose" itself and win itself; it can also lose itself and never win itself' (Heidegger 1973: 68). Heidegger goes on to connect these alternatives with the possibilities of authentic and inauthentic existence, and this is indeed helpful. For it is in the context of an inquiry into 'self'-identity that it makes sense to talk of authenticity and inauthenticity: an inauthentic 'self'-identity is one that does not acknowledge one's actual motivations, the ways in which one actually finds self-fulfilment instead of following the expectations that others have of one, whereas authenticity is the achievement of a 'self'-identity which by recognizing one's actual motivations, fears, and hopes enables one to find a form of life that is potentially fulfilling.

Identity

If this is what 'self'-identity amounts to, how does it relate to personal identity? Is it indeed a type of identity at all, or can two different people have the very same 'self'-identity, just as they can have the same character? Without adding some further considerations one certainly cannot differentiate 'self'-identities simply by reference to the person of whom they are the 'self'-identity, as the 'self'-identity of *this* person, rather than *that* one, since that situation is consistent with them being general types, comparable to character, or indeed height. But 'self'-identity, unlike height, is supposed to have an explanatory role, as explaining the unity of a life, and it may be felt that this makes a crucial difference. Yet, this explanatory relationship will only ensure that 'self'-identities cannot be shared if there is something inherent in the course of different personal lives which implies that the 'self'-identities which account for them have to be different. If, for example, different persons could be as similar as the duplicate red billiard balls which provided the counterexample to Leibniz's thesis of the identity of indiscernibles, then there would be no ground for (p. 134) holding that they must have different 'self'-identities. Suppose, however, that persons do satisfy Leibniz's thesis, ie that different persons always have different lives, then there is at least logical space for the hypothesis that their 'self'-identities will always be different too. Attractive as this hypothesis is, however, much more would need to be said to make it defensible, so I will have to end this long discussion of identity on a speculative note.

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The Common Good

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Abstract and Keywords

In conventional thinking, the promise of scientific progress gives automatic and unquestioned legitimacy to any new development in biotechnology. It is the nearest thing we have in a morally relativistic society to the concept of the common good. This chapter begins by examining a recent case study, so-called ‘mitochondrial transfer’ or three-person IVF, in which policymakers appeared to accept that this new technology should be effectively deregulated because that would serve UK national scientific progress and the national interest, despite serious unanswered concerns about its effectiveness and safety. The historical and philosophical underpinnings of the concept of the common good should make us more sceptical of the manner in which the concept can be perverted by particular interests. But there are also hopeful signs that the common good and the biomedical commons are being taken seriously in new models for governance of genomics and biotechnology more generally.

Keywords: common good, tragedy of the commons, communitarianism, human genome, mitochondrial transfer, three-person IVF, bioeconomy, biobanks

1. Introduction

IN modern bioeconomies (Cooper and Waldby 2014) proponents of new biotechnologies always have the advantage over opponents because they can rely on the notion of scientific progress to gain authority and legitimacy. Those who are sceptical about any proposed innovation are frequently labelled as anti-scientific Luddites, whereas the furtherance of science is portrayed as a positive moral obligation (Harris 2005). In this view, the task of bioethics is to act as an intelligent advocate for science, providing factual information to allay public concerns. The background assumption is that correct factual information will always favour the new proposal, whereas opposition is grounded in irrational fears. In the extreme of this view, the benefits of science are so powerful and universal that there is no role for bioethics at all, beyond what Steven Pinker has termed ‘the primary moral goal for today’s bioethics ...: “Get out of the way” ’ (2015).

But why is scientific progress so widely viewed as an incontrovertible benefit for all of society? Despite well-argued exposés of corruption in the scientific funding and refereeing process and undue influence by pharmaceutical companies in setting the goals of research (Goldacre 2008, 2012; Elliott 2010; Healy 2012), the sanctity of biomedical research still seems widely accepted. Although we live in an individualistic society which disparages Enlightenment notions of progress and remains staunchly relativistic about truth-claims favouring any one particular world-view, (p. 136) scientific progress is still widely regarded as an unalloyed benefit for everyone. It is a truth universally acknowledged, to echo the well-known opening lines of Jane Austen's *Pride and Prejudice*.

Yet, while the fruits of science are typically presented and accepted as a common good, we are generally very sceptical about any such notion as the common good. Why should technological progress be exempt? Does the answer lie, perhaps, in the decline of religious belief in an afterlife and the consequent prioritization of good health and long life in the here and now? That seems to make intuitive sense, but we need to dig deeper. In this chapter I will examine social, economic, and philosophical factors influencing the way in which science in general, and biotechnology in particular, have successfully claimed to represent the common good.

With the decline of traditional manufacturing, and with new modes of production focusing on innovation value, nurturing the 'bioeconomy' is a key goal for most national governments (Cooper and Waldby 2014). In the UK, these economic pressures have led to comparatively loose biotechnology regulatory policy (Dickenson 2015b). Elsewhere, government agencies that have intervened to regulate the biotechnology sectors have found themselves under attack: for example, the voluble critical response from some sectors of the public after the US Food and Drug Administration (FDA) imposed a marketing ban on the retail genetics firm 23andMe (Shuren 2014). However, in the contrasting case of the FDA's policy on pharmacogenomics (Hogarth 2015), as well as elsewhere in the developed and developing worlds (Sleeboom-Faulkner 2014), regulatory agencies have sometimes been 'captured' to the extent that they are effectively identified with the biotechnology sector. It is instructive that the respondents in the leading case against restrictive patenting included not only the biotechnology firm and university which held the patents, but also the US Patent and Trade Office itself, which operated the permissive regime that had allowed the patents (Association for Molecular Pathology 2013).

I begin by examining a recent UK case study in which so-called 'mitochondrial transfer' or three-parent IVF was approved by Parliament, even though the common good of future generations could actually be imperilled by the germline genetic manipulations involved in the technology. In this case, government, medical charities and research scientists successfully captured the language of scientific progress to breach an international consensus against the modification of the human germline, although some observers (myself included) thought that the real motivation was more to do with the UK's scientific competitiveness than with the common good of the country. This case example will be followed by an analysis of the conceptual background to the concept of the common good. I will end by examining the biomedical commons as a separate but related concept which provides

concrete illustrations of how biotechnology could be better regulated to promote the common good.

(p. 137) 2. Three-Person IVF: The Human Genome and the Common Good

In 2015, the UK Parliament was asked to vote on regulations permitting new reproductive medicine techniques aimed at allowing women with mitochondrial disease to bear genetically related children who would have a lesser chance of inheriting the disease. These techniques, pro-nuclear transfer and maternal spindle transfer, broadly involve the use of gametes and DNA from two women and one man. A parliamentary vote was required because the UK Human Fertilisation and Embryology Act 1990 stipulated that eggs, sperm, or embryos used in fertility treatment must not have been genetically altered (s 3ZA 2–4). This prohibition would be breached by transferring the nucleus from an egg from a woman who has mitochondrial disease to another woman's healthy egg with normal mitochondria and then further developing the altered egg. (The term 'three-person IVF' is actually more accurate than the proponents' preferred term of 'mitochondrial transfer', since it was not the mitochondria being transferred.) However, s 3ZA (5) of the 1990 Act (as amended in 2008) did potentially allow regulations to be passed stipulating that an egg or embryo could fall into the permitted category if the process to which it had been subjected was designed to prevent transmission of mitochondrial disease.

Tampering with the genetic composition of eggs raises concern because any changes made are passed down to subsequent generations. It is the permanence of mitochondrial DNA that enables ancestry and genetic traits to be traced back up the maternal line from descendants (for example, in the recent case of the identification of the body of Richard III). Even if the changes are intended to be beneficial, any mistakes made in the process or mutations ensuing afterwards could endure in children born subsequently. Germline genetic engineering is therefore prohibited by more than 40 other countries and several international human rights treaties, including the Council of Europe Convention on Biomedicine (Council of Europe 1997). That international consensus suggests that preserving the human genome intact is widely regarded as a common good, consistently with the statement in the 1997 UNESCO Universal Declaration on the Human Genome and Human Rights that the human genome is 'the common heritage of humanity' (UNESCO 1997). Unanimously passed by all 77 national delegations, the declaration goes on to assert that the 'human genome underlies the fundamental unity of all members of the human family, as well as the recognition of their inherent dignity and diversity'.

There was scientific concern about the proposed techniques, because not all the faulty mitochondria could be guaranteed to be replaced. Even a tiny percentage of mutated mitochondria might be preferentially replicated in embryos (Burgstaller and others 2014), leading to serious problems for the resulting child and possibly transferring these mutations into future generations. There was also concern **(p. 138)** about the lack of experimental evidence in humans. As David Keefe, Professor of Obstetrics and Gynecology at New

York University School of Medicine, remarked in his cautionary submission to the Human Fertilisation and Embryology Authority (HFEA) consultation, ‘The application of [these] techniques to macaques and humans represents intriguing advances of earlier work, but displays of technical virtuosity should not blind us to potential hazards of these techniques nor to overestimate the scope of their applicability.’ Abnormal fertilization had been observed in some human eggs by Oregon scientists who had not been expecting that result from their previous studies in monkeys (Tachibana and others 2012). Other scientists also concluded that ‘it is premature to move this technology into the clinic at this stage’ (Reinhardt and others 2013).

Last but certainly not least, the techniques would require the donors of healthy eggs to undergo the potentially hazardous procedure of ovarian stimulation and extraction. The US National Institutes of Health had already cautioned scientists about that procedure in its 2009 guidelines on stem cell research. But the executive summary of the HFEA consultation document masked this requirement by stating that the ‘techniques would involve the donation of healthy mitochondria’, without mentioning that mitochondria only come ready-packaged in eggs.

The FDA’s Cellular, Tissue and Gene Therapies Advisory committee, meeting in February 2014, had already decided against allowing the techniques because the science was not yet sufficiently advanced, stating that ‘the full spectrum of risks ... has yet to be identified’ (Stein 2014). These discussions raised a wide range of troubling prospects, including the carryover of mutant mitochondrial DNA as a result of the procedures and the disruption of interactions between mitochondrial DNA and nuclear DNA. There were also daunting challenges in designing meaningful and safe trials, since pregnancy and childbirth pose serious health risks for the very women who would be the most likely candidates for the techniques. In a summary statement, FDA committee chair Dr Evan Snyder characterized the ‘sense of the committee’ as being that there was ‘probably not enough data either in animals or in vitro to conclusively move on to human trials’. He described the concerns as ‘revolv[ing] around the preclinical data with regard to fundamental translation, but also with regard to the basic science’. That decision was represented in the UK, however, as a claim that the FDA had not decided *whether* to proceed. An HFEA expert panel report issued in June 2014, four months after the FDA hearings, stated that ‘the FDA has not made a decision whether to grant such a trial’ (HFEA 2014). In fact, the American agency had decided *not* to proceed—not until the clinical science was better established.

In the UK, the techniques were trumpeted as pioneering for the nation’s researchers and life-saving for a vulnerable population of parents. The Wellcome Trust, the UK’s largest biomedical research charity, had already ‘thrown its considerable political clout behind changing the law’ (Callaway 2014). Introducing the draft revised (p. 139) regulations in Parliament, the Chief Medical Officer for England, Professor Dame Sally Davies, asserted that:

Scientists have developed ground-breaking new procedures which could stop these diseases being passed on, bringing hope to many families seeking to prevent

their future children inheriting them. It is only right that we look to introduce this life-saving treatment as soon as we can.

(UK Department of Health 2014: sec 2.1)

In fact the techniques would not have *saved* any lives: at best they might allow affected women to have genetically related children with a lesser chance (not *no* chance) of inheriting mitochondrial disease.

The Department of Health consultation document claimed:

The intended effects of the proposal are: a. To enable safe and effective treatment for mitochondrial disease; b. To ensure that only those mothers with a significant risk of having children with severe mitochondrial disease would be eligible for treatment; c. To signal the UK's desire to be at the forefront of cutting edge of medical techniques.

(UK Department of Health 2014: annex C)

But the proposed techniques were not treatment, positive safety evidence was lacking, and many women with mitochondrial disease had disclaimed any desire to use the techniques. As a colleague and I wrote in *New Scientist*: 'If the safety evidence is lacking and if the handful of beneficiaries could be put at risk, that only leaves one true motive for lifting the ban post-haste: positioning the UK at the forefront of scientific research on this' (Dickenson and Darnovsky 2014: 29). Lest that judgement sound too much like conspiracy theory, Jane Ellison, Under-Secretary of State for Health, had already foregrounded British scientific competitiveness when she argued in her testimony before UK House of Commons that: 'The use of the techniques would also keep the UK at the forefront of scientific development in this area and demonstrate that the UK remains a world leader in facilitating cutting-edge scientific breakthroughs' (HC Deb 12 March 2014).

Despite claims by the HFEA that the new techniques had mustered 'broad support', a ComRes survey of 2,031 people showed that a majority of women polled actually opposed them (Cussins 2014). Yet, the language of the common good was successfully appropriated in the media by those favouring the techniques. Sometimes this was done by enlisting natural sympathy for patients with untreatable mitochondrial disease (for example, Callaway 2014). Opponents were left looking flinty-hearted, even though it could equally well be argued that it would be wrong to use such vulnerable patients in a context where there were to be no clinical trials and no requirement of a follow-up study. There was no huge groundswell of patients pleading for treatment: the Department of Health consultation document admitted that no more than ten cases per year would be involved (UK Department of Health 2014: 41). Despite procedural concerns and disagreement within science itself about the efficacy and safety of so-called 'mitochondrial transfer', the notion (p. 140) that the common good was served by the new technique carried the parliamentary day. In January 2015, the UK House of Commons voted by a large majority to allow fertility clinics to use these germline genetic engineering techniques. The proposals were

approved by the House of Lords in February, thus allowing the HFEA to license their use from the autumn of the same year.

3. The Common Good: Analysing the Concept

Why was such research, about which many scientists themselves had deep efficacy and safety doubts, allowed to claim that it represented the common good? Harms to egg providers, harms to potential offspring and future generations, harms to specific interest groups, and harms to society all gave cause for serious concern (Baylis 2013). Why was there a government and media presumption in favour of this new biotechnology? Nurturing the bioeconomy and promoting UK scientific competitiveness might well be a factor, but why was there not more widespread dissent from that goal? Instead, as Françoise Baylis has commented:

in our world—a world of heedless liberalism, reproductive rights understood narrowly in terms of freedom from interference, rampant consumerism, global bio-exploitation, technophilia and hubris undaunted by failure—no genetic or reproductive technology seems to be too dangerous or too transgressive.

(2014: 533)

If maintaining the human germline intact does not constitute the common good, what does? Why did comparatively few UK bioethicists make that point in this case? We might expect bioethics to have provided a careful analysis of the assumption that new biotechnologies (such as three-person IVF) automatically serve the common good. After all, most of its original practitioners, and many of its current scholars, have had exactly the sort of analytical philosophical training that should qualify them to do so. Some observers, however, accuse bioethics of laxity in this regard. The medical sociologist John Evans argues that the field of bioethics is no longer critical and independent: rather, 'it has taken up residence in the belly of the medical whale', in a 'complex and symbiotic relationship' with commercialized modern biotechnology: 'Bioethics is no longer (if it ever was) a free-floating oppositional and socially critical reform movement' (Evans 2010: 18–19).

Although Evans writes from outside the field, some very prominent bioethicists take a similar view: most notably Daniel Callahan. It is precisely on the issue of serving the common good that Callahan grounds his critique of how bioethics has (p. 141) developed, since its founding in the late 1960s with the aim of protecting research subjects and ensuring the rights of patients. As Callahan writes

Partly as a reflection of the times, and of those issues, the field became focused on autonomy and individual rights, and liberal individualism came to be the dominant ideology ... Communitarianism as an alternative ideology, focused more on the common good and the public interest than on autonomy, was a neglected approach.

(2003: 496)

This development is partly explained by 'the assumption that in a pluralistic society, we should not try to develop any rich, substantive view of the common good' (Callahan 1994: 30). The best we can do, in this widely accepted pluralist view, is to create institutions that serve the common good of having open and transparent *procedures*, in which more substantive contending notions of interests and benefits can be debated and accommodated. But in the UK case example not even this minimal, procedural conception of the common good was met. In the rush to promote British scientific competitiveness, there were profound flaws in the consultation process: for example, a window of a mere two weeks in March 2014 for public submission of any new evidence concerning safety. The HFEA review panel then concluded that the new technologies were 'not unsafe' (HFEA 2014), despite the safety concerns identified earlier that year by the FDA hearings.

Callahan regards the liberal individualism that came to dominate bioethics as an ideology rather than a moral theory (Callahan 2003: 498). He notes that its doctrinaire emphasis on autonomy combines with a similarly ideological emphasis on removing any constraints that might hamper biomedical progress. Both, one might say, are aspects of a politically libertarian outlook, which would be generally distrustful of regulation. There is a presumption of innocence, in this view, where new biotechnologies are concerned. As Callahan describes the operations of this assumption:

If a new technology is desired by some individuals, they have a right to that technology unless hard evidence (not speculative possibilities) can be advanced showing that it will be harmful; since no such evidence can be advanced with technologies not yet deployed and in use, therefore the technology may be deployed. This rule in effect means that the rest of us are held hostage by the desires of individuals and by the overwhelming bias of liberal individualism toward technology, which creates a presumption in its favour that is exceedingly difficult to combat.

(2003: 504)

Dominant liberal individualism in bioethics also possesses 'a strong antipathy to comprehensive notions of the human good' (Callahan 2003: 498). That is not surprising: liberal individualism centres on 'rights talk', which presupposes irreducible and conflicting claims on individuals against each other (Glendon 1991). The extreme of this image lies in Hobbes's metaphor of men as mushrooms 'but newly sprung out of the earth', connected to each other by only the flimsiest of roots. What is inconsistent for liberal individualism is to oppose notions of the common good (p. 142) while simultaneously promoting scientific progress as a supreme value because it implicitly furthers the common good. Yet, this inconsistency goes unremarked.

The concept of the common good is intrinsically problematic in a liberal world-view, where there are no goods beyond the disparate aims of individuals, at best coinciding uneasily through the social contract. Hobbes made this plain when he wrote: '[f]or there is no such *Finis ultimis* (utmost ayme), nor *Summum Bonis* (greatest Good), as is spoken of in the Books of the Old Moral Philosophers' (1914: 49). Here, Hobbes explicitly rejects the Thomist notion of the *bonum commune*, the idea that law aims at a common good

which is something more than the mere sum of various private goods (Keyes 2006; Ryan 2012: 254).

The antecedents of the common good lie not in the liberal theorists who have had greatest influence on the English-speaking world, such as Hobbes, Smith, Locke, or Mill, but rather in Aristotle, Aquinas, and Rousseau (Keyes, 2006). In book III of *The Politics*, Aristotle distinguishes the just state as the polity that seeks the common good of all its citizens, in contrast to regimes that only further private interests. A democracy is no more immune from the tendency to promote private interests than a dictatorship or an oligarchy, Aristotle remarks; indeed, he regards democracy as a corrupted or perverse form of government. The extent to which the common good is served underpins his typology of good regimes (kingship, aristocracy, and constitutional government or *politeia*) and their evil twins (tyranny, oligarchy, and democracy): ‘For tyranny is a kind of monarchy which has in view the interest of the monarch only; oligarchy has in view the interest of the wealthy; democracy, of the needy: none of them the common good of all’ (Aristotle 1941: 1279b 6–10). Unlike the liberal social contract theorists, Aristotle famously regards people as ‘political animals’, brought to live together by their inherently social nature and by their common interests, which are the chief end of both individuals and states (Aristotle 1941: 1278b 15–24): ‘The conclusion is evident: that governments which have a regard to the common interest are constituted in accordance with strict principles of justice, and are therefore true forms; but those which regard only the interest of the rulers are all defective and perverted forms’ (Aristotle 1941: 1279a 17–21).

Although Aristotle founds his typology of governments on the question of which regimes pervert the common good, for modern readers his scheme is vulnerable to the question of who decides what constitutes the common good in the first place. To Aristotle himself, this is actually not a problem: the just society is that which enables human flourishing and promotes the virtues. Whether the polity that pursues those aims is ruled by one person, several persons, or many people is a matter of indifference to him. Nor can we really talk of the common good as being decided by the rulers in Aristotle’s framework: rather, only implemented by them.

The rise of Western liberalism has put paid to this classical picture (Siedentop 2014) and strengthened the notion that the good for humanity does not antedate society itself. Except at the very minimal level of the preservation of life (in Hobbes) or of property as well (in Locke) as aims that prompt us to enter the social contract, (p. 143) there is no pre-existing common good in liberal theory: only that agreed by individuals in deliberating the creation of the social contract which creates the state. Rousseau offers a different formulation of the common good to the English theorists, in his discussion of the general will, but retains the notion of the social contract.

Is the ‘common good’ fundamental to genuine democracy, or antithetical to transparency and accountability? Might the concept of ‘acting in the public interest’ simply be a fig leaf for illegitimate government actions? Of course the political theorist who insists most strongly on asking that question is Marx, with *The Communist Manifesto*’s formulation of

the state as ‘a committee for managing the common affairs of the whole bourgeoisie’ (Marx and Engels 1849). The state is ultimately dependent on those who own and control the forces of production. Indeed, ‘the state had itself become an object of ownership; the bureaucrats and their masters controlled the state as a piece of property’ (Ryan 2012: 783). However, elsewhere in his work, particularly in *The Eighteenth Brumaire of Louis Napoleon*, Marx views the state as partly autonomous of the class interests that underpin it (Held 1996: 134). Both strands of Marx’s thinking are relevant to the regulation of biotechnology: we need to be alert to the economic interests behind new biotechnologies—what might be termed ‘the scientific-industrial complex’ (Fry-Revere 2007)—but we should not cravenly assume that the state can do nothing to regulate them because it has no autonomy whatsoever. That is a self-fulfilling prophecy.

As Claus Offe warns (perhaps with the Reichstag fire or the Night of Broken Glass in mind): ‘In extreme cases, common-good arguments can be used by political elites (perhaps by trading on populist acclamation) as a vehicle for repealing established rights at a formal level, precisely by referring to an alleged “abuse” of certain rights by certain groups’ (2012: 8). Liberal political theory has traditionally distrusted the common good precisely on those grounds, at most allowing it a role as the lowest common denominator among people’s preferences (Goodin 1996) or a ‘dominant end’ (Rawls 1971). But the common good is more than an aggregate of individual preferences or the utilitarian ‘greatest happiness of the greatest number’. Such additive totals are closer to what Rousseau calls ‘the will of all’, not the ‘general will’ or common good.

We can see this distinction quite clearly in a modern example, climate change. Leaving the bulk of fossil fuel reserves in the ground would assuredly serve the common good of averting global warming, but the aggregate of everyone’s individual preferences for consuming as much oil as we please is leading us rapidly in the fateful opposite direction. The papal encyclical *Care for our Common Home*, issued in June 2015, uses the language of the common good deliberately in this regard: ‘The climate is a common good, belonging to all and meant for all’ (Encyclical Letter *Laudato Si’* of the Holy Father Francis 2015). As Offe argues, we need a concept of the common good that incorporates the good of future generations as well as our own: one such as sustainability, for example (2012: 11). An extreme but paradoxical form of libertarianism, however, asserts that it damages the common good to talk (p. 144) about the common good at all (Offe 2012: 16). Perhaps that is why we so rarely talk about the assumption that scientific progress is the only universally acceptable form of the common good. Yet, biotechnology regulation policy is frequently made on that implicit assumption, as the case study demonstrated in relation to the UK.

Although the concept of the common good does not figure in liberal theory, in practice liberal democracy cannot survive without some sense of commonality: ‘The liberal constitutional state is nourished by foundations that it cannot itself guarantee—namely, those of a civic orientation toward the common good’ (Offe 2012: 4; Boeckenoferde 1976). Robert Putnam’s influential book *Bowling Alone* (Putnam 2000) argues that American liberal democracy was at its healthiest during the post-war period, when a residual sense of

shared values and experience supposedly promoted civic activism and trust in government. Although I have been critical of that view (Dickenson 2013) because it paints too rosy a picture of the 1950s, I think Putnam is correct to say that liberal democracy requires solidarity. That value is somewhat foreign to the English-speaking world, but it is readily acknowledged elsewhere: for example, it is central in French bioethics (see Dickenson 2005, 2007, 2015a).

Possibly the role of scientific progress is to act as the same kind of social cement, fulfilling the role played by solidarity in France. If so, however, we still need to examine whether it genuinely promotes the common welfare. In the three-person IVF case, I argued that it did not. Rather, the rhetoric of scientific progress was used to promote a new technology that imposed possible adverse effects for future generations. Although it is commonly said that liberal democracy must content itself with a procedural rather than a substantive notion of the common good, this case study also shows that even that criterion can be violated in the name of scientific progress. We can do better than that in regulating new biotechnology.

4. The Common Good and the Biomedical Commons

Even though mainstream bioethics remains dominated by emphasis on individual rights, reproductive freedom, and choice, there has been substantial progress towards reasserting more communitarian values. Among these are successfully implemented proposals to establish various forms of the biomedical commons, particularly in relation to the human genome, to be protected as the common heritage of humanity (Ossorio 1997). Academic philosophers, lawyers, and theologians have used common-good arguments in favour of recognizing the genome as a form of common property (for example, Shiffrin 2001; Reed 2006), although some have (p. 145) distinguished between the entire genome and individual genes (Munzer 2002). The notion of the commons as applying to human tissue and organs was first promulgated in 1975 by Howard Hiatt, but its application now extends much further and its relevance is crucial. As I wrote in my recent book *Me Medicine vs. We Medicine*, 'Reclaiming biotechnology for the common good will involve resurrecting the commons. That's a tall order, I know, but moves are already afoot to give us grounds for optimism' (Dickenson 2013: 193).

Ironically, however, resurrecting the commons as a strategy is open to objections in the name of the common good. We saw that Aristotle warned against the way in which the common good tends to be perverted by sectional or class interests in degenerate polities. The commons, too, has been said to be prone to misappropriation by private interests. This is the so-called 'tragedy of the commons' (Hardin 1968), which arises from the temptation for everyone who has a share in communal property to overuse it. Pushed to the extreme, that temptation leads to depletion of the common resource, which is a sort of common good. We could think of this potential tension between the tragic commons and the common good as similar to Rousseau's opposition between the will of all and the general

will, illustrated in the example about climate change which I gave earlier. But how true is the ‘tragedy of the commons’?

There is certainly a trend in modern biomedicine towards viewing the human genome or public biobanks as ‘an open source of free biological materials for commercial use’ (Waldby and Mitchell 2006: 24). When this is done in the attractive name of ‘open access’ but arguably more for corporate profit, the biomedical commons does not necessarily serve the common good. It is well to remember this caveat in the face of influential arguments to the contrary, such as the view that in order for genome-wide analysis to make further progress, research ethics needs to lessen or abandon such traditional protections for research subjects as privacy, consent and confidentiality, in favour of a notion of ‘open consent’ (Lunshof and others 2008). We need to ask who would benefit most: do these proposals serve the common good or private interests? (Hoedemaekers, Gordijn, and Pijnenburg 2006). Unless we believe that scientific progress automatically serves the common good—and I have presented arguments against that easy assumption in section 1—we should be sceptical about sacrificing the comparatively narrow protections that patients and research subjects have only gained after some struggle. These ‘open access’ proposals are all too consistent with Evans’s claim that mainstream bioethics is now resident ‘inside the belly of the whale’. Any loosening of protections in informed consent protocols should be balanced by a quid pro quo in the form of much tighter biobank governance, including recognition of research subjects and publics as a collective body (O’Doherty and others 2011).

However, it is generally inappropriate to apply the ‘tragedy of the commons’ idea to the human genome, which is inherently a non-rivalrous good. It is hard to see how anyone could ‘overuse’ the human genome. In fact, the opposite dilemma (p. 146) has often troubled modern biomedicine: the tragedy of the *anti*-commons (Heller 1998). There are two ways in which any commons can be threatened: either individual commoners may endanger the communal resource by taking more than their fair share, or the valuable commons may be turned wholly or partially into a private good, depriving the previous rights holders of their share (Dickenson 2013: 194). In modern biotechnology, particularly in relation to the genome, the first risk is much less of a problem than the second.

When a valuable communal possession is converted to private wealth, as occurred during the English enclosures and the Scottish clearances, the problem is not overuse but *underuse*, resulting from new restrictions placed on those who previously had rights of access to the resource. Those commoners will typically constitute a defined class of persons, rather than the entire population (Harris 1996: 109), but for that community, the commons in which they held entitlements was far closer to a common good than the entirely private system which replaced it. In the agricultural example, the old peasant commoners were deprived of their communal rights to pasture animals and, ultimately, of their livelihoods and homes. Land was instead turned over to commercialized sheep-farming or deer-grazing, but the collapse of the wool market and the decline of agricultural popula-

tions on aristocratic estates then left land underused and villages derelict (Boyle 1997, 2003).

How does underuse apply to the genetic commons? In the example of restrictive genetic patenting, companies or universities which had taken out patents on genes themselves—not just the diagnostic kits or drugs related to those genes—were able to use restrictive licensing to block other researchers from developing competing products. They were also able to charge high monopoly-based fees to patients, so that many patients who wanted and needed to use the diagnostic tests were unable to access them if they could not afford the fees or their insurers would not pay. The *Myriad* decision (Association for Molecular Pathology 2013) reversed many aspects of this particular tragedy of the anti-commons, bringing together a ‘rainbow coalition’ of researchers, patients, medical professional bodies, the American Civil Liberties Union, and the Southern Baptist Convention in a successful communitarian movement to overturn restrictive BRCA1 and BRCA2 patents.

The *Myriad* plaintiffs’ success is one encouraging development towards entrenching the notion of the common good in biotechnology regulation; another is the charitable trust model (Gottlieb 1998; Winickoff and Winickoff 2003; Otten, Wyle, and Phelps 2004; Boggio 2005; Winickoff and Neumann 2005; Winickoff 2007). This model, already implemented in one state biobank (Chrysler and others 2011), implicitly incorporates the notion of common interests among research participants by according them similar status to beneficiaries of a personal trust. Just as trustees are restricted in what they can do with the wealth stored in the trust by the fiduciary requirement to act in beneficiaries’ interest, the charitable trust model limits the rights of biobank managers to profit from the resource or to sell it on to (p. 147) commercial firms. Robust accountability mechanisms replace vague assurances of stewardship or dedication to scientific progress.

Although the group involved is not as broad as the general public—just as agricultural commoners were limited to a particular locality or estate—the charitable trust model recognizes the collaborative nature of large-scale genomic research, transcending an individualistic model in the name of something more akin to the common good. Effectively the charitable trust model creates a new form of commons, with specified rights for the commoners in the resource. Although those entitlements stop short of full ownership, these procedural guarantees might nevertheless go a long way towards alleviating biobank donors’ documented concerns (Levitt and Weldon 2005) that their altruism is not matched by a similar dedication to the common good on the part of those conducting the research or owning the resulting resource.

More generally, we can translate the traditional commons into a model of the genome and donated human tissue as ‘inherently public property’ (Rose 1986), that is, all assets to which there is a public right of access regardless of whether formal ownership is held by a public agency or a private body. The differentiated property model embodied in the commons is not that of sole and despotic dominion for the single owner, but rather that of a ‘bundle of sticks’ including physical possession, use, management, income, and security against taking by others (Hohfeld 1978; Honoré 1987; Penner 1996), many of which are

shared among a wider set of persons with entitlements. Property law can underpin commons-like structures which facilitate community and sharing, not only possessive individualism: 'Thus, alongside exclusion and exclusivity, property is also a proud home for inclusion and the community' (Dagan 2011: xviii).

Indigenous peoples have been at the forefront of the movement to make biomedical researchers take the common good into account. In Tonga, a local resistance movement forced the government to cancel an agreement with a private Australian firm to collect tissue samples for diabetes research, on the grounds that the community had not genuinely consented. With their sense that their collective lineage is the rightful owner of the genome, many indigenous peoples reject the notions of solely individual consent to DNA donation. When she was thinking of sending a DNA sample off for internet genetic analysis, the Ojibwe novelist Louise Erdrich was cautioned by family members: 'It's not yours to give, Louise' (Dickenson 2012: 71). In 2010 the Havasupai tribe of northern Arizona effectively won a legal battle in which they had claimed a collective right to question and reject what had been done with their genetic data by university researchers. Like the Tongans and Ojibwe, they appealed to concepts of the common good against narrowly individualistic conceptions of informed consent.

Against these hopeful developments must be set a caution, although one that underscores the argument of the relevance of the commons in modern biotechnology. Private firms are already creating a surprising new anomaly, a 'corporate (p. 148) commons' in human tissue and genetic information (Dickenson 2014). Instead of a commonly created and communally held resource, however, the new 'corporate commons' reaps the value of many persons' labour but is held privately. In umbilical cord blood banking (Brown, Machin, and McLeod 2011; Onisto, Ananian, and Caenazzo 2011), retail genetics (Harris, Wyatt, and Kelly 2012), and biobanks (Andrews 2005), we can see burgeoning examples of this phenomenon. This new corporate form of the commons does not allow rights of access and usufruct to those whose labour has gone to establish and maintain it. Thus, Aristotle's old concern is relevant to the common good in biomedicine (Sleeboom-Faulkner 2014: 205): the perversion of the common good by particular interests. The common good and the corporate 'commons' may not necessarily be antithetical, but it would be surprising, to say the least, if they coincided.

The concept of the common good, when properly and carefully analysed, demands that we should always consider the possibility of regulating new technologies, despite the prevalent neo-liberal presumption against regulation. That does not necessarily mean that we will decide to proceed with regulation, but rather that the option of regulation must at least be on the table, so that we can have a reasoned and transparent public debate about it (Nuffield Council on Bioethics 2012). Opponents of any role for bioethics in regulating biotechnology—those who take the view that bioethics should just 'get out of the way'—risk stifling that debate in an undemocratic manner. That itself seems to me antithetical to the common good.

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Law, Responsibility, and the Sciences of the Brain/Mind



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Abstract and Keywords

This chapter considers whether the new sciences of the brain/mind, especially neuroscience and behavioural genetics, are likely to transform the law's traditional concepts of the person, agency, and responsibility. The chapter begins with a brief speculation about why so many people think these sciences will transform the law. It reviews the law's concepts of the person, agency and responsibility, misguided challenges to these concepts, and the achievements of the new sciences. It then confronts the claim that the brain/mind sciences prove that we are not agents who can guide our conduct by reason and thus cannot be responsible. It argues that this claim cannot be supported empirically or conceptually, and that no revolution in legal thinking is foreseeable. The chapter concludes by suggesting that the new sciences have little to offer the law at present, but in the future, they may contribute modestly to reforming doctrine, policy, and practice.

Keywords: Personhood, agency, responsibility, neuroscience, behavioural genetics, compatibilism, rationality, autonomy

1. Introduction

SOCRATES famously posed the question of how human beings should live. As social creatures, we have devised many institutions to guide our interpersonal lives, including the law. The law shares this primary function with many other institutions, including morality, custom, etiquette, and social norms. Each of these institutions provides us with reasons to behave in certain ways as we coexist with each other. Laws tell us what we may do, and what we must and must not do. Although law is similar to these other institutions, in a liberal democracy it is created by democratically elected officials or their appointees, and it is also the only one of these institutions that is backed by the power of the state. Consequently, law plays a central role in, and applies to, the lives of all living in that state.

This account of law explains why the law is a thoroughly folk-psychological enterprise.¹ Doctrine and practice implicitly assume that human beings are agents, i.e. creatures who act intentionally for reasons, who can be guided by reasons, and who in adulthood are capable of sufficient rationality to ground full responsibility unless an excusing condition obtains. We all take this assumption for granted because it is the foundation, or 'standard picture', not just of law, but also of interpersonal relations generally, including how we explain ourselves to others, and to ourselves.

(p. 154) The law's concept of the person and personal responsibility has been under assault throughout the modern scientific era, but in the last few decades dazzling technological innovations and discoveries in the brain/mind sciences, especially the new neuroscience and to a lesser extent behavioural genetics, have put unprecedented pressure on the standard picture. For example, a 2002 editorial published in *The Economist* warned that 'Genetics may yet threaten privacy, kill autonomy, make society homogeneous and gut the concept of human nature. But neuroscience could do all of these things first' (*The Economist* 2002). Neuroscientists Joshua Greene of Harvard University and Jonathan Cohen of Princeton University have stated a far-reaching, bold thesis, which I quote at length to give the full flavour of the claim being made:

[A]s more and more scientific facts come in, providing increasingly vivid illustrations of what the human mind is really like, more and more people will develop moral intuitions that are at odds with our current social practices.... Neuroscience has a special role to play in this process for the following reason. As long as the mind remains a black box, there will always be a donkey on which to pin dualist and libertarian intuitions.... What neuroscience does, and will continue to do at an accelerated pace, is elucidate the 'when', 'where' and 'how' of the mechanical processes that cause behaviour. It is one thing to deny that human decision-making is purely mechanical when your opponent offers only a general, philosophical argument. It is quite another to hold your ground when your opponent can make detailed predictions about how these mechanical processes work, complete with images of the brain structures involved and equations that describe their function.... At some further point ... [p]eople may grow up completely used to the idea that every decision is a thoroughly mechanical process, the outcome of which is completely determined by the results of prior mechanical processes. What will such people think as they sit in their jury boxes? ... Will jurors of the future wonder whether the defendant ... could have done otherwise? Whether he really *deserves* to be punished ...? We submit that these questions, which seem so important today, will lose their grip in an age when the mechanical nature of human decision-making is fully appreciated. The law will continue to punish misdeeds, as it must for practical reasons, but the idea of distinguishing the truly, deeply guilty from those who are merely victims of neuronal circumstances will, we submit, seem pointless

(Greene and Cohen 2006: 217-218).

These are thought-provoking claims from serious, thoughtful people.

This is not the familiar metaphysical claim that determinism is incompatible with responsibility (Kane 2005), about which I will say more later.² It is a far more radical claim that denies the conception of personhood and action that underlies not only criminal responsibility, but also the coherence of law as a normative institution. It thus completely conflicts with our common sense. As Jerry Fodor, eminent philosopher of mind and action, has written:

[W]e have ... no decisive reason to doubt that very many commonsense belief/desire explanations are—literally—true. Which is just as well, because if commonsense intentional psychology really were to collapse, that would be, beyond comparison, the greatest intellectual catastrophe in the history of our species; if we're that wrong about the mind, then that's the wrongest we've ever been about anything. The collapse of the supernatural, for example, didn't compare; theism never came close to being as intimately involved in our thought and our practice ... as belief/desire explanation is. Nothing except, perhaps, our (p. 155) commonsense physics—our intuitive commitment to a world of observer-independent, middle-sized objects—comes as near our cognitive core as intentional explanation does. We'll be in deep, deep trouble if we have to give it up. I'm dubious ... that we can give it up; that our intellects are so constituted that doing without it (... really doing without it; not just loose philosophical talk) is a biologically viable option. But be of good cheer; everything is going to be all right

(Fodor 1987: xii).

The central thesis of this chapter is that Fodor is correct and that our common-sense understanding of agency and responsibility and the legitimacy of law generally, and criminal law in particular, are not imperilled by contemporary discoveries in the various sciences, including neuroscience and genetics. These sciences will not revolutionize law, at least not anytime soon, and at most they may make modest contributions to legal doctrine, practice, and policy.

For the purposes of brevity and because criminal law has been the primary object of so many of these challenges, I shall focus on the criminal law. But the argument is general because the doctrines and practices of, say, torts and contracts, also depend upon the same concept of agency as the criminal law. Moreover, for the purpose of this chapter, I shall assume that behavioural genetics, including gene by environment interactions, is one of the new brain/mind sciences (hereinafter, 'the new sciences').

The chapter first examines why so many commentators seem eager to believe that the law's conception of agency and responsibility is misguided. Then it turns to the law's concepts of personhood, agency, and responsibility, and explores the various common attacks on these concepts, and discusses why they are as misguided as they are frequent. In particular, it demonstrates that law is folk psychological and that responsibility is secure from the familiar deterministic challenges that are fuelled by the new brain/mind sci-

ences. It then briefly canvases the empirical accomplishments of the new brain/mind sciences, especially cognitive, affective, and social neuroscience, and then addresses the full-frontal assault on responsibility exemplified by Greene and Cohen quote above. It suggests that the empirical and conceptual case for a radical assault on personhood and responsibility is not remotely plausible at present. The penultimate section provides a cautiously optimistic account of modest changes to law that might follow from the new sciences as they advance and the data base becomes more secure. A brief conclusion follows.

2. Scientific Overclaiming

Advances in neuroimaging since the early 1990s and the complete sequencing of the human genome in 2000 have been the primary sources of making exaggerated claims about the implications of the new sciences. Two neuroscientific developments (p. 156) in particular stand out: the discovery of functional magnetic resonance imaging (fMRI), which allows noninvasive measurement of a proxy for neural activity, and the availability of ever-higher-resolution scanners, known colloquially as ‘magnets’ because they use powerful magnetic fields to collect the data that are ultimately expressed in the colourful brain images that appear in the scientific and popular media. Bedazzled by the technology and the many impressive findings, however, too many legal scholars and advocates have made claims for the relevance of the new neuroscience to law that are unsupported by the data (Morse 2011), or that are conceptually confused (Pardo and Patterson 2013; Moore 2011). I have termed this tendency ‘brain overclaim syndrome (BOS)’ and have recommended ‘cognitive jurotherapy (CJ)’ as the appropriate therapy (Morse 2013; 2006).

Everyone understands that legal issues are normative, and address how we should regulate our lives in a complex society. They dictate how we live together, and the duties we owe each other. But when violations of those duties occur, when is the state justified in imposing the most afflictive—but sometimes warranted—exercises of state power, criminal blame, and punishment?³ When should we do this, to whom, and to what extent?

Virtually every legal issue is contested—consider criminal responsibility, for example—and there is always room for debate about policy, doctrine, and adjudication. In 2009, Professor Robin Feldman argued that law lacks the courage forthrightly to address the difficult normative issues that it faces. The law therefore adopts what Feldman terms an ‘internalizing’ and an ‘externalizing’ strategy for using science to try to avoid the difficulties (Feldman 2009: 19–21, 37–39). In the internalizing strategy, the law adopts scientific criteria as legal criteria. A futuristic example might be using neural criteria for criminal responsibility. In the externalizing strategy, the law turns to scientific or clinical experts to make the decision. An example would be using forensic clinicians to decide whether a criminal defendant is competent to stand trial and then simply rubberstamping the clinician’s opinion. Neither strategy is successful because each avoids facing the hard questions and impedes legal evolution and progress. Professor Feldman concludes, and I agree, that the law does not err by using science too little, as is commonly claimed (Feld-

man 2009: 199–200). Rather, it errs by using it too much, because the law is insecure about its resources and capacities to do justice.

A fascinating question is why so many enthusiasts seem to have extravagant expectations about the contribution of the new sciences to law, especially criminal law. Here is my speculation about the source. Many people intensely dislike the concept and practice of retributive justice, thinking that they are prescientific and harsh. Their hope is that the new neuroscience will convince the law at last that determinism is true, that no offender is genuinely responsible, and that the only logical conclusion is that the law should adopt a consequentially based prediction/prevention system of social control guided by the knowledge of the neuroscientist-kings who will finally have supplanted the platonic philosopher-kings.⁴ Then, they (p. 157) believe, criminal justice will be kinder, fairer, and more rational. They do not recognize, however, that most of the draconian innovations in criminal law that have led to so much incarceration—such as recidivist enhancements, mandatory minimum sentences, and the crack/powder cocaine sentencing disparities—were all driven by consequential concerns for deterrence and incapacitation. Moreover, as CS Lewis recognized long ago, such a scheme is disrespectful and dehumanizing (Lewis 1953). Finally, there is nothing inherently harsh about retributivism. It is a theory of justice that may be applied toughly or tenderly.

On a more modest level, many advocates think that the new sciences may not revolutionize criminal justice, but they will demonstrate that many more offenders should be excused or at least receive mitigation and do not deserve the harsh punishments imposed by the United States criminal justice system. Four decades ago, the criminal justice system would have been using psychodynamic psychology for the same purpose. The impulse, however, is clear: jettison desert, or at least mitigate, judgments of desert. As will be shown later in this chapter, however, these advocates often adopt an untenable theory of mitigation or of excuse that quickly collapses into the nihilistic conclusion that no one is really criminally responsible.

3. The Concept of the Person and Responsibility in Criminal Law

This section offers a ‘goodness of fit’ interpretation of current Anglo-American criminal law. It does not suggest or imply that the law is optimal ‘as is’, but it provides a framework for thinking about the role the new sciences should play in a fair system of criminal justice.

Law presupposes the ‘folk psychological’ view of the person and behaviour. This psychological theory, which has many variants, causally explains behaviour in part by mental states such as desires, beliefs, intentions, willings, and plans (Ravenscroft 2010). Biological, sociological, and other psychological variables also play a role, but folk psychology considers mental states fundamental to a full explanation of human action. Lawyers, philosophers, and scientists argue about the definitions of mental states and theories of

action, but that does not undermine the general claim that mental states are fundamental. The arguments and evidence disputants use to convince others itself presupposes the folk psychological view of the person. Brains do not convince each other; people do. The law's concept of the responsible person is simply an agent who can be responsive to reasons.

(p. 158) For example, the folk psychological explanation for why you are reading this chapter is, roughly, that you desire to understand the relation of the new sciences to agency and responsibility, that you believe that reading the chapter will help fulfil that desire, and thus you formed the intention to read it. This is a 'practical' explanation, rather than a deductive syllogism.

Brief reflection should indicate that the law's psychology must be a folk-psychological theory, a view of the person as the sort of creature who can act for, and respond to, reasons. Law is primarily action-guiding and is not able to guide people directly and indirectly unless people are capable of using rules as premises in their reasoning about how they should behave. Unless people could be guided by law, it would be useless (and perhaps incoherent) as an action-guiding system of rules.⁵ Legal rules are action-guiding primarily because they provide an agent with good moral or prudential reasons for forbearance or action. Human behaviour can be modified by means other than influencing deliberation, and human beings do not always deliberate before they act. Nonetheless, the law presupposes folk psychology, even when we most habitually follow the legal rules. Unless people are capable of understanding and then using legal rules to guide their conduct, the law is powerless to affect human behaviour. The law must treat persons generally as intentional, reason-responsive creatures and not simply as mechanistic forces of nature.

The legal view of the person does not hold that people must always reason or consistently behave rationally according to some preordained, normative notion of optimal rationality. Rather, the law's view is that people are capable of minimal rationality according to predominantly conventional, socially constructed standards. The type of rationality the law requires is the ordinary person's common-sense view of rationality, not the technical, often optimal notion that might be acceptable within the disciplines of economics, philosophy, psychology, computer science, and the like. Rationality is a congeries of abilities, including, inter alia, getting the facts straight, having a relatively coherent preference-ordering, understanding what variables are relevant to action, and the ability to understand how to achieve the goals one has (instrumental rationality). How these abilities should be interpreted and how much of them are necessary for responsibility may be debated, but the debate is about rationality, which is a core folk-psychological concept.

Virtually everything for which agents deserve to be praised, blamed, rewarded, or punished is the product of mental causation and, in principle, is responsive to reasons, including incentives. Machines may cause harm, but they cannot do wrong, and they cannot violate expectations about how people ought to live together. Machines do not deserve praise, blame, reward, punishment, concern, or respect neither because they exist,

nor as a consequence of the results they cause. Only people, intentional agents with the potential to act, can do wrong and violate expectations of what they owe each other.

(p. 159) Many scientists and some philosophers of mind and action might consider folk psychology to be a primitive or prescientific view of human behaviour. For the foreseeable future, however, the law will be based on the folk-psychological model of the person and agency described. Until and unless scientific discoveries convince us that our view of ourselves is radically wrong, a possibility that is addressed later in this chapter, the basic explanatory apparatus of folk psychology will remain central. It is vital that we not lose sight of this model lest we fall into confusion when various claims based on the new sciences are made. If any science is to have appropriate influence on current law and legal decision making, the science must be relevant to and translated into the law's folk-psychological framework.

Folk psychology does not presuppose the truth of free will, it is consistent with the truth of determinism, it does not hold that we have minds that are independent of our bodies (although it, and ordinary speech, sound that way), and it presupposes no particular moral or political view. It does not claim that all mental states are conscious or that people go through a conscious decision-making process each time that they act. It allows for 'thoughtless', automatic, and habitual actions and for non-conscious intentions. It does presuppose that human action will at least be rationalizable by mental state explanations or that it will be responsive to reasons under the right conditions. The definition of folk psychology being used does not depend on any particular bit of folk wisdom about how people are motivated, feel, or act. Any of these bits, such as that people intend the natural and probable consequences of their actions, may be wrong. The definition insists only that human action is in part causally explained by mental states.

Legal responsibility concepts involve acting agents and not social structures, underlying psychological variables, brains, or nervous systems. The latter types of variables may shed light on whether the folk psychological responsibility criteria are met, but they must always be translated into the law's folk psychological criteria. For example, demonstrating that an addict has a genetic vulnerability or a neurotransmitter defect tells the law nothing per se about whether an addict is responsible. Such scientific evidence must be probative of the law's criteria and demonstrating this requires an argument about how it is probative.

Consider criminal responsibility as exemplary of the law's folk psychology. The criminal law's criteria for responsibility are acts and mental states. Thus, the criminal law is a folk-psychological institution (Sifferd 2006). First, the agent must perform a prohibited intentional act (or omission) in a state of reasonably integrated consciousness (the so-called 'act' requirement, usually confusingly termed the 'voluntary act'). Second, virtually all serious crimes require that the person had a further mental state, the *mens rea*, regarding the prohibited harm. Lawyers term these definitional criteria for *prima facie* culpability the 'elements' of the crime. They are the criteria that the prosecution must prove beyond a reasonable doubt. For example, one definition of murder is the intentional killing of an-

other human being. To be *prima facie* guilty of murder, the person must have intentionally performed some (p. 160) act that kills, such as shooting or knifing, and it must have been his intent to kill when he shot or knifed. If the agent does not act at all because his bodily movement is not intentional—for example, a reflex or spasmodic movement—then there is no violation of the prohibition against intentional killing because the agent has not satisfied the basic act requirement for culpability. There is also no violation in cases in which the further mental state, the *mens rea*, required by the definition is lacking. For example, if the defendant's intentional killing action kills only because the defendant was careless, then the defendant may be guilty of some homicide crime, but not of intentional homicide.

Criminal responsibility is not necessarily complete if the defendant's behaviour satisfies the definition of the crime. The criminal law provides for so-called affirmative defences that negate responsibility, even if the *prima facie* case has been proven. Affirmative defences are either justifications or excuses. The former obtain if behaviour otherwise unlawful is right or at least permissible under the specific circumstances. For example, intentionally killing someone who is wrongfully trying to kill you, acting in self-defence, is certainly legally permissible and many think it is right. Excuses exist when the defendant has done wrong, but is not responsible for his behaviour. Using generic descriptive language, the excusing conditions are lack of reasonable capacity for rationality and lack of reasonable capacity for self-control (although the latter is more controversial than the former). The so-called cognitive and control tests for legal insanity are examples of these excusing conditions. Both justifications and excuses consider the agent's reasons for action, which is a completely folk-psychological concept. Note that these excusing conditions are expressed as capacities. If an agent possessed a legally relevant capacity, but simply did not exercise it at the time of committing the crime or was responsible for undermining his capacity, no defence will be allowed. Finally, the defendant will be excused if he was acting under duress, coercion, or compulsion. The degree of incapacity or coercion required for an excuse is a normative question that can have different legal responses depending on a culture's moral conceptions and material circumstances.

It may appear that the capacity for self-control and the absence of coercion are the same, but it is helpful to distinguish them. The capacity for self-control or 'will power', is conceived of as a relatively stable, enduring trait or congeries of abilities possessed by the individual that can be influenced by external events (Holton 2009). This capacity is at issue in 'one-party' cases, in which the agent claims that he could not help himself in the absence of an external threat. In some cases, the capacity for control is poor characterologically; in other cases, it may be undermined by variables that are not the defendant's fault, such as mental disorder. The meaning of this capacity is fraught. Many investigators around the world are studying 'self-control', but there is no conceptual or empirical consensus. Indeed, such conceptual and operational problems motivated both the American Psychiatric Association (1983) and the American Bar Association (1989) to reject control tests for legal insanity (p. 161) during the 1980s wave of insanity defence reform in the US. In all cases in which such issues are raised, the defendant does act to satisfy the allegedly overpowering desire.

In contrast, coercion exists if the defendant was compelled to act by being placed in a 'do-it-or-else', hard-choice situation. For example, suppose that a miscreant gunslinger threatens to kill me unless I kill another entirely innocent agent. I have no right to kill the third person, but if I do it to save my own life, I may be granted the excuse of duress.

Note that in cases of external compulsion, like the one-party cases and unlike cases of no action, the agent does act intentionally. Also, note that there is no characterological self-control problem in these cases. The excuse is premised on how external threats would affect ordinary people, not on internal drives and deficient control mechanisms. The agent is acting in both one-party and external threat cases, so the capacity for control will once again be a folk psychological capacity.

In short, all law as action-guiding depends on the folk-psychological view of the responsible agent as a person who can be properly be responsive to the reasons the law provides.

4. False Starts and Dangerous Distractions

This section considers three false and distracting claims that are sometimes made about agency and responsibility: 1) the truth of determinism undermines genuine responsibility; 2) causation, and especially abnormal causation, of behaviour entails that the behaviour must be excused; and, 3) causation is the equivalent of compulsion.

The alleged incompatibility of determinism and responsibility is a foundational issue. Determinism is not a continuum concept that applies to various individuals in various degrees. There is no partial or selective determinism. If the universe is deterministic or something quite like it, responsibility is either possible, or it is not. If human beings are fully subject to the causal laws of the universe, as a thoroughly physicalist, naturalist worldview holds, then many philosophers claim that 'ultimate' responsibility is impossible (e.g. Strawson 1989; Pereboom 2001). On the other hand, plausible 'compatibilist' theories suggest that responsibility is possible in a deterministic universe (Wallace 1994; Vihvelin 2013). Indeed, this is the dominant view among philosophers of responsibility and it most accords with common sense. When any theoretical notion contradicts common sense, the burden of persuasion (p. 162) to refute common sense must be very high and no metaphysics that denies the possibility of responsibility exceeds that threshold.

There seems no resolution to this debate in sight, but our moral and legal practices do not treat everyone or no one as responsible. Determinism cannot be guiding our practices. If one wants to excuse people because they are genetically and neurally determined, or determined for any other reason, to do whatever they do, in fact, one is committed to negating the possibility of responsibility for everyone.

Our criminal responsibility criteria and practices have nothing to do with determinism or with the necessity of having so-called 'free will' (Morse 2007). Free will, the metaphysical libertarian capacity to cause one's own behaviour uncaused by anything other than one-self, is neither a criterion for any criminal law doctrine nor foundational for criminal responsibility. Criminal responsibility involves evaluation of intentional, conscious, and po-

tentially rational human action. And few participants in the debate about determinism and free will or responsibility argue that we are not conscious, intentional, potentially rational creatures when we act. The truth of determinism does not entail that actions and non-actions are indistinguishable and that there is no distinction between rational and non-rational actions, or between compelled and uncompelled actions. Our current responsibility concepts and practices use criteria consistent with and independent of the truth of determinism.

A related confusion is that, once a non-intentional causal explanation has been identified for action, the person must be excused. In other words, the claim is that causation per se is an excusing condition. This is sometimes called the 'causal theory of excuse'. Thus, if one identifies genetic, neurophysiological, or other causes for behaviour, then allegedly the person is not responsible. In a thoroughly physical world, however, this claim is either identical to the determinist critique of responsibility and furnishes a foundational challenge to all responsibility, or it is simply an error. I term this the 'fundamental psycholegal error' because it is erroneous and incoherent as a description of our actual doctrines and practices (Morse 1994). Non-causation of behaviour is not and could not be a criterion for responsibility, because all behaviours, like all other phenomena, are caused. Causation, even by abnormal physical variables, is not per se an excusing condition. Abnormal physical variables, such as neurotransmitter deficiencies, may cause a genuine excusing condition, such as the lack of rational capacity, but then the lack of rational capacity, not causation, is doing the excusing work. If causation were an excuse, no one would be responsible for any action. Unless proponents of the causal theory of excuse can furnish a convincing reason why causation per se excuses, we have no reason to jettison the criminal law's responsibility doctrines and practices just because a causal account can be provided.

An example from behavioural genetics illustrates the point. Relatively recent and justly celebrated research demonstrates that a history of childhood abuse coupled with a specific, genetically produced enzyme abnormality that produces a (p. 163) neurotransmitter deficit increases the risk ninefold that a person will behave antisocially as an adolescent or young adult (Caspi and others 2002). Does this mean that an offender with this gene by environment interaction is not responsible or less responsible? No. The offender may not be fully responsible or responsible at all, but not because there is a causal explanation. What is the intermediary excusing or mitigating principle? Are these people, for instance, more impulsive? Are they lacking rationality? What is the actual excusing or mitigating condition? Causal explanations can provide only evidence of a genuine excusing condition and do not themselves excuse.

Third, causation is not the equivalent of lack of self-control capacity or compulsion. All behaviour is caused, but only some defendants lack control capacity or act under compulsion. If causation were the equivalent of lack of self-control or compulsion, no one would be responsible for any criminal behaviour. This is clearly not the criminal law's view.

As long as compatibilism remains a plausible metaphysics—and it is regnant today—there is no metaphysical reason why the new sciences pose a uniquely threatening challenge to the law's concepts of personhood, agency, and responsibility. Neuroscience and genetics are simply the newest determinisms on the block and pose no new problems, even if they are more rigorous sciences than those that previously were used to make the same arguments about the law.

5. The Current Status of the New Sciences

The relation of brain, mind, and action is one of the hardest problems in all science. We have no idea how the brain enables the mind or how action is possible (McHugh and Slavney 1998: 11–12; Adolphs 2015: 175). The brain–mind–action relation is a mystery, not because it is inherently not subject to scientific explanation, but rather because the problem is so difficult. For example, we would like to know the difference between a neuromuscular spasm and intentionally moving one's arm in exactly the same way. The former is a purely mechanical motion, whereas the latter is an action, but we cannot explain the difference between the two. The philosopher, Ludwig Wittgenstein, famously asked: 'Let us not forget this: when "I raise my arm", my arm goes up. And the problem arises: what is left over if I subtract the fact that my arm goes up from the fact that I raise my arm?' (Wittgenstein 1953: para 621). We know that a functioning brain is a necessary condition for having mental states and for acting. After all, if your brain is dead, you have no mental states and (p. 164) are not acting. Still, we do not know how mental states and action are caused. The rest of this section will focus on neuroscience because it currently attracts vastly more legal and philosophical attention than do the other new sciences. The relation of the others, such as behavioural genetics, to behaviour is equally complicated and our understanding is as modest as the relation of the brain to behaviour.

Despite the astonishing advances in neuroimaging and other neuroscientific methods, we still do not have sophisticated causal knowledge of how the brain enables the mind and action generally, and we have little information that is legally relevant. The scientific problems are fearsomely difficult. Only in the present century have researchers begun to accumulate much data from non-invasive fMRI imaging, which is the technology that has generated most of the legal interest. New artefacts are constantly being discovered.⁶ Moreover, virtually no studies have been performed to address specifically legal questions. The justice system should not expect too much of a young science that uses new technologies to investigate some of the most fearsomely difficult problems in science and which does not directly address questions of legal interest.

Before turning to the specific reasons for modesty, a few preliminary points of general applicability must be addressed. The first and most important is contained in the message of the preceding section. Causation by biological variables, including abnormal biological variables, does not per se create an excusing or mitigating condition. Any excusing condition must be established independently. The goal is always to translate the biological evidence into the law's folk-psychological criteria. Neuroscience is insufficiently developed

to detect specific, legally relevant mental content or to provide a sufficiently accurate diagnostic marker for even a severe mental disorder (Morse and Newsome 2013: 159–160, 167). Nonetheless, certain aspects of neural structure and function that bear on legally relevant capacities, such as the capacity for rationality and control, may be temporally stable in general or in individual cases. If they are, neuroevidence may permit a reasonably valid retrospective inference about the defendant's rational and control capacities, and their impact on criminal behaviour. This will, of course, depend on the existence of adequate science to do this. We currently lack such science,⁷ but future research may provide the necessary data. Finally, if the behavioural and neuroscientific evidence conflict, cases of malingering aside, we must always believe the behavioural evidence because the law's criteria are acts and mental states. Actions speak louder than images.

Now let us consider the specific grounds for modesty about the legal implications of cognitive, affective, and social neuroscience, the sub-disciplines most relevant to law. At present, most neuroscience studies on human beings involve very small numbers of subjects, although this phenomenon is rapidly starting to change as the cost of scanning decreases. Future studies will have more statistical power. Most of the studies have been done on college and university students, who are hardly a random sample of the population generally. Many studies, however, have been done on other (p. 165) animals, such as primates and rats. Whether the results of these studies generalize to human animals is an open question. There is also a serious question of whether findings based on human subjects' behaviour and brain activity in a scanner would apply to real-world situations. This is known as the problem of 'ecological validity'. For example, does a subject's performance in a laboratory on an executive function task in a scanner really predict the person's ability to resist criminal offending?

Consider the following example. The famous Stroop test asks subjects to state the colour of the letters in which a word is written, rather than simply to read the word itself. Thus, if the word 'red' is written in yellow letters, the correct answer is yellow. We all have what is known as a strong prepotent response (a strong behavioural predisposition) simply to read the word rather than to identify the colour in which it is written. It takes a lot of inhibitory ability to refrain from the prepotent response. But are people who do poorly on the Stroop more predisposed to commit violent crimes, even if the associated brain activation is consistent with decreased prefrontal control in subjects? We do not know. And in any case, what legally relevant, extra information does the neuroscience add to the behavioural data with which it was correlated?

Most studies average the neurodata over the subjects, and the average finding may not accurately describe the brain structure or function of any actual subject in the study. Research design and potentially unjustified inferences from the studies are still an acute problem. It is extraordinarily difficult to control for all conceivable artefacts. Consequently, there are often problems of over-inference.

Replications are few, which is especially important for law. Policy and adjudication should not be influenced by findings that are insufficiently established, and replications of find-

ings are crucial to our confidence in a result, especially given the problem of publication bias. Indeed, there is currently grave concern about the lack of replication of most findings in social and neuroscience (Chin 2014). Recently, for example, a group of scientists attempted to replicate some of the most important psychological studies and found that only about one-third were strongly replicated (Open Science Collaboration 2015; but see Gilbert and others for a critique of the power of the OSC study).

The neuroscience of cognition and interpersonal behaviour is largely in its infancy, and what is known is quite coarse-grained and correlational, rather than fine-grained and causal.⁸ What is being investigated is an association between a condition or a task and brain activity. These studies do not demonstrate that the brain activity is a sensitive diagnostic marker for the condition or either a necessary, sufficient, or predisposing causal condition for the behavioural task that is being done in the scanner. Any language that suggests otherwise—such as claiming that some brain region is the neural substrate for the behaviour—is simply not justifiable based on the methodology of most studies. Such inferences are only justified if everything else in the brain remains constant, which is seldom the case (Adolphs 2015: 173), even if the experimental design seems to permit genuine causal inference, say, by temporarily rendering a brain region inactive. Moreover, activity in the same (p. 166) region may be associated with diametrically opposite behavioural phenomena—for example, love and hate. Another recent study found that the amygdala, a structure associated with negative behaviour and especially fear, is also associated with positive behaviours such as kindness (Chang and others 2015).

The ultimate question for law is the relevance of neuroscientific evidence to decision-making concerning human behaviour. If the behavioural data are not clear, then the potential contribution of neuroscience is large. Unfortunately, it is in just such cases that neuroscience at present is not likely to be of much help. I term the reason for this the ‘clear-cut’ problem (Morse 2011). Virtually all neuroscience studies of potential interest to the law involve some behaviour that has already been identified as of interest, such as schizophrenia, addiction and impulsivity, and the point of the study is to identify that behaviour’s neural correlates. To do this properly presupposes that the researchers have already well characterized and validated the behaviour under neuroscientific investigation. This is why cognitive, social, and affective neuroscience are inevitably embedded in a matrix involving allied sciences such as cognitive science and psychology. Thus, neuro-data can very seldom be more valid than the behaviour with which it is correlated. In such cases, the neural markers might be quite sensitive to the already clearly identified behaviours precisely because the behaviour is so clear. Less clear behaviour is simply not studied, or the overlap in data about less clear behaviour is greater between experimental and comparison subjects. Thus, the neural markers of clear cases will provide little guidance to resolve behaviorally ambiguous cases of relevant behavior, and they are unnecessary if the behavior is sufficiently clear.

On occasion, the neuroscience might suggest that the behaviour is not well characterized or is neurally indistinguishable from other, seemingly different behaviour. In general, however, the existence of relevant behaviour will already be apparent before the neuro-

scientific investigation is begun. For example, some people are grossly out of touch with reality. If, as a result, they do not understand right from wrong, we excuse them because they lack such knowledge. We might learn a great deal about the neural correlates of such psychological abnormalities. But we already knew without neuroscientific data that these abnormalities existed, and we had a firm view of their normative significance. In the future, however, we may learn more about the causal link between the brain and behaviour, and studies may be devised that are more directly legally relevant. Indeed, my best hope is that neuroscience and ethics and law will each richly inform the other and perhaps help reach what I term a conceptual-empirical equilibrium in some areas. I suspect that we are unlikely to make substantial progress with neural assessment of mental content, but we are likely to learn more about capacities that will bear on excuse or mitigation. Over time, all these problems may ease as imaging and other techniques become less expensive and more accurate, as research designs become more sophisticated, and as the sophistication of the science increases generally. For now, however, the contributions of the new sciences to our understanding of agency and the criteria for responsibility is extremely modest.

(p. 167) 6. The Radical Neuro-challenge: Are We Victims of Neuronal Circumstances?

This section addresses the claim and hope raised earlier that the new sciences, and especially neuroscience, will cause a paradigm shift in the law's concepts of agency and responsibility by demonstrating that we are 'merely victims of neuronal circumstances' (or some similar claim that denies human agency). This claim holds that we are not the kinds of intentional creatures we think we are. If our mental states play no role in our behaviour and are simply epiphenomenal, then traditional notions of responsibility based on mental states and on actions guided by mental states would be imperilled. But is the rich explanatory apparatus of intentionality simply a post hoc rationalization that the brains of hapless homo sapiens construct to explain what their brains have already done? Will the criminal justice system as we know it wither away as an outmoded relic of a prescientific and cruel age? If so, criminal law is not the only area of law in peril. What will be the fate of contracts, for example, when a biological machine that was formerly called a person claims that it should not be bound because it did not make a contract? The contract is also simply the outcome of various 'neuronal circumstances'.

Before continuing, we must understand that the compatibilist metaphysics discussed above does not save agency if the radical claim is true. If determinism is true, two states of the world concerning agency are possible: agency exists, or it does not. Compatibilism assumes that agency is true because it holds that agents can be responsible in a determinist universe. It thus essentially begs the question against the radical claim. If the radical claim is true, then compatibilism is false because no responsibility is possible if we are not agents. It is an incoherent notion to have genuine responsibility without agency. The question is whether the radical claim is true.

Given how little we know about the brain–mind and brain–mind–action connections, to claim that we should radically change our conceptions of ourselves and our legal doctrines and practices based on neuroscience is a form of ‘neuroarrogance’. It flies in the face of common sense and ordinary experience to claim that our mental states play no explanatory role in human behaviour. The burden of persuasion is firmly on the proponents of the radical view, who have an enormous hurdle to surmount. Although I predict that we will see far more numerous attempts to use the new sciences to challenge traditional legal and common sense concepts, I have elsewhere argued that for conceptual and scientific reasons, there is no reason at present to believe that we are not agents (Morse 2011: 543–554; 2008).

(p. 168) In particular, I can report based on earlier and more recent research that the ‘Libet industry’ appears to be bankrupt. This was a series of overclaims about the alleged moral and legal implications of neuroscientist Benjamin Libet’s findings, which were the primary empirical neuroscientific support for the radical claim. This work found that there was electrical activity (a readiness potential) in the supplemental motor area of the brain prior to the subject’s awareness of the urge to move his body and before movement occurred. This research and the findings of other similar investigations led to the assertion that our brain mechanistically explains behaviour and that mental states play no explanatory role. Recent conceptual and empirical work has exploded these claims (Mele 2009; Moore 2011; Schurger and others 2012; Mele 2014; Nachev and Hacker 2015; Schurger and Uithol 2015). In short, I doubt that this industry will emerge from whatever chapter of the bankruptcy code applies in such cases. It is possible that we are not agents, but the current science does not remotely demonstrate that this is true. The burden of persuasion is still firmly on the proponents of the radical view.

Most importantly, and contrary to its proponents’ claims, the radical view entails no positive agenda. If the truth of pure mechanism is a premise in deciding what to do, no particular moral, legal, or political conclusions follow from it.⁹ This includes the pure consequentialism that Greene and Cohen incorrectly think follows. The radical view provides no guide as to how one should live or how one should respond to the truth of reductive mechanism. Normativity depends on reason, and thus the radical view is normatively inert. Reasons are mental states. If reasons do not matter, then we have no reason to adopt any particular morals, politics, or legal rules, or, for that matter, to do anything at all.

Suppose we are convinced by the mechanistic view that we are not intentional, rational agents after all. (Of course, what does it mean to be ‘convinced’, if mental states are epiphenomenal? Convinced usually means being persuaded by evidence and argument, but a mechanism is not persuaded, it is simply physically transformed. But enough.) If it is really ‘true’ that we do not have mental states or, slightly more plausibly, that our mental states are epiphenomenal and play no role in the causation of our actions, what should we do now? If it is true, we know that it is an illusion to think that our deliberations and intentions have any causal efficacy in the world. We also know, however, that we experience sensations—such as pleasure and pain—and care about what happens to us and to the world. We cannot just sit quietly and wait for our brains to activate, for determinism

to happen. We must, and will, deliberate and act. And if we do not act in accord with the 'truth' that the radical view suggests, we cannot be blamed. Our brains made us do it.

Even if we still thought that the radical view was correct and standard notions of genuine moral responsibility and desert were therefore impossible, we might still believe that the law would not necessarily have to give up the concept of incentives. Indeed, Greene and Cohen concede that we would have to keep punishing people for practical purposes (Greene and Cohen 2006). The word 'punishment' in their (p. 169) account is a solecism, because in criminal justice it has a constitutive moral meaning associated with guilt and desert. Greene and Cohen would be better off talking about positive and negative reinforcers or the like. Such an account would be consistent with 'black box' accounts of economic incentives that simply depend on the relation between inputs and outputs without considering the mind as a mediator between the two. For those who believe that a thoroughly naturalized account of human behaviour entails complete consequentialism, this conclusion might be welcomed.

On the other hand, this view seems to entail the same internal contradiction just explored. What is the nature of the agent that is discovering the laws governing how incentives shape behaviour? Could understanding and providing incentives via social norms and legal rules simply be epiphenomenal interpretations of what the brain has already done? How do we decide which behaviours to reinforce positively or negatively? What role does reason—a property of thoughts and agents, not a property of brains—play in this decision?

Given what we know and have reason to do, the allegedly disappearing person remains fully visible and necessarily continues to act for good reasons, including the reasons currently to reject the radical view. We are not Pinocchios, and our brains are not Geppettos pulling the strings. And this is a very good thing. Ultimately, I believe that the radical view's vision of the person, of interpersonal relations, and of society bleaches the soul. In the concrete and practical world we live in, we must be guided by our values and a vision of the good life. I do not want to live in the radical's world that is stripped of genuine agency, desert, autonomy and dignity. For all its imperfections, the law's vision of the person, agency, and responsibility is more respectful and humane.

7. The Case for Cautious Neuro-law Optimism

Despite having claimed that we should be cautious about the current contributions that the new sciences can make to legal policy, doctrine, and adjudication, I am modestly optimistic about the near- and intermediate-term contributions these sciences can potentially make to our ordinary, traditional, folk-psychological legal doctrine and practice. In other words, the new sciences may make a positive contribution, even though there has been no paradigm shift in thinking about the nature of the person and the criteria for agency and responsibility. The legal regime to which these sciences will contribute will continue to take people seriously as people—as autonomous agents who may fairly be expected to

be guided (p. 170) by legal rules and to be blamed and punished based on their mental states and actions.

My hope, as noted previously, is that over time there will be feedback between the folk-psychological criteria and the neuroscientific data. Each might inform the other. Conceptual work on mental states might suggest new neuroscientific studies, for example, and the neuroscientific studies might help refine the folk-psychological categories. The ultimate goal would be a reflective, conceptual-empirical equilibrium.

At present, I think much of the most promising legally relevant research concerns areas other than criminal justice. For example, there is neuroscientific progress in identifying neural signs of pain that could make assessment of pain much more objective, which would revolutionize tort damages. For another example, very interesting work is investigating the ability to find neural markers for veridical memories. Holding aside various privacy or constitutional objections and assuming that we could detect counter-measures being used by subjects, this work could profoundly affect litigation. In what follows, however, I will focus on criminal law.

More specifically, there are four types of situations in which neuroscience may be of assistance: (1) data indicating that the folk-psychological assumption underlying a legal rule is incorrect; (2) data suggesting the need for new or reformed legal doctrine; (3) data that help adjudicate an individual case; and (4) data that help efficient adjudication or administration of criminal justice.

Many criminal law doctrines are based on folk-psychological assumptions about behaviour that may prove to be incorrect. If so, the doctrine should change. For example, it is commonly assumed that agents intend the natural and probable consequences of their actions. In many or most cases it seems that they do, but neuroscience may help in the future to demonstrate that this assumption is true far less frequently than we think because, say, more apparent actions are automatic than is currently realized. In that case, the rebuttable presumption used to help the prosecution prove intent should be softened or used with more caution.

Such research may be fearsomely difficult to perform, especially if the folk wisdom concerns content rather than functions or capacities. In the example just given, a good working definition of automaticity would be necessary, and 'experimental' subjects being scanned would have to be reliably in an automatic state. This will be exceedingly difficult research to do. Also, if the real-world behaviour and the neuroscience seem inconsistent, with rare exception the behaviour would have to be considered the accurate measure. For example, if neuroscience was not able to distinguish average adolescent from average adult brains, the sensible conclusions based on common sense and behavioural studies would be that adolescents on average behave less rationally and that the neuroscience was not yet sufficiently advanced to permit identification of neural differences.

Second, neuroscientific data may suggest the need for new or reformed legal doctrine. For example, control tests for legal insanity have been disfavoured for some (p. 171) decades because they are ill understood and hard to assess. It is at present impossible to distinguish 'cannot' from 'will not', which is one of the reasons both the American Bar Association and the American Psychiatric Association both recommended abolition of control tests for legal insanity in the wake of the unpopular Hinckley verdict (American Bar Association 1989; American Psychiatric Association Insanity Defense Working Group 1983).

Perhaps neuroscientific information will help to demonstrate and to prove the existence of control difficulties that are independent of cognitive incapacities (Moore 2016). If so, then independent control tests may be justified and can be rationally assessed after all. Michael Moore, for example makes the most thorough attempt to date to provide both the folk-psychological mechanism for loss of control and a neuroscientific agenda for studying it. I believe, however, that the mechanism he describes is better understood as a cognitive rationality defect and that such defects are the true source of alleged 'loss of control' cases that might warrant mitigation or excuse (Morse 2016). These are open questions, however, and more generally, perhaps a larger percentage of offenders than we currently believe have such grave control difficulties that they deserve a generic mitigation claim that is not available in criminal law today.¹⁰ Neuroscience might help us discover that fact. If that were true, justice would be served by adopting a generic mitigating doctrine. I have proposed such a generic mitigation doctrine that would address both cognitive and control incapacities that would not warrant a full excuse (Morse 2003), but such a doctrine does not exist in English or United States law. On the other hand, if it turns out that such difficulties are not so common, we could be more confident of the justice of current doctrine.

Third, neuroscience might provide data to help adjudicate individual cases. Consider the insanity defence again. As in *United States v Hinckley*, there is often dispute about whether a defendant claiming legal insanity suffered from a mental disorder, which disorder the defendant suffered from, and how severe the disorder was (*US v Hinckley* 1981: 1346). At present, these questions must be resolved entirely behaviourally, and there is often room for considerable disagreement about inferences drawn from the defendant's actions, including utterances. In the future, neuroscience might help resolve such questions if the various methodological impediments to discovering biological diagnostic markers of mental disorders can be overcome. In the foreseeable future, I doubt that neuroscience will be able to help identify the presence or absence of specific mental content, because mind reading seems nearly impossible, but we may be able to identify brain states that suggest that a subject is lying or is familiar with a place he denies recognizing (Greely 2013: 120). This is known as 'brain reading' because it identifies neural correlates of a mental process, rather than the subject's specific mental content. The latter would be 'mind reading'. For example, particular brain activation might reliably indicate whether the subject was adding or subtracting, but it could not show what specific numbers were being added or subtracted (Haynes and others 2007).

(p. 172) Finally, neuroscience might help us to implement current policy more efficiently. For example, the criminal justice system makes predictions about future dangerous behaviour for purposes of bail, sentencing (including capital sentencing), and parole. If we have already decided that it is justified to use dangerousness predictions to make such decisions, it is hard to imagine a rational argument for doing it less accurately if we are in fact able to do it more accurately (Morse 2015). Behavioural prediction techniques already exist. The question is whether neuroscientific variables can add value by increasing the accuracy of such predictions considering the cost of gathering such data. Two recent studies have been published showing the potential usefulness of neural markers for enhancing the accuracy of predictions of antisocial conduct (Aharoni and others 2013; Pardini and others 2014). At present, these must be considered preliminary, ‘proof of concept’ studies. For example, a re-analysis of one found that the effect size was exceedingly small.¹¹ It is perfectly plausible, however, that in the future genuinely valid, cost-benefit, justified neural markers will be identified and, thus, prediction decisions will be more accurate and just.

None of these potential benefits of future neuroscience is revolutionary. They are all reformist or perhaps will lead to the conclusion that no reforms are necessary. At present, however, very little neuroscience is genuinely relevant to answering legal questions, even holding aside the validity of the science. For example, a recent review of the relevance of neuroscience to all the doctrines of substantive criminal law found that with the exception of a few already well-characterized medical disorders, such as epilepsy, there was virtually no relevant neuroscience (Morse and Newsome 2013). And the exceptions are the old neurology, not the new neuroscience.

Despite the foregoing caution, the most methodologically sound study of the use of neuroscience in criminal law suggests that neuroscience and behavioural genetic evidence is increasingly used, primarily by the defence, but that the use is haphazard, ad hoc, and often ill-conceived (Farahany 2016). The primary reason it is ill-conceived is that the science is not yet sound enough to make the claims that advocates are supporting with the science. I would add further that even when the science is reasonably valid, it often is legally irrelevant; it doesn’t help answer the question at issue, and it is used more for its rhetorical impact than for its actual probative value. There should not be a ban on the introduction of such evidence, but judges and legislators will need to understand when the science is not sound or is legally irrelevant. In the case of judges, the impetus will come from parties to cases and from judicial education.

Again, despite the caution, as the new sciences advance and the data become genuinely convincing, and especially if there are studies that investigate more legally relevant issues, these sciences can play an increasingly helpful role in the pursuit of justice.

(p. 173) **8. Conclusion**

In general, the new sciences are not sufficiently advanced to be of help with legal doctrine, policy, and practice. Yet, the new sciences are already playing an increasing role in criminal adjudication in the United States and there needs to be control of the admission of scientifically weak or legally irrelevant evidence. Although no radical transformation of criminal justice is likely to occur with advances in the new sciences, the new sciences can inform criminal justice as long as it is relevant to law and translated into the law's folk-psychological framework and criteria. It could also more radically affect certain practices such the award of pain and suffering damages in torts. Most importantly, the law's core view of the person, agency, and responsibility seem secure from radical challenges by the new sciences. As Jerry Fodor counselled, '[E]verything is going to be all right' (Fodor 1987: xii).

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Notes:

- (1.) I discuss the meaning of folk psychology more thoroughly in *infra* section 3.
- (2.) See Kane (2005: 23–31) explaining incompatibilism. I return to the subject in Parts 3 and 5. For now, it is sufficient to note that there are good answers to this challenge.
- (3.) See, e.g. *In re Winship* (1970), holding that due process requires that every conviction be supported by proof beyond reasonable doubt as to every element of the crime.
- (4.) Greene and Cohen (2006) are exemplars of this type of thinking. I will discuss the normative inertness of this position in Part 6.

(5.) See Sher (2006: 123) stating that although philosophers disagree about the requirements and justifications of what morality requires, there is widespread agreement that 'the primary task of morality is to guide action' as well as Shapiro (2000: 131–132) and Searle (2002: 22, 25).

This view assumes that law is sufficiently knowable to guide conduct, but a contrary assumption is largely incoherent. As Shapiro writes:

Legal skepticism is an absurd doctrine. It is absurd because the law cannot be the sort of thing that is unknowable. If a system of norms were unknowable, then that system would not be a legal system. One important reason why the law must be knowable is that its function is to guide conduct

(Shapiro 2000: 131).

I do not assume that legal rules are always clear and thus capable of precise action guidance. If most rules in a legal system were not sufficiently clear most of the time, however, the system could not function. Further, the principle of legality dictates that criminal law rules should be especially clear.

(6.) E.g. Bennett and others (2009), indicating that a high percentage of previous fMRI studies did not properly control for false positives by controlling for what is called the 'multiple comparisons' problem. This problem was termed by one group of authors 'voodoo correlations,' but they toned back the claim to more scientifically respectable language. Vul and others (2009). Newer studies have cast even graver doubt on older findings, suggesting that many are not valid and may not be replicatable (Button and others 2013; Eklund, Nichols & Knutson 2016; Szucs and Ioannidis 2016). But see, Lieberman and others (2009). As any old country lawyer knows, when a stone is thrown into a pack of dogs, the one that gets hit yelps.

(7.) Morse and Newsome (2013: 166–167), explaining generally that, except in the cases of a few well-characterized medical disorders such as epilepsy, current neuroscience has little to add to resolving questions of criminal responsibility.

(8.) See, e.g. Miller (2010), providing a cautious, thorough overview of the scientific and practical problems facing cognitive and social neuroscience.

(9.) This line of thought was first suggested by Professor Mitchell Berman in the context of a discussion of determinism and normativity. (Berman 2008: 271 n. 34).

(10.) I have proposed a generic mitigating condition that would address both cognitive and control incapacities short of those warranting a full excuse (Morse 2003).

(11.) For example, a re-analysis of the Aharoni study by Russell Poldrack, a noted 'neuromethodologist,' demonstrated that the effect size was tiny (Poldrack 2013). Also, the study used good, but not the best, behavioural predictive methods for comparison.

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Human Dignity and the Ethics and Regulation of Technology

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Abstract and Keywords

This chapter investigates how human dignity might be understood as a normative concept for the regulation of technologies. First, various distinctions that are relevant for the way human dignity can be understood are discussed. It is argued that it is particularly important that we should see human dignity as a concept that ascribes a specific status that forms the basis of the human rights regimes. Second, the author's own approach, inspired by Kant and Gewirth, is presented, it being proposed that we should see the concrete content of human dignity as the protection of the authority of human beings to govern their own lives. Third, various consequences for the evaluation of technologies are discussed. In a context of major global and ecological challenges, together with the replacement of human action by automation, the role of human dignity becomes one of guiding the development of a technology-responsive human rights regime.

Keywords: human dignity, Kantian philosophy of technology, agency, human rights, technology

1. Introduction

At first sight, a chapter about human dignity might come as a surprise in a handbook about law, regulation, and technology. Human dignity played a role in ancient virtue ethics in justifying the duty of human beings to behave according to their rational nature. In Renaissance philosophy, human dignity was a relevant concept to indicate the place of human beings in the cosmos. In contemporary applied ethics, human dignity has been primarily disputed in bioethics (e.g. in the context of euthanasia or the use of human embryos)—technologies were relevant here (e.g. to create embryos) but the development and the use of technology itself was not the central question of the debate. A first look at this whole tradition does not explain why human dignity should be a central topic when it comes to the regulation of technology (for an overview about various traditions, see Düwell and others 2013; McCrudden 2013).

(p. 178) At first glance, this negative result does not change significantly if we look at human dignity's role within the human rights regime. Human dignity seems to function in the first instance as a barrier against extreme forms of violations, as a normative concept that aims to provide protection for human beings against genocide, torture, or extreme forms of instrumentalization; after all, the global consensus on human rights is historically a reaction to the Shoah and other atrocities of the twentieth century. But if human dignity were only a normative response to the experience of extreme degradation and humiliation of human beings, it would in the first instance function in contexts in which human actors have voluntarily treated human beings in an unacceptable way. If that were the relevant perspective for the use of human dignity, it would have to be seen as a normative response to extreme forms of technological interventions in the human body or to Orwellian totalitarian systems. However, it would be very problematic to take extreme forms of abuse as the starting point to think about the regulation of technologies, as the dictum says: 'extreme cases make bad law'.

The picture changes, however, if we focus our attention on the fact that human dignity is understood as the foundational concept of the entire human rights regime, which is the core of the normative political order after the Second World War. Then the question would be how human rights—as the core of a contemporary global regulatory regime—relate to developments of technologies. If human dignity is the normative basis for rights in general, then the normative application of human dignity cannot be restricted to the condemnation of extreme forms of cruelty, but must be a normative principle that governs our life in general. We can and should therefore ask what the role of human rights could be when it comes to the regulation of technologies that strongly influence our life. After all, technologies are shaping our lives: they determine how we dwell, how we move, how we are entertained, how we communicate, and how we relate to our own bodies. Due to technology, we are living in a globalized economy, changing the climate, and exhausting natural resources. But, with regard to all of these regulatory contexts, it is far from evident what human rights have to say about them. Technologies evidently have positive effects on human life; it may even be a human right to use certain technologies. However, most technologies have ambivalent effects, which we often cannot even predict. Some of these effects may in the long run be relevant for human rights, and some will affect the lives of human beings who are not yet born.

In all of these contexts, is it uncertain what the answer of human rights should be, and it is as of yet unclear whether human rights have anything relevant to say. Many scholars doubt this. But if human rights regimes had nothing significant to say about the most pressing challenges for the contemporary world—and nearly all of them are related to the consequences of technologies—it is dubious whether human rights could be seen as the central normative framework for the future. Perhaps human rights have just been a plausible normative framework for a certain (p. 179) bourgeois period; perhaps we are facing the 'end of human rights' (Douzinas 2000) and we have to look for a new global normative framework. In line with this consideration, to investigate the relationship between human dignity and the regulation of technologies means nothing less than to ask the

question what an appropriate normative framework for the contemporary technology-driven world could be.

In this chapter, I will (1) discuss some philosophical considerations that are necessary for the understanding of human dignity's role within the human-rights framework, (2) shortly sketch my own proposal for an understanding of human dignity, (3) outline some central aspects of human dignity's application to the regulation of technology, and (4) conclude with some remarks concerning future discussions.

2. Why Human Dignity?

Human dignity has been strongly contested over previous decades.¹ Some have criticized human dignity for being a 'useless' concept, solely *rhetoric*: that human dignity has no significance that could not be articulated by other concepts as well, such as autonomy—it is just that human dignity sounds much more ponderous (Macklin 2003). Some have assumed that it functions as a *discussion stopper* or a taboo; if this trump card is laid on the table, no further justification needs to be given. Some accuse 'human dignity' of being an *empty* concept upon which anybody can project his or her own ideological content. In that sense, liberals understand human dignity as a concept that defends our liberty to decide for ourselves how we want to live, while followers from different religious traditions have co-opted the concept as part of their heritage.

If these accusations were appropriate, this would be dangerous for the normative order of the contemporary world, because its ultimate resource for the justification of a publically endorsed morality would be solely rhetorical and open to ideological usurpation. Accordingly, references to human rights would not settle any normative disagreement in a rational or argumentative manner, since the foundational concept could be used by all proponents for their own ends. This situation explains the high level of rhetorical and emotional involvement around dignity discussions. For the context of this chapter, I will not discuss the various facets of these discussions, but will focus only on some elements that are relevant in the context of this volume; I will not give an elaborated defence of this concept, but will explain some conceptual distinctions and some conditions under which it can make sense.

(p. 180) 2.1 The Normative Content of Human Dignity

We have to wonder what kind of normative concept human dignity is. Is human dignity a normative concept that has a *distinct normative content*, in the sense in which specific normative concepts are distinct from each other (e.g. the right to bodily integrity as distinct from a right to private property, or the duty to help people in need as distinct from a duty to self-perfection)? If human dignity did not have such distinct normative content, it would indeed seem to be empty. But at the same time, it is implausible that its content would be determined in the same sense as that of a specific right, because in that case it could not function as the foundation of specific rights; rather, it is a much more general concept. This question is relevant because some scholars claim that respect for human

dignity would solely require that we do not humiliate or objectify human beings. (Kaufmann and others 2011). Such a humiliationist interpretation would reduce the normative scope of human dignity to the condemnation of extreme atrocities. I would propose, against this position, that we see human dignity as a *principle* that has the function of determining the normative content of other normative concepts, such as rights and duties, and the appropriate institutions related to these. Within the human rights regime, only this interpretation could make sense of the idea of human dignity as the foundation of human rights. This of course also condemns the use of human beings as means only, but would interpret this as having a much broader normative content. In such a sense, Kant's famous 'Formula of Humanity' claims that we have to treat humanity as an 'end in itself', which at once determines the content of morality in general and at the same time excludes by implication the reduction of humans to mere objects (Kant 1996: 80). For Kant, this formula does not only determine the content of the public morality that should guide the organization of the state, but at the same time forms the basis for his virtue ethics.

2.2 Value or Status

It is often assumed that human dignity has to be seen as *a fundamental value behind the human rights regime* and should be embraced or abandoned as a concept in this sense. This interpretation raises at least two questions. First, we can wonder whether it is convincing to *base the law on specific values*. Without discussion of the various problems of value-theory in this context, a philosopher of law could argue it is problematic to see the law as a system for the enforcement of action based on a legal order that privileges specific values or ideals; this would be particularly problematic for those who see the law as a system for the protection of the liberty of individuals to realize *their own* ideals and values. But why should we understand human dignity as a value in the first place? The legal, religious, and moral (p. 181) traditions in which human dignity occurred do not give much reason for such an interpretation. In the Stoic tradition, human dignity was associated with the status of a rational being, and functions as the basis for duties to behave appropriately. In the religious tradition, human dignity is associated more with a status vis-à-vis God or within the cosmos. In the Kantian tradition, we can also see that the specific status of rational beings plays a central role within the moral framework.² It therefore makes sense to interpret 'human dignity' not as a value, but the ascription of a *status* on the basis of which rights are ascribed (see Gewirth 1992 and—in a quite different direction—Waldron 2012). Even a liberal, supposedly value-neutral concept of law has to assume that human beings have a significant status which commands respect.

2.3 A Deontological Concept?

How does human dignity relate to the distinction between deontological, teleological, and consequentialist normative theories that is often assumed to be exhaustive? All ethical/normative theories are supposedly either deontological or teleological/consequentialist—and 'human dignity' is often seen as one of the standard examples of a deontological concept, according to which it would be morally wrong to weigh the dignity of a human being against other moral considerations. These notions, however, have a variety of meanings.³

According to a standard interpretation, *consequentialist* theories examine the moral quality of actions according to the (foreseeable and probable) outcomes they will produce, while *deontological* theories assess moral quality (at least partly) independently of outcomes. One can doubt in general to what extent this distinction makes sense, since hardly any ethical theory ignores the consequences of actions (one can even doubt if an agent understands what it means to act if he or she does not act under assumptions about the possible consequences of his or her actions). At the same time, a consequentialist account must measure the quality of the consequences of actions by some standards—‘focusing on outcomes’ does not itself set such a standard. Human rights requirements can function as measure for the moral quality of political and societal systems. Those measures are sensitive to the consequences of specific regulations, but they will be based on the assumption that it is inherently important for human beings to live in conditions under which specific rights are granted. These standards consider the aggregation of positive consequences, but according to a concept of human dignity there will be limitations when it comes to weighing those aggregated consequences against the fundamental interests of individuals. We may not kill an innocent person simply because this would be advantageous for a larger group of people. William Frankena (and later John Rawls) used a different opposition when distinguishing between *teleological normative theories* that see moral obligations as functions (e.g. a maximizing) of a non-moral good such as happiness, and *deontological* (p. 182) *theories* that do not see moral duties as a function of a non-moral good (Frankena 1973: 14f). We can ignore here the sophisticated details of such a distinction; the relevant point is that in the Frankena/Rawls interpretation, human dignity could be seen as a deontological concept that allows for the weighing of consequences, but forms the criterion for the assessment of different possible consequences; actions would be acceptable to the extent that their consequences would be compatible with the required respect for human dignity. I think that this latter distinction is more appropriate in forming a model for the interpretation of human dignity as a deontological concept. Human dignity would not prescribe maximizing well-being or happiness, but would protect liberties and opportunities and would at the same time be open to the assessment of consequences of actions, which a deontological concept in the previous distinction would exclude. Human dignity would justify strict prohibitions of extreme atrocities (e.g. genocide), prohibitions that may not be weighed against other *prima facie* moral considerations. At the same time, it would function in the assessment of consequences for other practices as well, practices in which it is required to weigh advantages against disadvantages, where the relative status of a specific right has to be determined and where judgements are made in more gradual terms. On the basis of human dignity, we can see some practices as strictly forbidden, while others can only be formulated as aspirational norms; some consequences are obviously unacceptable, while others are open to contestation. So, we can see human dignity as a deontological concept, but only if we assume that this does not exclude the weighing of consequences.

2.4 How Culturally Dependent Is Human Dignity?

To what extent is human dignity dependent on a specific Western or modern world-view or lifestyle, and, in particular, to what extent does it protect a specific form of *individualism* that has only occurred in rich parts of the world from the twentieth century onwards? This question seems quite natural because it is generally assumed that respect for human dignity commits us to respecting *individual* human beings, and this focus on the individual seems to be the characteristic feature of modern societies (Joas 2013). Thus, we could think of human dignity as a normative concept which was developed in modernity and whose normative significance is bound to the specific social, economic, and ideological conditions of the modern world. In such a constellation, human dignity would articulate the conviction that the respect individual human beings deserve is—at least to some extent—independent of their rank and the collective to which they belong. In the case of conflicts between collective interests, the liberty of individuals would outweigh the interests of a collective e.g. the family, clan, or state). If collective interests are relevant, this is only because of the value individuals give to them, or because they are necessary for (p. 183) human beings to realize their goals in life. This modern view depends on a specific history of ideas. It could be argued that this conviction is only plausible within a world-view that is characterized by an ‘atomistic’ view of the human being (Taylor 1985), a view for which relationships between human beings are secondary to their self-understanding. Richard Tuck (1979) argued that the whole idea of natural rights is only possible against the background of a history where specific legal and social concepts from Roman law have undergone specific transformations within the tradition of natural and canon law in the Middle Ages. Gesa Lindemann (2013) proposed a sociological analysis (referring to Durkheim and Luhmann) according to which human dignity can only be understood under the condition of a modern, functionally differentiated society. Such societies have autonomous spheres (law, economy, private social spheres, etc.) which develop their own internal logic. Human beings are confronted in these various spheres with different role expectations. For the individual, it is of central importance that one has the possibility to distance him- or herself from those concurrent expectations, and that one is not completely dominated by one of those spheres. According to Lindemann, protecting human dignity is the protection of the individual from domination by one of these functionally differentiated spheres. This view would imply, however, that human dignity would only be intelligible on the basis of functionally differentiated societies.

I cannot evaluate here the merits of such historical and sociological explanations. But these interpretations raise doubts about whether or not we can understand human dignity as a normative concept that can rightly be seen as universal—ultimately its development depends on contingent historical constellations. This first impression, however, has to be nuanced in three regards. First, we can wonder whether there are different routes to human dignity; after all, quite different societies place respect for the human being at the centre of their moral concern. It could be possible that those routes will have different normative implications—for example, it is not impossible that there can be a plausible reconstruction of an ethos of human dignity in the Chinese tradition, where perhaps the right to private property or specific forms of individualism would not have the same im-

portance as in the Western tradition. Or, it is possible that the Western idea of a teleological view of history (based on the will of a creator, which is alien to the Chinese tradition) has implications for the interpretation of human dignity. In any case, we could try to reconstruct and justify a universal core of human dignity and discuss whether, on the basis of such a core, some elements of the human rights regime that are so valuable for the West really deserve such a status. Second, the assumed dependency of human dignity on the structure of a functionally differentiated society can also be inverted. If we have reason to assume that all human beings should be committed to the respect for human dignity, and if this respect can—at least in societies of a specific complexity—only be realized on the basis of functional differentiation, then we would have normative reasons to embrace functional differentiation due to our commitment to human dignity. Third, human dignity cannot simply be understood (p. 184) as an individualistic concept, because the commitment to human dignity forms the basis of relationships between human beings in which all of them are connected by mutual respect for rights; human dignity forms the basis of a ‘community of rights’ (Gewirth 1996).

These short remarks hint at a range of broader discussions. For our purposes, it is important to see that it is necessary for an understanding of human dignity in a global perspective to be self-critical about hidden cultural biases, and to envisage the possibility that such self-criticism would make reinterpretations of human dignity necessary. But these culturally sensitive considerations do not provide us with sufficient reason to abandon a universal interpretation of human dignity.

2.5 Human Dignity between Law and Ethics

Human dignity is a legal concept; it is as a concept of the human rights regime, an element of the international law. Many philosophers propose treating the entire concept of human rights not as a moral concept, but as a concept of the praxis of international law (Beitz 2009). I agree with this proposal to the extent that there is a fundamental distinction between the human rights system as it is agreed on in international law and those duties which human beings can see as morally obligatory on basis of the respect they owe to each other. However, the relationship between the legal and the ethical dimension is more complex than this. From a historical perspective, human rights came with a moral impulse, and still today we cannot understand political discourse and the existence of human rights institutions if we do not assume that there are moral reasons behind the establishment of those institutions. Therefore, there are reasons to ask whether these moral reasons in favour of the establishment of human rights are valid, and this directly leads legal-political discourse to ethical discourse. This is particularly the case if we talk about human dignity, because this seems to be a concept *par excellence*, which can hardly be reconstructed as a legal concept alone.

On the other hand, if human dignity makes sense as an ethical concept, it ascribes a certain status to human beings which forms the basis for the respect we owe to each other. This respect then articulates itself in a relationship of rights and duties; this means that we have duties that follow from this respect, and we must then assume that responses to

this required respect would necessarily imply the duty to establish institutions that are sufficiently capable of ensuring this respect. Thus, if we have reasons to believe that all human beings are obliged to respect human dignity, then we have reason to see ourselves as being obliged to create institutions that are effectively able to enforce these rights. In that sense, there are moral reasons for the establishment of political institutions, and the international human rights (p. 185) regime is a response to these moral reasons. Of course, we could come to the conclusion that it is no longer an appropriate response, and we would then have moral reasons to search for other institutional arrangements.

3. Outline of a Concept of Human Dignity

I now want to briefly present an outline of my own proposal of human dignity as foundational concept within the human rights regime.⁴ With human dignity we ascribe a status to human beings which is the basis for why we owe them respect. If we assume that human dignity should be universally and categorically accepted, the ascription of such a status is not just a contingent decision to value our fellow humans. Rather, we must have reason to assume that human beings in general are obliged to respect each other. If morality has a universal dimension, it must be based on reasons for actions that all human beings must endorse. This would mean that the moral requirements have to be intelligible from the first-person perspective, which means that all agents have to see themselves as being bound by these requirements. Human dignity can only be understood from within the first-person perspective if it is based on the understanding that each of us can, in principle, develop by ourselves reasons that have a universal dimension. That does not assume that human beings normally think about those reasons (perhaps most people never do) but only means that the reasons are not particular to me as a specific individual.

Kant has proposed that understanding ourselves as agents rationally implies that we see ourselves as committed to instrumental and eudemonistic imperatives, but also that we must respect certain ends, namely: humanity, understood as rational agency (for a very convincing reconstruction, see Steigleder 2002). Gewirth (1978) has, in a similar fashion, provided a reconstruction of those commitments that agents cannot rationally deny from a first-person perspective. As agents that strive for successful fulfilment of their purposes, agents must want others not to diminish those means that are required for their ability of successful agency. Since this conviction is not based on my particular wish as an individual, but is based on my ability to act in general, an ability I share with others, I have reasons to respect this ability in others as well. The respect for human dignity is based on a status that human beings share, and on their ability to set ends and to act as purposive agents. Respect for human dignity entails the obligation to accept the equal status of all beings capable of controlling their own actions, who should therefore not be subjected to unjustified force.

(p. 186) If, in this sense, we owe respect to human beings with such capacity, then this respect has a variety of implications, four of which I want to briefly sketch. The first impli-

cation is that we must ensure that human beings have access to those means that they need to live an autonomous life. If the possibility of living an autonomous life is the justificatory reason for having a right to those goods, then the urgency and needfulness of those goods is decisive for the degrees of such rights, which means there is a certain hierarchical order of rights. Second, if the relevant goal that we cannot deny has to do with the autonomy of human beings, then there are negative limitations to what we can do with human beings; human beings have rights to decide for themselves and we have the duty to respect those decisions within the limits set by the respect we owe to human beings. Third, since human beings can only live together in certain levels of organization, and since rights can only be ensured by certain institutional arrangements, the creation of such an institutional setting is required. Fourth, these institutions are an articulation of the arrangements human beings make, but they are at the same time embedded in the contingent historical and cultural settings that human beings are part of. We cannot create these institutions from scratch, and we cannot decide about the context in which we live simply as purely rational beings. We live in a context, a history, as embodied beings, as members of families, of nations, of specific cultures, etc. These conditions enable us to do specific things and they limit our range of options at the same time. We can make arrangements that broaden our scope of action, but to a certain degree we must simply endorse these limitations in general—if we were not to endorse them, we would lose our capacity for agency in general.

I am aware that this short outline leaves a lot of relevant questions unanswered;⁵ it has only the function of showing the background for further considerations. Nonetheless, I hope that it is evident that human dignity as the basis of the human rights regime is not an empty concept, but outlines some normative commitments. At the same time, it is not a static concept; what follows concretely from these considerations for normative regulations will depend on a variety of normative and practical considerations.

4. Human Dignity and Regulation of Technology

I have tried to sketch how I think that human dignity can be reconstructed as the normative idea behind human rights. This foundational idea is particularly relevant in contexts where we can wonder whether or not human rights can still function (p. 187) as the normative framework on basis of which we should understand our political and legal institutions. There may be various reasons why one can doubt that human rights are appropriate in fulfilling this role. In this section, I only want to focus on one possible doubt: if we see human rights as a normative framework which empowers individual human beings by ascribing rights to them, it could be that human rights underdetermine questions regarding the development of these technologies, and, accordingly, the way in which these technologies determine our lifeworld. To phrase it otherwise: perhaps human rights provide a normative answer to the problems that Snowden has put on the agenda (the systematic infringement upon the privacy of nearly everybody in the world by the CIA). But there is a

huge variety of questions, such as the effect of technologies on nature, the changes of communication habits through iPhones or the changes of sexual customs through pornography on the Internet, where human rights are only relevant in the sideline. Of course, online pornography has some human rights restrictions when it comes to the involvement of children, or informed consent constraints, but human rights do not seem to be relevant to the central question how those changes are affecting people's everyday lives. Human rights seem only to protect the liberty to engage in these activities. However, if the human rights regime cannot be of central normative importance regarding the regulation of these changes of the technological world, then we have reason to doubt whether the human rights regime can be normatively important, if we bear in mind how central new technologies are in designing our lives and world.

In the following section, I will not provide any answers to these problems; I only want to outline what kind of questions could be put on the agenda for ethical assessment on the basis of human dignity.

4.1 Goals of Technology

A first consideration could be to evaluate the human rights relevance of technologies primarily with regard to the goals we want to achieve with them. The question would then be: why did we want to have these technologies, and are these goals acceptable? Technologies are developed to avoid harm for human beings (e.g. medical technologies to avoid illnesses, protection against rain and cold), to fulfil basic needs (e.g. technology for food production), to mitigate side effects of other technologies (e.g. technologies for sustainable production) or to facilitate human beings in life projects, such as by making their lives easier, or by helping them to be more successful in reaching their goals of action. Some technologies are quite *generic* in the sense that they support a broad variety of possible goals (e.g. trains, the Internet) while others are related to more *specific life projects* (e.g. musical technologies, apps for computer games).

(p. 188) From this perspective, the question will be: are these goals acceptable under the requirements of the human rights regime? Problematic technologies would then be technologies whose primary goal is, for example, to kill people (e.g. military technology) or which have high potential for harming people. Here a variety of evaluative approaches are available. One could, for example, think of the so-called *Value-sensitive design* as an approach which aims to be attentive to the implicit evaluative dimensions of technological developments (Manders-Huits and van den Hoven 2009). Such an approach has the advantage of reflecting on the normative dimensions of new technologies at an early stage of their development. From the normative basis of the human-rights regime, we could then firstly evaluate the potential of new technologies to violate human rights. This would be in the first place a *negative approach* that aims to avoid the violation of negative rights. But the human rights regime does not only consist of negative rights; there are positive rights which aim to support human beings in the realization of specific life goals (e.g. socio-economic rights).⁶ Such a moral evaluation of the goals of technology seems to be embedded in the generally shared morality, as people often think that it is morally

praiseworthy, or even obligatory, to develop, for example, technologies to fight cancer, for sustainable food production, or to make the lives of people with disabilities easier. Thus, the goals for which technologies are produced are not seen as morally neutral, but as morally significant. However, there are of course all kind of goals for which technologies could be developed (e.g. we spend a lot of money for cancer research, while it is difficult to get funding to fight rare diseases). This means that we seem to have an implicit hierarchy concerning the importance and urgency of morally relevant goals. These hierarchies are, however, scarcely made explicit, and in a situation of moral disagreement it is quite implausible to assume that there would be a kind of spontaneous agreement in modern societies regarding the assessment of these goals. If, therefore, the assessment of the goals of technological developments is not merely rhetoric, one can reasonably expect the hierarchy behind this assessment to be explicated, and the reasons for this hierarchy to be elaborated. Content-wise, my proposal to justify a hierarchy in line with the concept of human dignity sketched above would be to assume a hierarchy according to the *needfulness for agency* (Gewirth 1978: 210–271). The goals of technologies would be evaluated in light of the extent to which the goals that technologies aim to support are necessary to support the human ability to act. If this were the general guideline, there would be a lot of follow-up questions, for example, on how to compare goals from different areas (e.g. sustainability, medicine) or, within medicine, on how the dependency on technologies of some agents (e.g. people with rare handicaps) could be weighed against the generic interests of a broad range of agents in general.

But is it at all possible to evaluate technologies on the basis of these goals? First, it may be quite difficult to judge technologies in this way because it would presuppose that we can predict the outcome of the development of a technology. Many technological developments can be used for a variety of goals. Generic technologies (p. 189) can serve a variety of purposes, some of which are acceptable or even desirable on the basis of human rights, whereas others are perhaps problematic. The same holds true for so-called ‘moral enhancement’, the use of medical technology to enhance human character traits that are thought to be supportive for moral behaviour. Most character traits can be used for various purposes; intelligence and emotional sensibility can be used to manipulate people more successfully. It seems hard to claim that technologies can only be judged by the goals they are supposed to serve.

Second, there are significant uncertainties around the development of technologies. This has to do with, for example, the fact that technological developments often take a long time; it is hard to predict the circumstances of application from the outset. Take for example the long time from the discovery of the double helix in the 1950s to the conditions under which the related technologies are being developed nowadays. In the meantime, we became aware, for example, of epigenetics, which explains the expression of gene functions as being interrelated in a complex way with all kind of external factors. The development of technologies is much more complex than was ever thought in the 1980s. We did not know that there would be an Internet, which could make all kind of genetic self-diagnoses available to ordinary citizens. It was not clear in the 1950s in which political and cultural climate the technologies would be applied: while in the 1950s people would have

been afraid that totalitarian states could use those technologies, nowadays the lack of governmental control of the application of technologies creates other challenges.

These complications are no reason to cease the development of biotechnologies, but they form the circumstances under which an assessment of those technologies takes place. Some implications of these considerations on the basis of human dignity are: *firstly*, that we should *change assessment practices procedurally*. If respect for human dignity deserves normative priority, we must first ask what this respect requires from us regarding the development of new technologies, instead of first developing new technologies and then asking what kind of ethical, legal, and social problems they will create. Second, if it is correct that human dignity requires us to respect in our actions a hierarchy that follows from the *needfulness for agency*, then we would have to debate the legitimacy of the goals of technology on this basis. This is all the more relevant, since political discourses are full of assumptions about the moral quality of these goals (eg concerning cancer research or stem cell research). If respect for human dignity requires us to respect human beings equally, and if it implies that we should take seriously the hierarchy of goods that are necessary for the ability of agents to act successfully, then the assumptions of these goals would have to be disputed. Third, in light of the range of uncertainties mentioned above, respect for human dignity would require that we develop an account of precautionary reasoning that is capable of dealing with the uncertainties that surround technological developments without rendering us incapable of action (Beyleveld and Brownsword 2012).

(p. 190) 4.2 The Scope of Technologies

An assessment of the basis of goals, risks, and uncertainties is, however, insufficient, because emerging technologies are also affecting the *relationships between human beings regarding place and time* in a way that alters responsibilities significantly. Nuclear energy is the classic example for an extension of responsibility in time; by creating nuclear waste, we endanger the lives of future people and we knowingly create a situation where it is likely that for hundreds and thousands of years, people will have to maintain institutions that are capable of dealing with this kind of waste. Climate change is another example of probably irreversible changes in the circumstances of people's lives. We are determining life conditions of future people, and this is in need of justification.

There are various examples of extensions of technological regimes already in *place*. There are various globally functioning technologies, of which the Internet is the most prominent example, and life sciences is another. One characteristic of all of these technologies is that they are developed through global effort and that they are applied globally. That implies, for example, that these technologies operate in very different cultural settings (e.g. genetic technologies are applied at once in Western countries and in very traditional, family-oriented societies). This global application of technologies creates a need for global regulation.

This context of technological regulation has some implications: firstly, that there must be global regulation, which requires a kind of subject of global regulation. This occurs in the first instance through contracts between nation states, but increasingly regulatory regimes are being established, which lead lives of their own, and establish their own institutions with their own competences. The effective opportunity of (at least smaller) states to leave these institutions is limited, or even non-existent, and so is their ability to efficiently make democratically initiated changes in the policies of these regimes. This means in fact that supranational regulatory bodies are established. This creates all kinds of problems: the lack or insufficiency of harmonization between these international regulatory regimes is one of them. However, for our purposes, it is important to see that there is a necessary tension: on the one hand, there is no alternative to creating these regulatory regimes at a time when there are globally operating technologies: technologies such as the Internet enforce such regimes. In the same vein, the extension of our *scope of action in time* forces us to question how future people are integrated into our regulatory regimes, because of the impact that technologies will have on the lives of future people. This means that the technologies we have established impact upon the possible regulatory regimes that are acceptable on the basis of the normative starting points of the human rights regime. The human rights regime was established on the basis of cooperation between nation states, while new technologies enforce supranational regulatory regimes and force us to ask how future people are included in these regimes under circumstances where the (long-term) effects of technologies are to a significant extent uncertain.

(p. 191) I propose that the appropriate normative response to these changes cannot only consist in questioning what the implications of a specific right, such as the right to privacy, would be in the digital age (though we must of course ask this as well). The primary task is to develop an understanding of what the regulatory regime on the basis of human dignity might look like in light of the challenges described above. This means asking how respect for the individual can be ensured, and how these structures can be established in such a way that democratic control is still effectively possible. The extension with regard to future people furthermore requires that we develop a perspective on their place within the human rights framework. Some relevant aspects are discussed elsewhere more extensively (see Beyleveld, Düwell, and Spahn 2015; Düwell 2016). First, we cannot think about our duties with regard to sustainability as independent from human rights requirements; since human rights provisions are supposed to have normative priority, we must develop a unified normative perspective on how our duties to contemporaries and inter-generational duties relate to each other. This, secondly, gives rise to the question of what respect for human dignity implies for our duties concerning future people. If human dignity means that human beings have certain rights to generic goods of agency, then the question is not whether the right holder already exists, but whether we have reason to assume that there will be human beings in the future, and whether we can know what needs and interests they will have, and whether our actions can influence their lives. If these questions are to be answered positively, we will have to take those needs and interests into account under human rights standards. This raises a lot of follow-up questions about how this can be done.

In the context of these emerging technologies, we must rethink our normative framework, including the content and institutions of human rights, because our commitment to respecting human dignity requires us to think about effective structures for enforcing this respect, and if these institutions are not effective, we must rethink them. The outcome of this reconsideration may also be that certain technologies are not acceptable under the human rights regime, because with them it is impossible to enforce respect for human dignity. If, for example, privacy cannot effectively be ensured, or if there is no way to establish democratic control over technologies, this would affect the heart of human dignity and could be a reason to doubt the legitimacy of the developments of these technologies. In any case, human dignity is the conceptual and normative cornerstone of this reconsideration of the normative and institutional framework.

4.3 The Position of the Human Being in the Technological World

Within the variety of further normative questions that could be extensively discussed are those about technologies that affect the relationship of human beings to (p. 192) themselves, to others or to nature. If the normative core of human dignity is related to the protection of the ability of human beings to be in control of their own actions, then there are various technologies which may influence this ability. We would have to discuss those forms of genetic diagnoses and interventions where others make decisions about the genetic make-up of persons, or the influence of medicalization on the practical self-understanding of agents. Another relevant example would be the architecture and the design of our lives and world, and the extent to which this design determines the ways in which human beings can exercise control.

However, technologies are also changing the place of human beings in the world, in the sense that our role as agents and subjects of control is still possible. That is not a new insight; critical theorists such as Adorno previously articulated this worry in the mid-twentieth century; in our context, we can wonder what the human rights-related consequences are. If respect for human dignity requires leaving us in control, then this would require, for example, that politics should be able to make decisions about technological developments and should be able to revise former decisions. This would mean, however, that technologies with irreversible consequences would only be acceptable if there could be hardly any doubt that their impact will be positive. It would furthermore require that technologies must be maximally controllable in the sense of human beings having effective influence, otherwise political negotiations would hardly be possible.

A further central question is the extent to which human decisions will play a central role in the regulation of technology in the future.⁷ This question arises if one extrapolates from various current developments into the future: we are integrating technologies in all areas of our lives for various reasons. The relevant changes range from the organization of the external world via changes in communication between people, to changes in our self-experience (e.g. the enhancement debate). Many of these changes are not at all morally dubious; we want to increase security, or we want to avoid climate change. We introduce technologies to make communication easier, and we want to support people with

non-standard needs. *Prima facie*, there is nothing wrong with these aims, and there is nothing wrong with developing technologies to achieve these aims. The effect, however, is that the possibility for regulation by human beings is progressively diminished. The possibilities for action are increasingly predetermined by the technical design of the social and material world. This implies that the role of moral and legal regulation changes fundamentally. Regulations still exist, but parts of their functions are replaced by the organization of the material world. In this setting, persons often do not experience themselves as intentional agents responding to normative expectations, but simply as making movements that the design of the world allows them to make. From the perspective of human dignity, this situation raises a variety of concerns. These are not only about the compatibility of the goals of technological developments with human rights concerns, or the modes of regulations, but also about the fundamental place of the human being within the regulatory process.

(p. 193) 5. Looking Forward

This chapter has given a first outline of the possible relevance of human dignity for the regulation of technologies. My proposal is to put human dignity at the centre of the normative evaluation of technologies. Technologies are seriously changing both our lives and the world, the way that human beings deal with each other, and the way they relate to nature and to themselves. Finally, they are changing the way human beings act and the role of human agency. These changes do not only raise the question of how specific human rights can be applied to these new challenges, in the sense of what a right to privacy could mean in times of the internet. If these challenges are changing the position of the human being in the regulatory process to such a significant extent, then the question that has to be asked is what kind of normative answers must be given from the perspective of the foundational principle of the human rights regime. The question is then whether the current structure of the human rights regime, its central institutions and related procedures, are still appropriate for regulation.

My intention was not to promote cultural scepticism regarding new technologies, but to take the challenge seriously. My proposal is therefore to rethink the normative structure of an appropriate response to new technologies in light of human dignity. This proposal is therefore an alternative to the propagation of the 'end of human rights' because of an obvious dysfunctionality of some aspects of the human rights regime. This proposal sees human rights as a normative regime that operates on the basis of human dignity as its foundational concept, which ascribes a central normative status to human beings and protects the possibility for their leading an autonomous life. The appropriate normative responses of human rights will depend on an analysis of what kind of challenges human dignity is confronted with, of what kind of institutions can protect it, and of what forms of protection are possible. That means a commitment to human dignity can require us to change the human rights regime significantly if the human situation changes significantly. By this, I do not mean a new interpretation of human dignity in the sense of suddenly reinterpreting human dignity, for instance, in a collectivistic way. Rather, the idea is the fol-

lowing: if we do indeed have rational reasons to see ourselves as being obliged to respect human dignity, then these reasons have not changed and we do not have reasons to doubt our earlier commitments. But we have reasons to think that the possibility of human beings leading an autonomous life is endangered by the side effects of technology, and that in times of globalization and the Internet an effective protection against these technologies is not possible on the level of nation states. At the same time, respect for human dignity forms the basis for the legitimacy of the state. If all that is correct, then respect for human dignity requires us to think (p. 194) about significant changes in the normative responses to those challenges, distinct from the responses that the human rights regime has given in the past. That could imply the formulation of new human rights charters, it could result in new supranational governmental structures, or in the insight that some technologies would just have to be strongly restricted or even forbidden.

Respect for human dignity requires us to think about structures in which technologies are no longer the driving force of societal developments, but which give human beings the possibility to give form to their lives; the possibility of being in charge and of leading fulfilled lives is the guiding aspect of public policy. There is hardly any area in which human dignity should play so significant a role as in the regulation of technologies. It is surprising that contemporary debate about technology and debates on human dignity do not mirror this insight.

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Notes:

(1.) This section is built on considerations that are more extensively explained in the introduction to Düwell and others (2013).

(2.) I reconstruct the concept of human dignity in Kant in the line of his 'Formula of Humanity' because this seems to me systematically appropriate. I am aware that Kant uses the term 'human dignity' in a much more limited way—in fact he uses the term 'human dignity' only a few times (see Sensen 2011 on the use of the terminology).

(3.) Gerald Gaus (2001a, 2001b), for example, has identified 11 different meanings of 'deontological ethics', some of which are mutually exclusive.

(4.) Perhaps it is superfluous to say that my proposal is strongly in a Kantian line. Besides Kant, my main source of inspiration is Gewirth (in particular, Gewirth 1978) and, in this vein, Beyleveld and Brownsword (2001).

(5.) For a detailed defence of this argument, see Beyleveld 1991.

(6.) On my understanding, negative and positive rights are distinct in a formal sense. Negative rights are characterized by the duty of others not to interfere in what the right holder has a right to, while positive rights are rights to receive support in attaining whatever it is that the right holder has a right to. I assume that both dimensions of human rights are inseparable, in the sense that one cannot rationally be committed to negative rights without at the same time holding the conviction that there are positive rights as well (see Gewirth 1996: 31–70; this is a different understanding of the relationship between negative and positive rights to that in Shue 1996). To assume that there is such a broad range of rights does not exclude differences in the urgency and importance of different kinds of rights. Negative rights are not, however, always more important than positive rights. There can be positive rights which are more important than some negative rights; there can for example be reasons for a right to private property to be violated in order to support people's basic needs.

(7.) I thank Roger Brownsword for the inspiration for this topic (see Brownsword 2013, 2015; see also Illies and Meijers, 2009).

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Human Rights and Human Tissue: The Case of Sperm as Property

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Abstract and Keywords

In a 2012 Canadian case, the Supreme Court of British Columbia held that sperm acquired and stored for the purposes of IVF could be considered shared marital property in the event of a separation. This case followed on from similar cases that accepted sperm as capable of being property. This chapter suggests that these cases are indicative of a shift from the legal conceptualization of bodies and body parts as falling within a human dignity frame to accepting individual property rights claims. It explores the nature of the property claims to sperm before the (common law) courts in the context of the rise of human rights within law and technology, and argues that accepting these claims risks corrupting the very thing rights seek to protect.

Keywords: property rights, human rights, rights talk, sperm, giftedness, J.C.M.

1. Introduction

*HUMAN rights and technology has become a major field of study, both from the perspective of the law and technology field as well as from the human rights field, where human rights scholars are being forced to re-think existing interpretations of human rights to take account of technological developments. This new field has numerous sub-fields, in part determined by different technologies, for example ICT and human rights; or related to cross-cutting issues, such as IPR and human rights; or to broader geo-political concerns, such as human rights in the context of Global South–North relations. Rights are increasingly becoming the preferred lens for understanding the relationship of, or the interaction between, technology and ourselves. Thus, in place of dignity-based concerns or ethical considerations, the trend is towards articulating our most fundamental concerns in the language of individual rights.¹ While the shift may be a subtle one—human rights are for many, of course, founded on a concern for human dignity—it is nonetheless, I wish to argue, an important one for the way in which it reflects changes in how we see (p. 198)

ourselves in relation to others and to the world around us: in short, what we think it is to be human.

This shift to human rights away from earlier reliance on human dignity-based ethical concerns is of course not limited to the technology domain, but rather forms part of a broader trend; as Joseph Raz has noted, human rights have become our general contemporary moral lingua franca (2010: 321).² Given the dominance of human rights more broadly in articulating our moral and political concerns in the late twentieth century, it should come as no surprise that human rights are becoming the dominant narrative within technology studies, despite well-developed alternative narratives being available, notably medical or bioethics. While this development has not gone unchallenged,³ it appears here to stay. Particularly in the field of technology, the dominance of human rights in providing a moral narrative of universal pretensions is sustained by the transnational nature of technological innovation and adoption.

Another characteristic of human rights that has determined their dominance is their apparent infinite flexibility. This is partly as a consequence of their indeterminateness in the abstract. Human rights can be used to challenge both the permissiveness of laws—for example in *S. and Marper v the UK*⁴—as well as their restrictiveness—*Evans v the UK*.⁵ This flexibility extends to the mode in which human rights can be claimed. Human rights, where they are legal rights, are necessarily rights asserted by an individual claimant against a particular political community represented by the body of the State. As such, they are used to challenge State actions as a tool in the vertical relationship between State and citizen. However, human rights exist as moral rights that are prior to and in parallel with their existence as legal rights. This entails not only their near-limitless possibility as regards content, but also that human rights are not restricted to vertical claims. They can be used to challenge the actions of other individuals or, indeed, behaviour of any kind. Human rights become a means of expressing something that is important to us and that should, we think, prevail over other claims—what has been termed ‘rights-talk’. The necessary balancing between individual and community interests thus becomes a three-way balancing act between individual parties in the context of the broader community interest. Both types of claims are represented by the cases considered here, but the trend is clearly towards individual claims in relation to other individuals. This accords with the well-noted rise of individualism in Western societies, expressed by Thomas Frank as the ‘empowered self’ (Franck 1999).

There is, thus, a distinct difference as to how ‘human rights’ is used in this chapter to the careful way in which Thérèse Murphy uses it in another chapter in this volume (see Chapter 39). Where Murphy refers to international human rights law, in this chapter ‘human rights’ is used in a much broader way to encompass what we might call fundamental rights—a blend of human rights and constitutional rights. Some might say that this is muddying the waters; moreover, they would have reason (p. 199) to argue that the human right to property is not really the subject of the cases studied here at all.⁶ However, what is interesting about the cases discussed here is precisely that they reflect how we think about and use (human) rights. Moreover, while human rights are ostensibly not the direct

subject of the sperm cases, human rights form the backdrop to how we think about rights more generally; in particular, 'property rights-talk' encompasses the fervour of human rights-talk—the sense of moral entitlement that human rights have given rise to—with the legal right encompassed in property regimes.

What I wish to suggest in this chapter is that the dominance of human rights as expressed in the ubiquity of 'rights-talk' is manifesting itself in a particular way within the field of technology regulation, and within new reproductive technologies and particularly, the regulation of the body. Specifically, it seems possible to talk of a movement towards the combination of rights talk with property as an organizing frame for technology regulation, whereby property rights are increasingly becoming the dominant means of addressing new technological developments.⁷ This manifests itself not only in the Western scholarly debate but the combination of property as intellectual property and human rights has also been used by indigenous groups to assert novel conceptions of personhood (Sunder 2005).

Much has been written in recent years about the increasing commodification of body parts. There is by now a thriving literature in this area, produced by both academics and popular writers, and, among the academics, by property law experts, family law specialists, philosophers, ethicists and, of course, technology regulation scholars. While I will draw on this literature, I will focus on one particular area: the attachment of property rights to sperm. Sperm and property is a particularly interesting area for two reasons: the first is that there is a steady stream of cases in common law jurisdictions concerning property claims to sperm and, as a lawyer of sorts, I think that cases matter. At the very least, they show us how courts are actually dealing with rights claims to sperm and they give us outcomes that have effect in the 'real world' for those involved. Secondly, we cannot fail to see the stakes involved where the question relates to human gametes, whether male or female, in a way that it is not so obvious in relation to, say, hair, blood, or skin cells. Sperm contains the possibility of new beginnings, of identities, and it speaks to existential questions about the very purpose of life.

Understanding how property rights are being used in relation to technology, by whom, and to what ends is a complex task. This chapter focuses on the question of sperm and does not attempt to make a case for human tissue in general, although part of the argument advanced applies equally to human tissue more generally. In addition, I am not interested in the strict commercialisation of sperm—the buying and selling of it—as most jurisdictions do not allow it.⁸ Instead, it focuses on the assignment of property rights *per se*. Finally, the focus is on sperm rather than female gametes, not because sperm is special and ova are not, but rather because it is sperm that is the subject of an interesting string of cases.

(p. 200) **2. All's Fair in Love or Profit: The Legal Framing of Our Bodies**

2.1 Owning Ourselves

It has become something of a commonplace to start consideration of studies of the law in relation to human bodies and human body parts with the observation that the classic position is that we do not own our own bodies.⁹ We are not permitted to sell our bodies (prostitution, for those jurisdictions in which it is de-criminalized, is better viewed as selling a service rather than the body as such) or parts of our bodies.¹⁰ We cannot sell ourselves or give ourselves over into slavery, regardless of the price that could be negotiated¹¹; nor do we have the ability to consent to harm being done to us, no matter the pleasure that can, for some, be derived from it.¹²

Similar legal constructions apply to body parts that have been separated from a human body by such means as medical procedures or accident. When a tissue is separated, the general principle is that it has been abandoned and is thus *res nullius*: no-one's thing. This is at least the case in common law.¹³ As Donna Dickenson notes, '[t]he common law posits that something can either be a person or an object—but not both—and that only objects can be regulated by property-holding' (Dickenson 2007: 3).¹⁴ Human tissue thus falls into a legal gap: it is neither a person, who can own property, nor an object, that can be owned. If I cannot own my own body, at least within the framing of the law,¹⁵ who does? The answer, classically, has been no-one. The same principle that determines that I cannot own my own body equally prevents anyone else from owning it or its tissues, whether separated or not. Simply put, the human body has not been subject to framing in terms of property.

This answer, however, has always been more complicated than the 'no property' principle suggests. In his study examining the question of property, ownership and control of body parts under the common law, Rohan Hardcastle notes a number of situations in which the common law has traditionally recognized some aspects of property rights in relation to human body parts (Hardcastle 2009: 25–40). For example, the right to possession of a body for the purpose of burial. Various US courts have recognized the 'quasi'-proprietary interests held by family members or the deceased's executor, although they disagree on whether these rights stem from a public duty to dispose of a body with dignity or from an interest in the body itself.¹⁶ A further exemption to the 'no property' ideal has taken on huge importance with the rise of the biotech industry. In a case from the turn of the previous century, *Doodeward v Spence*, the Australian High Court determined that a human body could in fact become subject to property law by 'the lawful exercise of work or skill' whereby the tissue acquires some attributes that differentiate it from 'a mere corpse'.¹⁷ Where this is the case, a right to retain possession can be asserted.¹⁸ This (p. 201) right as established in *Doodeward* has been key in a number of cases where the ownership of human body parts was at issue—the most well-known being *Moore*.¹⁹ Here, the courts in California granted ownership rights of a cell line developed from Mr Moore's tissue with-

out his knowledge and thus his consent to a biotech company. Mr Moore's attempt to assert ownership and thus control over the use to which his body tissue was being put fell afoul of the *Doodeward* principle that while he could not own his own body parts, a third party could gain ownership (and had indeed successfully patented the resultant cell line) over a product derived from it. The courts thus extended the *Doodeward* exception to tissue derived from a living subject, despite the lack of consent.

In a later case, and one more ostensibly in line with the original facts of *Doodeward*, concerning as it did tissue from a man no longer living, the Supreme Court of Western Australia found that the *Doodeward* principle had ceased to be relevant in determining whether or not, or indeed how, property rights should be applied to human body parts. In *Roche v Douglas*,²⁰ the applicant sought access to samples of body tissue of a deceased man, taken during surgery several years prior to his death and preserved in paraffin wax. The applicant wanted the tissue for the purpose of DNA testing in order to determine whether or not she was the deceased's daughter and thus had a claim to his estate. The Court held that the principle developed in *Doodeward* belonged to an era before the discovery of the double helix; rather than being bound by such outmoded reasoning, the case should be decided 'in accord with reason and common sense'.²¹

On the basis of such a 'common sense' approach, the Court rejected the no-property principle. The Court concluded that there were compelling reasons to view the tissue samples as property, to wit, savings in time and cost. Thus, whereas the Californian Supreme Court appears to imply that Moore is greedy for wanting access to the profits made from his body parts, the Supreme Court in Western Australia was not only willing to accept the applicant's claim over tissue samples from an, as it turned out, unrelated dead man, but did so on the basis that it saved everyone money and effort.²²

2.2 Sperm before the Courts

The above considered cases on body parts—*Doodeward*, *Moore* and *Roche*—form the legal background for the cases involving property claims to sperm. The main bulk of these cases concern property claims to sperm by the widow or partner of a deceased man for the sake of conceiving a child posthumously (at least for the man). Most of these cases are from common law jurisdictions, but not all. These cases suggest courts are struggling to adapt the law to rapid technological developments and are turning to property rights, often in combination with the idea of intent or interest of the various parties, in order to resolve the dilemmas before them.

(p. 202) In a very early case, the widow of a man who had died of testicular cancer brought a claim, together with his parents, against a sperm bank for access to her husband's sperm for the purposes of conceiving a child before a French Court. In *Parpalaix v Centre d'étude et de Conservation du Sperme*,²³ the applicants argued that the sperm constituted a movable object and was thus subject to property laws governing movable objects, and that they could thus inherit it. The sperm bank, CECOS, counter-argued that the life-creating potential of sperm entailed that it could not be subject to prop-

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erty laws; as such, sperm should be considered an indivisible part of the human body and not viewed as a movable object. While accepting CECOS's claim regarding the special nature of sperm, the Court rejected both arguments. Instead, it held that as sperm is 'the seed of life ... tied to the fundamental liberty of a human being to conceive or not to conceive ... the fate of the sperm must be decided by the person from whom it is drawn'.²⁴ As no part of the Civil Code could be applied to sperm, the Court determined that the sole issue became that of the intent of the originator of the sperm, in this case Mr Parpalaix.

A similar case came before the US courts a decade later. In the case of *Hecht*,²⁵ the Californian courts were required to determine questions of possession of the sperm of a man who had committed suicide. In his will, and in his contract with the sperm bank, the deceased had made clear his desire to father a child posthumously with his girlfriend, Ms Hecht. The contract authorized the release of his sperm to the executor of his estate, who was nominated as Ms Hecht, and his will bequeathed all rights over the sperm to the same. A dispute about ownership of the sperm arose, however, between Ms Hecht and the deceased's two children. This case is interesting for a number of reasons. The first is that the Californian Court of Appeals, while recognizing the importance of intent articulated by the French court in *Parpalaix*, went further, placing sperm within the ambit of property law.

The Court upheld Ms Hecht's claim that the sperm formed part of the deceased's estate:

at the time of his death, the decedent had an interest, in the nature of ownership to the extent that he has decision-making authority ... Thus, the decedent had an interest in his sperm which falls within the broad definition of property ... as 'anything that may be the subject of ownership and includes both real and personal property and any interest therein'.²⁶

The Appeals Court confirmed its decision that the sperm formed part of the deceased's estate when the case appeared before it for a second time and granted it to Ms Hecht for the purposes of conceiving a child in line with the deceased's wishes. However, it noted that while Ms Hecht could use the sperm to conceive a child, she was not legally entitled to sell or donate the sperm to another because the sperm remained the property of the deceased and its disposition remained governed by his intent. Thus, the Court recognized sperm as capable of falling within the regime of property law, but that full property rights remain vested with the (p. 203) originator of the sperm, even after his death. Any other property rights derived by others from the originator's wishes were thereby strictly limited.

The second interesting aspect of the *Hecht* case is the decision by the trial court upon the return of the case to it, in a Solomon-like ruling, to divide the sperm between the two parties. The sperm bank stored fifteen vials of the deceased's sperm. The Court held, basing itself on the terms of a general, earlier agreement between the parties in relation to the deceased's estate, that Ms Hecht was entitled to three of the fifteen vials, with the remaining passing into the ownership of the deceased's children. This strange decision, albeit one overturned on appeal, blatantly contradicts the recognition by the Court of the

special nature of the substance they were ruling on. The Court noted that ‘the value of sperm lies in its potential to create a child after fertilization, growth and birth’.²⁷ There was no indication that the deceased’s children wished to use their father’s sperm in any way, rather they wished to ensure precisely that no child could be created from it. Moreover, the decision to split the vials of sperm between the competing claims also failed to take the interests of the originator into account. The deceased had been very clear in his wish that Ms Hecht should take possession of his sperm for the purpose of conceiving a child. He did not intend that his children should take possession of it for any purpose. The decision to divide the sperm thus appears to make as much sense as dividing a baby in two—a point recognized by the Appeals Court when the case returned to it. The Appeals Court stressed that sperm is ‘a unique form of property’ and, as such, could not be subject to division through agreement.

Such an approach is similar to that taken by the Court of Appeals in England and Wales in *Yearworth*.²⁸ What is noteworthy about the *Yearworth* case, compared to those discussed thus far, is that the originators of the sperm were still alive and were the applicants in the case. The case concerned six men who had provided semen samples before under-going chemotherapy for cancer that was likely to render them infertile. The facility holding the sperm failed to store it at the correct temperature and thus damaged it beyond use. The case thus concerned a request for a recognition of ownership rights over their own sperm. Despite tracing the genealogy of the ‘no property’ principle, as well as its reaffirmation four years previously by the House of Lords in *R. v Bentham*, the Court of Appeals nonetheless unanimously found that sperm can constitute property for the purposes of a negligence claim.

The reasoning of the Court of the Appeals appears to form a line with that of earlier decisions, notably *Parpalaix* and the Californian Court of Appeals in *Hecht*, whereby the intention of the originator of the sperm determines the bounds of legal possibility; in their ruling, the Court notes that the sperm was produced by the applicants’ bodies and was ejaculated and stored solely for their own benefit. The consequence of this decision is that no other actor, human or corporate, may obtain any rights to the applicants’ sperm. This could be read as a categorical statement on the possibilities of ownership in sperm, but is better understood as belonging to the facts of this particular case. We cannot know whether the Court would have (p. 204) entertained the possibility that the men could have determined who else may obtain rights to their sperm, based on the men’s intent—as was the case in both *Parpalaix* and *Hecht*. What the judgment also suggests is the wariness of the Court in making the finding that sperm constitutes property: they needed to be ‘fortified’ by the framing of the case as one in which duties that were owed were breached.

Despite the Court’s wariness, *Yearworth* appears to have established a key precedent. In the most recent case, *Lam v University of British Columbia*, the Court of Appeal of British Columbia upheld a ruling that sperm could be considered property.²⁹ The case concerned circumstances very similar to *Yearworth*, whereby men being treated for cancer had stored their sperm in a facility run by the University of British Columbia. Faulty storage had resulted in irrevocable damage to the sperm. In the resulting class action suit, the

recognition by the Court that sperm constituted the men's property overturned the terms of the contractual agreement for storage that contained a strict liability limitation clause. The Vancouver courts appear to go one step further than *Yearworth*, however, while the *Yearworth* court noted merely that the common law needed to stay abreast of scientific developments, Mr Justice Chiasson in *Lam* takes what appears to be a more overtly teleological approach to property rights, noting that 'medical science had advanced to the point where sperm could be considered to be property'.³⁰

In a different case, also with overlapping elements from both *Parpalaix* and *Hecht* but this time before the Australian courts in New South Wales, a widow applied for possession of her dead husband's sperm for the purposes of conceiving a child.³¹ As in *Parpalaix*, there was no clearly expressed desire on the part of the deceased that his sperm be used in such a way; nor that it should form part of his estate upon his death. The Supreme Court of New South Wales nonetheless found, as the French court, that sperm could be conceived of as property. They did so, however, on different grounds: instead of basing their decision upon the intent of the originator—a tricky proposition given that not only was there no express written intent but that the sperm was extracted post-mortem upon the instruction of Mrs Edwards—the Court held that Mrs Edwards was entitled to possession (as opposed to the technicians who had extracted it in line with the *Doodewood* principle) because she was the only party with any interest in acquiring possession of it. In place, then, of the intent of the originator, the determining factor here becomes the interest of the claimant—a notable shift in perspective.

The question of intent—or, in this case, lack of intent—came back however in the extent of the property rights granted to Mrs Edwards. Unlike in *Parpalaix* and *Hecht*, where the courts accorded property rights for the purpose of using it to create a child, in *Edwards*, the Court granted mere possession rights. The law of New South Wales prohibits the use of sperm for the conception of a child via in vitro fertilization without the express written consent of the donor. Mrs. Edwards could take possession of the sperm but not use it for the purpose for which she desired, or had an interest in, it.

(p. 205) The final case to be considered here was heard before the Supreme Court of British Columbia and the central question at stake was whether sperm could constitute marital property for the sake of division after divorce. *J.C.M. v A.N.A.*³² concerned a married lesbian couple who had purchased sperm from an anonymous donor in 1999 for approximately \$250 per vial (or straw). From this sperm, they had conceived two children. The couple separated in 2006 and concluded a separation agreement in 2007 that covered the division of property and the custody arrangements for the two children. The sperm, stored in a sperm bank, was, however, forgotten and not included in the agreement. This discrepancy came to light when Ms J.C.M. began a new relationship and wished to conceive a child in the context of this new relationship with the previously purchased sperm so as to ensure that the resulting child was genetically-related to her existing children. Ms J.C.M. contacted Ms A.N.A. and offered to purchase her 'half' of the

sperm at the original purchase price. Ms A.N.A. refused and insisted that the vials could not be considered property and should be destroyed.

The central question before the Canadian court was thus whether the sperm could be considered marital property in the context of the separation of J.C.M. and A.N.A. In first determining whether or not sperm could be considered property at all, Justice Russell examined two earlier cases, that of *Yearworth* and a Canadian case concerning ownership of embryos. In the Canadian case, that court had held that embryos created from sperm gifted from one friend (the originator of the sperm) to another (a woman) for the purpose of conceiving a child were solely the property of the woman; indeed, it found: 'They [the fertilized embryos] are chattels that can be used as she sees fit'.³³ By donating his sperm in full knowledge of what his friend intended to do with it, the Court found that he lost all rights to control or direct the embryos. By framing the case before her in the context of this case-law, it is no surprise that Justice Russell found that sperm can constitute property. Yet, her decision was not apparently without some reservation or awareness of the implications of the decision; she claimed: 'In determining whether the sperm donation they used to conceive their children is property, I am in no way devaluing the nature of the substance at issue.'³⁴

The second question that then arose was whether the sperm could be marital property and thus subject to division. In making her decision, Justice Russell considered a US case in which frozen embryos were held to be the personal property of the biological parents and hence marital property in the context of their separation. As such, they could be the subject of a 'just and proper' division.³⁵ Following this, Justice Russell found that the sperm in the present case was the property of both parties and, as such, marital property which can, and should, be divided. In doing so, she dismissed the findings in *Hecht* that only the originator of the sperm can determine what should be done with his sperm as irrelevant because the originator in this case had either sold or donated his sperm for the purpose of it being sold on (p. 206) for the purpose of conceiving children. As J.C.M. and A.N.A. had purchased the sperm, the wishes of the originator were no longer relevant.

The outcome of the answers to the two questions—of whether sperm can be property and whether it can be marital property and thus subject to division—was not only that the parties were entitled to half each of the remaining sperm, but also that they were able to dispose of the sperm as they saw fit, i.e. they possessed full property rights over the sperm. In the words of the Court (in relation to A.N.A.'s desire that the sperm be destroyed), 'Should A.N.A. wish to sell her share of the gametes to J.C.M. that will be her prerogative. *She may dispose of them as she wishes*'.³⁶ The conclusion of the Court appears to be that the fact that the sperm had been purchased from the originator removed any special status from them: it became simply a movable object that is subject to regular property rules and thus to division as a marital asset despite the nice statements to the contrary.

2.3 The Wisdom of Solomon; or Taking Sperm Seriously?

If we analyse the approach that these courts, predominantly in common law systems, are taking to sperm, and if we do so against the backdrop of developments in relation to body parts more generally, what do we see? How are courts adapting age-old principles to the biotech era or, in the words of the Court in *Roche*, to the post-double helix age? It seems to me instructive to break these cases down along two lines. The first is the identity of those asserting property rights: is the claimant the originator of the sperm, or is another actor making the claim? The second line to take note of is the purpose for asserting property rights over the sperm, a perhaps particularly relevant aspect where the claimant is not the originator of the body part.

In only *Yearworth/Lam* and *Moore* were the sources of the body parts—the originators—claimants in a case, and the outcomes were very different. *Moore* was denied any property rights over the cell lines produced from his body parts, whereas the men represented in *Yearworth* successfully claimed ownership of their sperm. The different outcomes can be explained by the purpose of asserting property rights: Mr Moore ostensibly sought property rights in order to share in the profit being made by others; the gentlemen in *Yearworth* required a recognition of their property rights in order to bring a claim for negligence. As such, the nature of the claims are different: the actions of the defendants in *Yearworth* had placed the applicants in a worse position, whereby the compensation was to restore, however, inadequately, the claimants' position. In contrast, *Moore* could be argued not to have been harmed by the use of his tissue and thus any compensation would not restore his situation but improve it.³⁷ Either way, the claims in *Yearworth/Lam* (p. 207) appear more worthy than *Moore* and the court decision falls accordingly. However, motivations are never quite so clearly cut. Dickenson suggests that Moore was not particularly interested in sharing in the profit being made by others but was simply asserting ownership over his own body parts. Likewise, the outcome, whether or not it is the main motive, of a negligence claim such as that in *Yearworth* is financial compensation. The distinction between the two cases is thus murkier than at first glance. The difference in outcome might then be explained by the purpose of the counter-property claim. In *Yearworth*, the NHS Trust, whose sperm storing facility had been at fault, sought to deny the property claim because it did not wish to pay compensation. In *Moore*, Dr Golde and the UCLA Medical School sought recognition of their own property rights for profit; but not just any profit, according to the Californian Supreme Court, but rather the sort of profit that drives scientific progress and thus is of benefit to society as a whole. This reasoning has the strange outcome that a public body that is solely designed to further public health—Bristol NHS Trust—is on the losing side of the property claiming game, while the profit-making actors win their case precisely because they are profit making.

Alternatively, the difference between *Moore* and *Yearworth* could have been that sperm is accorded a special status. Perhaps the Californian Court would have reasoned differently had Mr Moore been claiming rights over his gametes rather than his T-cells. While this

seems unlikely, certainly in three of the cases that deal with sperm—*Hecht*, *Yearworth*, and *Parpalaix*—the special status of sperm is explicitly recognized by the courts.

The cases of *Hecht* and *Parpalaix* are very alike; in both cases, an individual claims possession of the sperm of a deceased other with whom she was intimate for the purpose of conceiving a child. Both cases hinged on the intent of the originator of the sperm, clearly expressed in *Hecht*, much less clearly in *Parpalaix*.³⁸ In both cases, the courts accept the applicant's claim based upon the intent of the originator of the sperm. However, there is also a notable difference between the two cases: in one, the court found that there was no question but that property or contractual rights could not be applied; the French court found for Mrs. Parpalaix purely on the basis of intent. In *Hecht*, the US court located sperm within the property law frame because of the interests of its originator; on the basis of the intent of Mr Kane, the claimant could be accorded very limited property rights over his sperm. Thus, the special nature of sperm (or of gametes in general) either leads to no place or a special place within the property law regime—sperm as a 'unique form of property'—and thus directly to limited property rights for an individual over the sperm of another (arguably by allowing Mrs Parpalaix to use her deceased husband's sperm for the purpose of conception the French court also accorded her a limited property right—usage—but without explicitly labelling it in this way).

This idea of limited rights based on the intent of the originator also plays an important role in *Edwards*. The difference in the Australian court's reasoning is, however, that the interests of the claimant take centre stage—at least in determining (p. 208) whether property rights exist or not. The switch from intent to interest is surely an important one, not least because the Court did not limit interest to the obvious interest of a childless widow or of an individual who had an intimate relationship with the deceased. This appears to open the possibility that others, such as profit-making actors, could make a claim to possession based upon interest, perhaps where some unique factor exists that renders the tissue particularly important for research purposes, without any intent on the part of the originator to have his tissue so used.

Unlike in *Yearworth* and *Moore*, where the originators of the sperm or body parts were alive and active participants in their own cases, in *Parpalaix*, *Hecht*, and *Edwards*, the originators of the sperm are all deceased. However, it is noteworthy that they are very present in the cases and in the courts' reasoning via the emphasis on their intent, whether in determining the existence of property rights or the extent of the scope of those rights. Here is a distinct contrast with the final two cases to be analysed, *Roche* and *J.C.M.*, in which the originators of the body parts and sperm are deceased in one and living in the other, but in both cases, they are markedly absent from the proceedings.

The absence of the originators in determining the outcome of the proceedings can perhaps be attributed to the fact that the applicants in *Parpalaix*, *Hecht*, and *Edwards* were intimately involved with the originators as either spouse or partner. In *Roche*, the claim was that of an individual who wished to determine whether she did in fact possess an intimate relationship of sorts with the deceased—whether she was his daughter—but who did

not have a personal relationship with him during his lifetime; they had not met. The purpose of her property claim, at least as framed by the nature of that claim, was profit. Ms Roche was seeking to claim part of the deceased's estate, which was not insubstantial. At the same time, the Court took a distinctly pragmatic approach to the disposal of body parts: finding that body parts could constitute property was necessary in order to save time and effort to all.

In *J.C.M.*, the originator of the sperm at issue was equally, if perhaps more dramatically, absent from the proceedings. He was unidentified, anonymous. His intent or further interests in his own sperm played no role in the proceedings.³⁹ It is in the case of *J.C.M.* that a shift can most clearly be asserted. The purpose of the claim was for conceiving a child, but the frame of the case marks it out from similar claims in *Parpalax*, *Hecht*, and *Edwards*. It is not simply that the originator was not known to the parties, but that in *J.C.M.* the sperm was framed within the terms of marital property and thus as subject to division. Here, sperm—despite a stated recognition by Justice Russell that sperm is valuable—no longer appears to retain any special characteristics. It has become entirely detached from the originator and is little more than a simple movable object that must be divided once love is over.

If this is the case—that an intimate body part like sperm can be entirely detached from its originator and become property in the most ordinary sense—what consequences flow?

(p. 209) 3. The 'Common Sense' Shift towards Property Rights? Protection and Pragmatism

In *Roche*, Master Sanderson suggested that it defied reason not to regard human tissue, once separated from the body, as property. This bold statement captures a trend in how we conceptualize human body parts and tissues. But this movement in our understanding of how we should conceive of human tissue is arguably part of a much broader coalescence between two phenomena: the rise and now dominance of rights-talk against the backdrop of property as the central organizing principle in Western societies (Waldron 2012).⁴⁰ As Julie Cohen has noted in relation to the movement away from viewing personal data as a privacy issue to one of property, 'property talk' is one of the key ways in which we express matters of great importance to us (Cohen 2000). Cohen's phrase 'property talk' implicitly captures this combination of rights talk with property as an organizing frame; the result is a stark and powerful movement towards the use of the language of property rights as one of the key means of addressing new technological developments. This section considers the arguments for property rights as the appropriate frame for human tissue,⁴¹ and focuses on the claim that only property rights can provide the necessary protection to individuals.

3.1 Pragmatic Protection

Donna Dickenson, who is well placed to observe such developments, has suggested that the view that the body should be left to the vagaries of the free market is now the dominant position within bioethics—a phenomenon that she has labelled the ‘new gold rush’ (Dickenson 2009: 7). It is against this background that she has developed her argument in favour of property rights as a means of protecting individuals against the claims of corporations and other collective actors, as in *Moore*. According to Dickenson, personal rights entail that, once consent has been given, the originator no longer has any control over what happens to the donated tissue. Property rights, in combination with consent, would entail, instead, that originators continue to have a say over how their tissue is used and ultimately disposed of. For this reason, Dickenson wishes to reinterpret the notion of ‘gift’ so as to move away from consent to a property-based regime.

A similar argument follows from Goold and Quigley’s observation that ‘[t]he reality is that human biomaterials are things that are used and controlled’ (Goold and Quigley 2014, 260). Following on from this, Lyria Bennett Moses notes that (p. 210) property is simply the ‘law’s primary mechanism for identifying who is allowed to interact with a “thing” ’ (Bennett Moses 2014: 201). Bennett Moses notes that the law does not provide for civil or criminal remedies for those who interfere with or damage a ‘thing’ anywhere but property law. This was, of course, the rationale in *Yearworth* and in *Lam* in granting property rights to the applicants. Thus, in order to protect the owners of body tissue, whether that be the originators or other parties (such as researchers), human tissue needs to be governed by property law.⁴² This protection argument has been expressed by Goold and Quigley as the need to provide legal certainty and stability: ‘when a property approach is eschewed, there is an absence of clarity’ (Goold and Quigley 2014: 241, 261).

3.2 Neither a Good Thing or a Bad Thing

Advocates of property as the most appropriate regime for human tissue argue for an understanding of property that is neutral, i.e. that is neither a good thing nor a bad thing in itself, but that it is the type of property rights that are accorded that determine whether property rights expose us to unacceptable moral risk. Put simply, these scholars argue for a complex understanding of property whereby property does not necessarily entail commercialization (Steinbock 1995; Beyleveld and Brownsword 2001: 173–178).

Bennett Moses argues for a nuanced, or ‘thin’ understanding of property in which recognition of a property right does not entitle the rights-holder to do whatever one wishes with a human body object. She argues that it is possible to grant property rights over human tissue and embryos without entailing ‘commodification’ and ‘ownership’. Indeed, property rights may not include alienability, i.e. the ability to transfer a thing (Bennett Moses 2014: 210). Similarly, Dickenson begins her account of property rights by acknowledging the influential definition by Honoré of property as a ‘bundle of rights’ (Honoré 1961). Following this notion entails that different property rights can be assigned in different contexts and that acknowledging a property right does not entail *all* property

rights. This understanding was taken by the Court in *Edwards*, which awarded Mrs Edwards possession of her dead husband's sperm, but not usage rights. In *Hecht*, the restriction imposed by the Court on Ms Hecht's ability to sell or donate the sperm to another came about because of a stronger property right held by the sperm's originator; the sperm, according to the Court, remained the property of Mr Hecht and its disposition remained governed by his intent.

An additional aspect of the argument for property rights is that such rights are not necessarily individual in nature. Instead, the property regime also contains notions of collective and communal property. What Dickenson is largely arguing, for example, is for communal mechanisms for governance of the new biotechnologies (p. 211) that, 'vest[...] the controls that constitute property relations in genuinely communal bodies' (Dickenson 2007: 49).

In sum, the arguments for property rights are largely pragmatic and are seen by their advocates as the best means for protecting the individual's relationship to their bodily tissues once they have been separated from the body. From pragmatism, we turn to moral matters.

4. Shooting the Walrus; or Why Sperm is Special

In his book, *What Money Can't Buy*, the philosopher Michael Sandel asks the memorable question: 'Should your desire to teach a child to read really count equally with your neighbour's desire to shoot a walrus at point-blank range?' (2012: 89). Beautifully illustrated by the outcry over the shooting of Cecil the Lion in July 2015, the question suggests that the value assigned by the market is not the only value that should matter and hints that it might be appropriate to value some things more highly than others: we may not all be able to agree that the existence of an individual walrus or lion has value in its own right but we can surely all acknowledge that the value to every human being of being able to read has a worth beyond monetary value.

In his book, Sandel puts forward two arguments for why there should be moral limits to markets. The first is one of fairness. According to Sandel, the reason that some people sell their gametes, or indeed any other parts of their body, is one of financial need and therefore it cannot be seen as genuinely consensual. Likewise, allowing financial incentives for actions such as sterilization or giving all things—such as 'free' theatre tickets or a seat in the public gallery of Congress—a price undermines common life. He writes, '[c]ommercialism erodes commonality' (Sandel 2012: 202). That unfairness is the outcome of putting a price to everything is undeniable, but this fear of commercialism in relation to our body tissues is precisely why some scholars are advocating property rights. Dickenson, for example, sees property rights as providing protection against the unfairness associated with commercialization (2009: ch 1).

Human Rights and Human Tissue: The Case of Sperm as Property

It is Sandel's second argument against the idea that everything has its price that is the one I wish to borrow here. According to Sandel, the simple fact of allowing some things to have a price corrupts the thing itself; that allowing this good to be bought and sold degrades it (2012: 111–113). This argument focuses on the nature of the good itself and suggests that certain things have a value distinct from any monetary price (p. 212) that the market might assign. This concern cannot be addressed by paying attention to bargaining power in the exchange of goods; it is not a question of consent or of fairness but relates to the intrinsic value of the good or thing itself. More crucially here, it cannot be addressed by using property rights.

Not only can property rights not address this type of concern, but I wish to suggest that applying individual property rights to sperm is in itself corrupting, regardless of whether the aim is commercialisation or protection. To claim this is to claim that sperm and other human tissue have a moral worth that is separate and unrelated to any monetary or proprietary value that might be attached to them, and which will be degraded by attaching property rights to them.

There are good reasons for thinking that sperm has value outside of any monetary or proprietary value; that sperm is special (the argument applies equally to ova, of course). There are two reasons for thinking this. The first is the life-generating potential of gametes. While ostensibly the main purpose of the court cases relating to sperm, the courts in question did not consider in any depth the life-creating potential of the good to be disposed of. In the end, they paid only lip-service to its special nature. While the Court in *Edwards* limited Mrs Edwards' property rights to possession, it did so in full knowledge that Mrs Edwards could take the sperm to another jurisdiction that was not so fussy about donor consent in order to conceive the desired child—which is precisely what Mrs Edwards did in fact do. The trial court in *Hecht*, despite explicitly stating that the value of sperm was its life-creating potential, proceeded to decide the matter by dividing the vials of Mr Kane's sperm between his widow and children, therefore viewing sperm as simple property that could be inherited; although the distribution was overturned on appeal, the idea that sperm could be inherited property was not. This was taken to the extreme in *J.C.M.*, where the court found that sperm was nothing more than marital property that could be sold or disposed of at will. Where the judge did consider the issue in *J.C.M.*, she did so obliquely, viewing the sperm as valuable in relation to the children that had already been created by it in the now-defunct relationship. The sperm was thus not considered special in relation to the existence of the potential children who were really the subject of the case, in the sense that they were the reason that the sperm had value and was being fought over. By failing to consider the awesome potential that gametes intrinsically possess, the courts were able to view sperm as just a thing to be disposed of as the parties wished.

The second factor that makes sperm special is that it contains not simply the potential of life-creation but the creation of a particular life, one that is genetically related to the sperm's originator. What mattered to the widows in *Parpalax*, *Hecht*, and *Edwards* was not that they had property rights in any sperm, but that they gained access to the sperm

of their deceased husbands. It was the particular genetic make-up of the potential child—the identity of that child as biologically related to their deceased husband—that gave the sperm in question its value. The relationship between sperm and the identity of the originator was acknowledged (p. 213) in the widow's cases, where the intent of the originator was largely decisive. Even in *J.C.M.*, it was the unique genetic markers of the sperm that gave it its value: *J.C.M.* and her new partner could simply have procured more sperm, but *J.C.M.* did not want just any sperm. She wanted her potential children to be genetically related to her existing children. It is thus the potential of sperm to create a *particular* life that means that sperm is special for the identity that it contains, for both the originator and for any child created by it.⁴³ It is this combination of life-giving potential and identity that makes gametes so special. Of course, it is not only gametes that contain our genetic identity. All the cells in our body do and we shed them regularly without concern. But this is not a convincing argument against attaching special status to gametes: when life can be created from nothing more than a hair follicle, this too then will attain the same level of value as gametes.⁴⁴

Suggesting reasons why sperm (and female gametes) have a special value does not, however, tell us why assigning individual property rights to them might be corrupting. The answer, I wish to argue, lies in an understanding of what it is to be human. This is of course a type of human dignity claim (Brownsword and Goodwin 2012: 191–205) and it consists in two parts.

The first argument concerns commodification. Individual property rights, it seems to me, reduce sperm to a commodity, regardless of whether that commodity is commercialized i.e. whether it is possible to trade in it, or not. In whatever way one chooses to define property rights (see Beyleveld and Brownsword 2001: 173–175 for a beautifully succinct discussion of definitions of property), there is arguably an irreducible core that is the idea that a concept of property concerns a relationship between a subject and an object (including the relationship between multiple subjects in relation to that object). If this is so, assigning property rights appears to necessarily reduce sperm, or indeed any human tissue, to an object—a 'thing'; this is so whether or not human tissues, following a 'thin' conception of property, are a different type of 'thing' to ordinary chattels (Bennett Moses and Gollan 2013). It remains a 'thing'. As Kate Greasley notes, making a good into a 'thing' is precisely the purpose of property rights:

Where legal property rights arise in anything, they are there chiefly to facilitate the possibility of *transferring* the possession, control or use of the object of property from one party to another—to make it possible that the object can be treated as a 'thing' in some fundamental ways

(Greasley 2014: 73, emphasis hers)

The reduction of a good of great value to a material 'thing' is well demonstrated in the *Yearworth* and *Lam* cases. These cases are the most convincing for property rights advocates because it is difficult not to have sympathy with the applicants. Yet, the assignment of individual property rights in order to grant financial compensation to the men affected

surely misses the point of what is at issue for these men. How can it be anything other than degrading of the value of their sperm to see money as a remedy for the loss of the ability to reproduce and all that that existentially entails?

(p. 214) In turn, the purpose of reducing a good to a thing is to be able to alienate it from an individual. As Baroness Hale noted in *OBG v Allan*, 'The essential feature of property is that it has an existence independent of a particular person: it can be bought and sold, given and received, bequeathed and inherited, pledged or seized to secure debts, acquired (in the olden days) by a husband on marrying its owner'.⁴⁵ However, while it is certainly possible to alienate human tissue in a physical way and we may view that tissue as a physical object outside our bodies, it is not just a 'thing'—it remains in some fundamental way part of us although it is physically separated. Jesse Wall argues that '[w]e are also more than a combination of things; we are a complex combination of preferences, emotions, experiences and relationships' (2014: 109). My body is not simply something that I use. Understanding the body as a collection of things or a resource accepts the Cartesian world view of the separation of mind and body; yet, where we view our bodies as integral to our being, it is impossible to view the body as a collection of scarce resources that are capable of alienation or as 'things' that I use and might therefore wish to exclude others from using. Rather, I am my body and my body parts are necessarily bound up with my identity, whether or not they have been physically alienated from the rest of me. If I am my body, to accept the idea of the body as a collection of 'things' that can be alienated from me is, arguably, to devalue the richness and complexity of what it is to be human, even if the aim of property rights is to protect bodily integrity.

Thus, even where the aim of attaching property rights is to protect human tissue from commercial exploitation, individual property rights inevitably adopt a view of the body that is alienating. They commodify the body because that is what property rights, even 'thin' ones, do. Bennett Moses suggests that we can separate legal rights in something from its moral status and has argued that that '[t]he fact that a person has property rights in a dog does not make animal cruelty legal' (2014: 211). While it, of course, does not, there is an undeniable relationship between the fact that it is possible to have property rights in a dog and the moral worth of the dog.

The second argument that individual property rights applied to gametes is undesirable concerns the drive for control that it represents. Sandel has written in an earlier book of the 'giftedness' of human life. In his plea against the perfectionism entailed by embryo selection for human enhancement, Sandel wrote:

To acknowledge the giftedness of life is to recognize that our talents and powers are not wholly our own doing, nor even fully ours, despite the efforts we expend to develop and to exercise them. It is able to recognize that not everything in the world is open to any use we may desire or devise

(2007: 26-27).

For Sandel, accepting the lottery-like nature of our genetic inheritance are fundamental aspects of what it means to be human. 'Giftedness' is the opposite of efforts to assert control and requires an acceptance that a fundamental part of what it is to be human, of human nature, is to be forced to accept our inability to control some of the most important aspects of our lives, such as our genetic make up.⁴⁶ Yet, what the (p. 215) concept of property reflects, according to two advocates in favour of applying property rights to human tissue, is precisely 'a desire for control' (Goold and Quigley 2014: 256). What is thus corrupting about applying individual property rights to gametes is the attempt to assert individual control where it does not belong. We hopefully think of life-creation in terms of consent or love or pleasure, but we do not think of it in terms of proprietary control.

The danger of the desire for control as reflected in a property-based understanding of sperm has been exposed by a recent advisory opinion by the Dutch Commission on Human Rights.⁴⁷ The opinion concerned the conditions that sperm donors could attach to recipients. The requested conditions ranged from the racial and ethnic origins, the religious beliefs, the sexuality, and the political beliefs to the marital status of recipients. They also included conditions as to lifestyle, such as whether recipients were overweight or smokers. While most sperm banks do not accept such conditions from donors, some do. If sperm is property—where the intent of the originators takes precedence—then it seems reasonable to accept that donors have the right to decide to whom their donated sperm may be given.⁴⁸ Even if we agree that there are certain grounds that cannot be the subject of conditions, such as racial or ethnic origins or sexuality, as the Commission did, we would perhaps follow the Commission in accepting that a donor can block the use of their sperm by someone who is unmarried, or is overweight, or who does not share their ideological opinions. However, when we accept this, the idea of donation as a gift—and the 'giftedness' that is thereby entailed—is lost. There seems to be little difference here between allowing donors to set conditions for the recipient and permitting the payment of sperm donors i.e. giving sperm a monetary value.

The suggestion therefore is that assigning individual property rights to gametes risks degrading their moral worth (and thus our moral worth). They reduce our being to a thing and risk alienating an essential part of ourselves. Moreover, individual property rights represent a drive to mastery that is undesirable. One can have sympathy for the widows in the sperm cases for the loss of their husbands without conceding that the proper societal response was to accord them property rights in their deceased husband's sperm. Likewise, acknowledging the tragedy of the situation of the applications in *Yearworth* and *Lam* does not require us to define their loss in proprietary terms so as to accord it a monetary value.

5. A Plea for Caution

Human rights provide protection to individuals but they also empower; this corresponds roughly to the negative and positive understanding or manifestation of rights. (p. 216) Both aspects of rights are at play in the property rights debate we have considered. I

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have great sympathy for the use of rights to provide protection and careful readers will have hopefully noted that I have limited my arguments to individual property rights. Donna Dickenson makes a strong case for the use of communal property rights to protect individuals from corporate actors and commercial third parties. Moreover, the public repository idea that she and others advance for cord banks or DNA banks, protected by a communal concept of property, may well be the best means available to protect individuals and to secure our common genetic inheritance from profit-making greed. However, what Dickenson is not arguing for is property rights to assist individuals in the furtherance of their own private goals, as is the case in the sperm cases considered here. There is no common good served by the decision to characterize sperm as marital property and thus as equivalent to any other thing that constitutes part of a once shared life that is divided upon separation, like old LPs or sofa cushions. Sperm is more than just a thing. To think otherwise is to devalue the awe-inspiring, life-giving potential that is its essence. Our gametes are, for many people, a large part of the clue to the meaning of our lives. In creating the lives of our (potential) children, gametes tether us to the world around us, even once our own individual lives are over.

What I have attempted to suggest in this chapter is that the cases considered here reflect a powerful trend in Western societies towards the dominance of human rights as our moral lingua franca. In particular, they demonstrate a key part of the trend towards a fusion of property and individual rights-talk. This 'sub'-trend is of growing relevance within the law and technology field. It appears that it is individual property rights that will fill the space opened up by the recognition that earlier case-law, such as *Doodeward*, is no longer fit for the bio-tech age. New technologies have ensured that human tissue can be separated from the body and stored in previously unimaginable ways, and, as a result, can possess an extraordinary monetary value. And there is certainly a need to address these issues through regulation in a way that provides protection to both individuals and communities from commercial exploitation. Yet, while the most convincing arguments for assigning property rights to human tissue are practical ones—that individual property rights will bring stability to the gold rush in human tissue and provide protection against rapacious commercial interests—just because a rule is useful, it does not make it moral.

Rights are always both negative (protective) and positive (empowering), i.e. they contain both facets within them and can be used in either way. Property rights are no different. They can be used to protect individuals or communities—as in the case of indigenous groups—but also to empower individuals against the community or against one another. One cannot use rights to protect without also allowing the possibility for empowerment claims; this may be a good thing but equally it may not. Moreover, human rights are not limited to natural persons, such as individuals or communities, but also apply to legal actors, such as corporations.⁴⁹ To balk at the use of individual property rights in cases such as these is not to deny that there is (p. 217) an increasing need for better regulation in relation to human tissue. What I have attempted to suggest is that there is a risk in abandoning alternative frames, such as human dignity, for individual rights, because private interests cannot protect the moral value of the interests that we share as human beings.

This chapter is a plea, then, for caution in rushing to embrace property rights as the solution to our technology regulation dilemma.

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Notes:

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nett Moses who kindly shared her rich knowledge of property law with me. The views expressed here and any errors are mine alone.

(1.) See, for an overview, Roger Brownsword and Morag Goodwin, *Law and the Technologies of the Twenty-First Century* (CUP 2012) ch 9. Also, Thérèse Murphy (ed), *New Technologies and Human Rights* (OUP 2009).

(2.) For an argument for the dominance of human rights in the late twentieth-century, see Samuel Moyn, *The Last Utopia. Human Rights in History* (Belknap Press 2010).

(3.) For example, see Richard E Ashcroft, 'Could Human Rights Supersede Bioethics' (2011) 10 *Human Rights Law Review* 639.

(4.) 30562/04 [2008] ECHR 1581.

(5.) 6339/05, ECHR 2007-IV 96.

(6.) The right to property is of course part of the international human rights canon, e.g. as Article 17 of the Universal Declaration of Human Rights. Yet it is not invoked by the cases here because property rights are generally well enough protected by national constitutional orders, at least those considered here.

(7.) There are of course exceptions to this trend and the European Court of Human Rights is one; the right to property does not play a central role in the life of European Convention of Human Rights and instead most cases are heard under Article 8, the right to private life.

(8.) The main exception to this rule is the United States.

(9.) It is quite literally a classical position, as the principle 'Dominus membrorum suorum nemo videtur' (no one is to be regarded as the owner of his own limbs) is found in Roman law, notably Ulpian, Edict, D9 2 13 pr.; see *Yearworth & Others v North Bristol NHS Trust* [2009] EWCA Civ 37, para. 30. This position within the common law was reaffirmed by the UK House of Lords in *R v Bentham* [2005] UKHL 18, [2005] 1 WLR 1057.

(10.) See, for example, the 1997 Oviedo Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine, including 2002 Optional Protocol Concerning Transplantation of Organs and Tissues of Human Origin. Exceptions are generally made in most jurisdictions for hair and, in the US, for sperm. Payment is allowed for expenses but the transaction is not one of purchase.

(11.) E.g. the 1926 International Convention to Suppress the Slave Trade and Slavery and the 1956 Supplementary Convention on the Abolition of Slavery, the Slave Trade, and Institutions and Practices Similar to Slavery.

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(12.) *Laskey, Jaggard and Brown v the UK*, Judgment of the European Court of Human Rights of 19 February 1997. Medical procedures are not viewed as harm in this way because medical professionals are bound by the ethical requirement that any procedure must be to the patient's benefit.

(13.) This is not a common-law peculiarity; civil law generally takes a similar approach. An exception is the German Civil Code, which awards property rights to human tissue or materials to the living person from which they were separated (section 90 BGB).

(14.) Ibid.

(15.) It is important to remember that legal framing is not the only way of conceiving of ourselves; morally, for example, we may well take to be self-evident that we own ourselves.

(16.) *Pierce v Proprietors of Swan Point Cemetery*, 14 Am Rep 465 (RI SC 1881); *Snyder v Holy Cross Hospital* 352 A 2d 334 (Md App 1976). For analysis of these cases, see Hardcastle, 51–53.

(17.) (1908) 6 CLR 406 (HCA), 414.

(18.) As Hardcastle has well demonstrated, the no property principle is not as straightforward as it seems at first glance; open questions include whether the property rights can be asserted by the person who alters the human tissue or the employer of that person, as well as what those property rights consist in; 38–39.

(19.) *Moore v Regents of the University of California*, 793 P 2d 479 (Cal SC 1990). For a detailed description and analysis of the case, see Dickenson 2008: 22–33.

(20.) *Roche v Douglas as Administrator of the Estate of Edward John Hamilton Rowan (dec.)* [2000] WASC 146.

(21.) Ibid., para 15.

(22.) Such savings can of course be seen as a public good of sorts.

(23.) T.G.I. Creteil, 1 Aug. 1984, Gaz. Du Pal. 1984, 2, pan. jurispr., 560. See Gail A. Katz, 'Parpalaix v. CECOS: Protecting Intent in Reproductive Technology' (1998) 11(3) *Harvard Journal of Law and Technology* 683.

(24.) Ibid., 561.

(25.) *Hecht v Superior Court of Los Angeles County (Kane)* [1993] 16 Cal. App 4th 836; (1993) 20 Cal. Rptr. 2d 775.

(26.) Ibid., 847.

(27.) Ibid., 849.

(28.) *Yearworth & Ore v North Bristol NHS Trust* [2009] EWCA Civ 37.

(29.) *Lam v University of British Columbia*, 2015 BCCA 2.

(30.) *Ibid.*, para. 52.

(31.) *Jocelyn Edwards Re. the Estate of the late Mark Edwards* [2011] NSWSC 478.

(32.) *J.C.M. v A.N.A.* [2012 BCSC 584].

(33.) *C.C. v A.W.* [2005 ABQB 290]; cited at *ibid.*, para. 21.

(34.) *Ibid.*, para. 54.

(35.) *In the Matter of Marriage of Dahl and Angle*, 222 Or. App. 572 (Ct. App. 2008); cited *ibid.*, 579–581. Cf. the case of Natalie Evans, whose claim for possession of embryos created with her ex-partner was considered within the larger frame of the right to private life and was decided on the basis of consent; *Evans v the United Kingdom* [GC] (2007), no. 6339/05, ECHR 2007-IV 96.

(36.) *J.C.M. v A.N.A.*, para. 96.

(37.) Thank you to Roger Brownsword for this observation.

(38.) The French Court takes as decisive the support of Mr Parpalaix's parents for his widow's claim—given that the marriage was only a matter of days old and that Mrs Parpalaix was to be directly involved in any resulting conception—on the not entirely reasonable basis that parents know their children's wishes. *Parpalaix*, 561.

(39.) While his original intent in either donating or selling his sperm to the sperm bank can perhaps be assumed—he would have known that the likely use would be for the purpose of conceiving children—it is nonetheless remarkable that the Court so readily assumed that the original decision to donate or sell terminated any further rights or interests in the sperm.

(40.) So central, that Sunder has suggested, following Radin, that property claims should be viewed as an assertion of our personhood; Sunder 2005: 169.

(41.) The focus is on human tissue more generally, rather than gametes specifically, because the academic literature takes the broader approach.

(42.) Beyleveld and Brownsword 2001: 176–193, have gone further and suggested that property rights, conceived as preclusionary rights, are essential to and underpin claims to personal integrity or bodily integrity or similar. I cannot do justice to their sophisticated argument within the scope of this chapter but I am as yet unconvinced that a claim to bodily integrity requires a property-type claim to underpin it. This seems to me a reflection of a Cartesian separation of mind and body discussed in section 4.

(43.) The importance of the connection between sperm and identity is acknowledged by the decision of many jurisdictions to no longer allow anonymous sperm donation.

(44.) Of course, that are tissue contains our identity is one important reason why it too is special. In the *Roche* case, the applicant wished to take possession of the deceased's tissue because she wished to prove that she was his biological daughter. Identity was the question at the heart of the matter in *Roche*, if only for the reason that we generally leave our estates to our offspring because of the shared sense of identity that comes with being biologically related. This remains true despite a growing acceptance of alternative ideas about what family consists in.

(45.) *OBG v Allan* [2007] UKHL 21 [309].

(46.) Dworkin has of course argued that the drive to challenge our limitations is an essential aspect of human nature; one can accept this, however, whilst still arguing that some limits are equally essential to that nature. Ronald Dworkin, 'Playing God: Genes, Clones and Luck' in *Sovereign Virtue* (HUP, 2000), 446.

(47.) College voor de Rechten van de Mens, Advies aan de Nederlandse Vereniging voor Obstetrie en Gynaecologie ten behoeve van de richtlijn spermadonatiezorg, January 2014.

(48.) Beyleveld and Brownsword's concept of property as a preclusionary right would not necessarily entail that the donor's wishes override the interests of another; Beyleveld and Brownsword 2001: 172-173. It would, however, seem reasonable to view this as flowing from many concepts of property forwarded in the human tissue debate.

(49.) For example, Article 1 Protocol 1 of the European Convention on Human Rights provides that 'Every natural or legal person is entitled to the peaceful enjoyment of his possessions' and a majority of applications under this protection have come from corporate actors.

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Legal Evolution in Response to Technological Change



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Abstract and Keywords

This introductory chapter to Part III examines whether there are generalizable lessons concerning law and its regulation of technology that we can learn from past experience with the law reacting to technological evolution. I suggest three insights from historical interactions between law and technological change: (1) pre-existing legal categories may no longer apply to new law and technology disputes; (2) legal decision makers should be mindful to avoid letting the marvels of a new technology distort their legal analysis; and (3) the types of legal disputes that will arise from new technology are often unforeseeable. These lessons are applicable across a wide range of technologies, legal fields, and contexts to aid in determining current and future legal responses to technological development.

Keywords: law, technology, regulation, governance, Internet, DNA typing, genetically modified, synthetic biology

1. Introduction

THE most fundamental questions for law and the regulation of technology concern whether, how, and when the law should adapt in the face of technological evolution. If legal change is too slow, it can create human health and environmental risks, privacy and other individual rights concerns, or it can produce an inhospitable background for the economy and technological growth. If legal change is too fast or ill-conceived, it can lead to a different set of harms by disrupting settled expectations and stifling further technological innovation. Legal responses to technological change have significant impacts on the economy, the course of future technological development, and overall social welfare.

Part III focuses on the doctrinal challenges for law in responding to technological change. Sometimes the novel legal disputes produced by technological advances require new legislation or regulation, a new administrative body, or revised judicial understanding. In other situations, despite potentially significant technological (p. 226) evolution, the kinds of disputes created by a new technological regime are not fundamentally different from

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previous issues that the law has successfully regulated. Determining whether seemingly new disputes require a changed legal response, and if so what response, is a difficult challenge.

Technological evolution impacts every field of law, often in surprising ways. The chapters in this Part detail how the law is reacting to technological change in areas as disparate as intellectual property, constitutional law, tax, and criminal law. Technological change raises new questions concerning the legitimacy of laws, individual autonomy and privacy, deleterious effects on human health or the environment, and impacts on community or moral values. Some of the many examples of new legal disputes created by technological change include: Whether various means of exchanging information via the Internet constitute copyright infringement? Should a woman be able to choose to get an abortion based on the gender of the foetus? Can synthetic biology be regulated in a manner that allows a promising new technology to grow while guarding against its unknown risks?

These and other legal issues created by technological advance are challenging to evaluate. Such issues often raise questions concerning how the law should respond in the face of uncertainty and limited knowledge. Uncertainty not just about the risks that a new technology presents, but also about the future path of technological development, the potential social effects of the technology, and the legitimacy of various legal responses. These challenges are exacerbated by the reality that the issues faced often concern technology at the forefront of scientific knowledge. Such technology usually is not only incomprehensible to the average person, but may not even be fully understood by scientific experts in the field. In the face of this uncertainty and limited understanding, generally lay legislative, executive, administrative, and judicial actors must continue to establish and rule on laws that govern uncharted technological and legal waters.

This is a daunting challenge, and the chapters in Part III describe how these legal developments and decisions are playing out in myriad legal fields, as well as make insightful recommendations concerning how the law could function better in such areas. This introductory chapter attempts to bring the varied experiences from different legal fields together to interrogate whether there are generalizable lessons about law and technology that we can learn from past experiences, lessons that could aid in determining current and future legal responses to technological development.

In examining legal responses to technological change across a variety of technologies, legal fields, and time, there are several insights that we can glean concerning how legal actors should (and should not) respond to technological change and the legal issues that it raises. These insights do not provide a complete road map for future responses to every new law and technology issue. Such a guide would be impossible considering the diverse scope of technologies, laws, and the manner in which they intersect in society. But the lessons suggested here can provide a number (p. 227) of useful guidelines for legal actors to consider when confronting novel law and technology issues.

The remainder of this chapter scopes out three lessons from past and current experience with the law and the regulation of technology that I suggest are generalizable across a wide variety of technologies, legal fields, and contexts (Mandel 2007). These three lessons are:

- (1) pre-existing legal categories may no longer apply to new law and technology disputes;
- (2) legal decision makers should be mindful to avoid letting the marvels of new technology distort their legal analysis; and
- (3) the types of legal disputes that will arise from new technology are often unforeseeable.

These are not the only lessons that can be drawn from experience with law and technology, and they are not applicable across all situations, but they do represent a start. Critical for any discussion of general lessons for law and the regulation of technology, I suggest that these guidelines are applicable across a wide variety of technologies, even those that we do not conceive of presently.¹

2. Pre-existing Legal Categories May No Longer Apply

Evidence that lessons from previous experience with law and technology can apply to contemporary issues is supported by examining the legal system's reaction to a variety of historic technological advances. Insights from past law and technology analysis are germane today, even though the law and technology disputes at issue in the present were entirely inconceivable in the periods from which these lessons are drawn.

Perhaps the most important insight to draw from the history of legal responses to technological advance is that a decision maker must be careful when compartmentalizing new law and technology disputes into pre-existing legal categories. Lawyers and judges are trained to work in a system of legal categorization. This is true for statutory, regulatory, and judicial-made common law, and in both civil law and common law jurisdictions. Categorization is vital both for setting the law and for enabling law's critical notice function.

Statutes and regulations operate by categorization. They define different types of legal regulation and which kinds of action are governed by such regulation. (p. 228) Similarly, judge-made common law operates on a system of precedent that depends on classifying current cases according to past categories. This is true whether the laws in question involve crystal rules that seek to define precise legal categories (for example, a speed limit of 100 kilometres per hour) or provide muddy standards that present less clear boundaries, but nevertheless define distinct legal categories (for example, a reasonableness standard in tort law) (Rose 1988).

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In many countries, law school is significantly devoted to teaching students to understand what legal categories are and how to recognize and define them. Legal practice primarily involves categorization as well: attorneys in both litigation and regulatory contexts argue that their clients' actions either fall within or outside of defined legal categories; attorneys in transactional practice draft contracts that define the areas of an agreement and what is acceptable within that context; and attorneys in advisory roles instruct their clients about what behaviour falls within or outside of legally accepted definitions. Law is about placing human actions in appropriate legal boxes.

Given the legal structure and indoctrination of categorization, it is not surprising that a typical response to new legal issues created by technological evolution is to try to fit the issue within existing legal categories. Although such responses are entirely rational, given the context described above, they ignore the possibility that it may no longer make sense to apply staid categories to new legal issues. While law can be delineated by category, technology ignores existing definitions. Technology is not bound by prior categorization, and therefore the new disputes that it creates may not map neatly onto existing legal boundaries. In order to understand a new law and technology issue one must often delve deeper, examining the basis for the existing system of legal categorization in the first instance. Complementary examples from different centuries of technological and legal development illustrate this point.

2.1 The Telegraph

Before Wi-Fi, fibre optics, and cell phones, the first means of instantaneous long-distance communication was the telegraph. The telegraph was developed independently by Sir William Fothergill Cooke and Charles Wheatstone in the United Kingdom and by Samuel Morse in the United States. Cooke and Wheatstone established the first commercial telegraph along the Great Western Railway in England. Morse sent the world's first long-distance telegraph message on 24 May 1844: 'What Hath God Wrought' (Burns 2004). Telegraph infrastructure rose rapidly, often hand in hand with the growth of railroads, and in a short time (on a nineteenth-century technological diffusion scale) both criss-crossed Europe and America and were in heavy use.

(p. 229) Unsurprisingly, the advent of the telegraph also brought about new legal disputes. One such issue involved contract disputes concerning miscommunicated telegraph messages. These disputes raised issues concerning whether the sender bore legal responsibility for damages caused by errors, whether the telegraph company was liable, or whether the harm should lie where it fell. At first glance, these concerns appear to present standard contracts issues, but an analysis of a pair of cases from opposite sides of the United States shows otherwise.²

Parks v Alta California Telegraph Co (1859) was a California case in which Parks contracted with the Alta California Telegraph Company to send a telegraph message. Parks had learned that a debtor of his had gone bankrupt and was sending a telegraph to try to attach the debtor's property. Alta failed to send Parks's message in a timely manner, caus-

ing Parks to miss the opportunity to attach the debtor's property with priority over other creditors. Parks sued Alta to recover for the loss.

The outcome of *Parks*, in the court's view, hinged on whether a telegraph company was classified as a common carrier, a traditionally defined legal category concerning transportation companies. Common carriers are commercial enterprises that hold themselves out to the public as offering the transport of persons or property for compensation. Under the law, common carriers are automatically insurers of the delivery of the goods that they accept for transport. If Alta was a common carrier, it necessarily insured delivery of Parks's message, and it would be liable for Parks's loss. But, if Alta was not a common carrier, it did not automatically insure delivery of the message, and it would only be liable for the cost of the telegraph.

The court held that telegraph companies were common carriers. The court explained that, prior to the advent of telegraphs, companies that delivered goods also delivered letters. The court reasoned, '[t]here is no difference in the general nature of the legal obligation of the contract between carrying a message along a wire and carrying goods or a package along a route. The physical agency may be different, but the essential nature of the contract is the same' (*Parks* 1859: 424). Other than this relatively circular reasoning about there being 'no difference' in the 'essential nature', the court did not further explain the basis for its conclusion.

In the *Parks* court's view, '[t]he rules of law which govern the liability of Telegraph Companies are not new. They are old rules applied to new circumstances' (*Parks* 1859: 424). Based on this perspective, the court analogized the delivery of a message by telegraph to the delivery of a message (a letter) by physical means, and because letter carriers fell into the pre-existing legal category of common carriers, the court classified telegraph companies as common carriers as well. As common carriers, telegraph companies automatically insured delivery of their messages, and were liable for any loss incurred by a failure in delivery.

About a decade later, *Breese v US Telegraph Co* (1871) concerned a somewhat similar telegraph message dispute in New York. In this case, Breese contracted with the US Telegraph Company to send a telegraph message to a broker to buy \$700 worth of gold. The message that was received, however, was to buy \$7,000 in gold, (p. 230) which was purchased on Breese's account. Unfortunately, the price of gold dropped, which led Breese to sue US Telegraph for his loss. In this case, US Telegraph's telegraph transmission form included a notation that, for important messages, the sender should have the message sent back to ensure that there were no errors in transmission. Return resending of the message incurred an additional charge. The form also stated that if the message was not repeated, US Telegraph was not responsible for any error.

The *Breese* case, like *Parks*, hinged on whether a telegraph company was a common carrier. If telegraph companies were common carriers, US Telegraph was necessarily an insurer of delivery of the message, and could not contractually limit its liability as it attempted to do on its telegraph form. The *Breese* court concluded that telegraph companies are not

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common carriers. It did not offer a reasoned explanation for its conclusion, beyond stating that the law of contract governs, a point irrelevant to the issue of whether telegraph companies are common carriers.

Though the courts in *Parks* and *Breese* reached different conclusions, both based their decisions on whether telegraph companies were common carriers. The *Parks* court held that telegraph companies were common carriers because the court believed that telegraph messages were not relevantly different from previous methods of message delivery. The *Breese* court, on the other hand, held that telegraph messages were governed by contract, not traditional common carrier rules, because the court considered telegraph messages to be a new form of message delivery distinguishable from prior systems.

Our analysis need not determine which court had the better view (a difficult legal issue that if formally analyzed under then-existing law would turn on the ephemeral question of whether a telegraph message is property of the sender). Rather, comparison of the cases reveals that neither court engaged in the appropriate analysis to determine whether telegraph companies should be held to be common carriers, and that neither court engaged in analysis to consider whether the historic categorization of common carriers, and the liability rules that descended from such categorization, should continue to apply in the context of telegraph companies and their new technology.

New legal issues produced by technological advance often raise the question of whether the technology is similar enough to the prior state of the art such that the new technology should be governed by similar, existing rules, or whether the new technology is different enough such that it should be governed by new or different rules. This question cannot be resolved simply by comparing the function of the new technology to the function of the prior technology. This was one of the errors made by both the *Parks* and *Breese* courts.

Legal categories are not developed based simply on the function of the underlying technology, but on how that function interacts in society. Thus, rather than asking whether a new technology plays a similar role to that of prior technology (is a telegraph like a letter?), a legal decision maker must consider the rationale for the (p. 231) existing legal categories in the first instance (Mandel 2007). Only after examining the basis for legal categories can one evaluate whether the rationale that established such categories also applies to a new technology as well. Legal categories (such as common carrier) are only that—legal constructs. Such categories are not only imperfect, in the sense that both rules and standards can be over-inclusive and under-inclusive, but they are also context dependent. Even well-constructed legal categories are not Platonic ideals that apply to all situations. Such constructs may need to be revised in the face of technological change.

The pertinent metric for evaluating whether the common carrier category should be extended to include telegraph companies is not the physical activity involved (message delivery) but the basis for the legal construct. The rationale for common carrier liability, for instance, may have been to institute a least-cost avoider regime and reduce transaction costs. Prior to the advent of the telegraph, there was little a customer could do to insure the proper delivery of a package or letter once conveyed to a carrier. In this context, the

carrier would be best informed about the risks of delivery and about the least expensive ways to avoid such risks. As a result, it was efficient to place the cost of failed delivery on the carrier.

Telegraphs changed all this. Telegraphs offered a new, easy, and cheap method for self-insurance. As revealed in *Breese*, a sender could now simply have a message returned to ensure that it had been properly delivered. In addition, the sender would be in the best position to know which messages are the most important and worth the added expense of a return telegraph. The advent of the telegraph substantially transformed the efficiencies of protection against an error in message delivery. This change in technology may have been significant enough that the pre-existing legal common carrier category, developed in relation to prior message delivery technology, should no longer apply. Neither court considered this issue.

The realization that pre-existing legal categorization may no longer sensibly apply in the face of new technology appears to be a relatively straightforward concept, and one that we might expect today's courts to handle better. Chalking this analytical error up to archaic legal decision-making, however, is too dismissive, as cases concerning modern message delivery reveal.

2.2 The Internet

The growth of the Internet and email use in the 1990s resulted in a dramatic increase in unsolicited email messages, a problem which is still faced today. These messages became known as 'spam', apparently named after a famous *Monty Python* skit in which Spam (the canned food) is a disturbingly ubiquitous menu item. Although email spam is a substantial annoyance for email users, it is an even greater problem for Internet service providers. Internet service providers are forced to make (p. 232) substantial additional investments to process and store vast volumes of unwanted email messages. They also face the prospect of losing customers annoyed by spam filling their inboxes. Though figures are hard to pin down, it is estimated that up to 90 per cent of all email messages sent are spam, and that spam costs firms and consumers as much as \$20 to \$50 billion annually (Rao and Reiley 2012).

Private solutions to the spam problem in the form of email message filters would eventually reduce the spam problem to some degree, especially for consumers. A number of jurisdictions, particularly in Europe, also enacted laws in the 2000s attempting to limit the proliferation of spam in certain regards (Khong 2004). But in the early days of the Internet in the 1990s, neither of these solutions offered significant relief.

One Internet service provider, CompuServe, attempted to ameliorate their spam issues by bringing a lawsuit against a particularly persistent spammer. CompuServe had attempted to electronically block spam, but had not been successful (an early skirmish in the ongoing technological battle between Internet service providers and spam senders that continues to the present day). Spammers operated more openly in the 1990s than they do now. CompuServe was able to identify a particular mass-spammer, CyberPromotions, and

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brought suit to try to enjoin CyberPromotions' practices (*CompuServe Inc v Cyber Promotions Inc* 1997).

CompuServe, however, had a problem for their lawsuit: they lacked a clear legal basis for challenging CyberPromotions' activity. CyberPromotions' use of the CompuServe email system as a non-customer to send email messages to CompuServe's Internet service clients did not create an obvious cause of action in contract, tort, property, or other area of law. In fact, use of CompuServe clients' email addresses by non-clients to send messages, as a general matter, was highly desirable and necessary for the email system to operate. CompuServe would have few customers if they could not receive email messages from outside users.

Lacking an obvious legal avenue for relief, CompuServe developed a somewhat ingenious legal argument. CompuServe claimed that CyberPromotions' use of CompuServe's email system to send spam messages was a trespass on CompuServe's personal property (its computers and other hardware) in violation of an ancient legal doctrine known as trespass to chattels. Trespass to chattels is a common law doctrine prohibiting the unauthorized use of another's personal property (*Kirk v Gregory* 1876; *CompuServe Inc v Cyber Promotions Inc* 1997). Trespass to chattels, however, was developed at a time when property rights nearly exclusively involved tangible property.

An action for trespass to chattels requires (1) physical contact with the chattel, (2) that the plaintiff was dispossessed of the chattel permanently or for a substantial period of time, and (3) that the chattel was impaired in condition, quality, or value, or that bodily harm was caused (*Kirk v Gregory* 1876; *CompuServe Inc v Cyber Promotions Inc* 1997). Application of the traditional trespass to chattels elements to email spam is not straightforward. Spam does not appear to physically (p. 233) contact a computer, dispossess a computer, or harm the computer itself. Framing their argument to match the law, CompuServe contended that the electronic signals by which email was sent constituted physical contact with their chattels, that the use of bandwidth due to sending spam messages dispossessed their computer, and that the value of CompuServe's computers was diminished by the burden of CyberPromotions' spamming. The court found CompuServe's analogies convincing and held in their favour.

While the court's sympathy for CompuServe's plight is understandable, the *CompuServe* court committed the same error as the courts in *Parks* and *Breese*—it did not consider the basis for legal categorization in the first instance before extending the legal category to new disputes created by new technology. The implications of the *CompuServe* rationale make clear that the court's categorization is problematic. Under the court's reasoning, all unsolicited email, physical mail, and telephone calls would constitute trespass to chattels, a result that would surprise many. This outcome would create a common law cause of action against telemarketers and companies sending junk mail. Although many people might welcome such a cause of action, it is not legally recognized and undoubtedly was not intended by the *CompuServe* court. This argument could potentially be extended to advertisements on broadcast radio and television. Under the court's reasoning, individu-

als could have a cause of action against public television broadcasters (such as the BBC in the United Kingdom or ABC, CBS, and NBC in the United States) for airing commercials by arguing that public broadcasts physically contact one's private television through electronic signals, that they dispossess the television in similar regards to spam dispossessing a computer, and that the commercials diminish the value of the television. The counter-argument that a television viewer should expect or implicitly consents to commercials would equally apply to a computer user or service provider expecting or implicitly consenting to spam as a result of connecting to the Internet.

A primary problem with the *CompuServe* decision lies in its failure to recognize that differences between using an intangible email system and using tangible physical property have implications for the legal categories that evolved historically at a time when the Internet did not exist. As discussed above, legal categories are developed to serve context-dependent objectives and the categories may not translate easily to later-developed technologies that perform a related function in a different way. The dispute in *CompuServe* was not really over the use of physical property (computers), but over interference with CompuServe's business and customers. As a result, the historic legal category of trespass to chattels was a poor match for the issues raised by modern telecommunications. A legal solution to this new type of issue could have been better served by recognizing the practical differences in these contexts.

Courts should not expect that common law, often developed centuries past, will always be well suited to handle new issues for law in the regulation of technology. (p. 234) Pre-existing legal categories may be applicable in some cases, but the only way to determine this is to examine the basis for the categories in the first instance and evaluate whether that basis is satisfied by extension of the doctrine. This analysis will vary depending on the particular legal dispute and technology at issue, and often will require consideration of the impact of the decision on the future development and dissemination of the technology in question, as well as on the economy and social welfare more broadly.

Real-world disputes and social context should not be forced into pre-existing legal categories. Legal categories are simply a construct; the disputes and context are the immutable reality. If legal categories do not fit a new reality well, then it is the legal categories that must be re-evaluated.

3. Do Not Let the Technology Distort the Law

A second lesson for law and the regulation of technology concerns the need for decision makers to look beyond the technology involved in a dispute and to focus on the legal issues in question. In a certain sense, this concern is a flipside of the first lesson, that existing legal categories may no longer apply. The failure to recognize that existing legal categories might no longer apply is an error brought about in part by blind adherence to existing law in the face of new technology. This second lesson concerns the opposite prob-

lem: sometimes decision makers have a tendency to be blinded by spectacular technological achievement and consequently neglect the underlying legal concerns.

3.1 Fingerprint Identification

People v Jennings (1911) was the first case in the United States in which fingerprint evidence was admitted to establish identity. Thomas Jennings was charged with murder in a case where a homeowner had confronted an intruder, leading to a struggle that ended with gunshots and the death of the homeowner. Critical to the state's case against Jennings was the testimony of four fingerprint experts matching Jennings's fingerprints to prints from four fingers from a left hand found at the scene of the crime on a recently painted back porch railing.

(p. 235) The fingerprint experts were employed in police departments and other law enforcement capacities. They testified, in varying manners, to certain numbers of points of resemblance between Jennings's fingerprints and the crime scene prints, and each expert concluded that the prints were made by the same person. The court admitted the fingerprint testimony as expert scientific evidence. The bases for admission identified in the opinion were that fingerprint evidence was already admitted in European countries, reliance on encyclopaedias and treatises on criminal investigation, and the experience of the expert witnesses themselves.

Upon examination, the bases for admission were weak and failed to establish the critical evidentiary requirement of reliability. None of the encyclopaedias or treatises cited by the court actually included scientific support for the use of fingerprints to establish identity, let alone demonstrated its reliability. Early uses of fingerprints starting in India in 1858, for example, included using prints to sign a contract (Beavan 2001). In a similar vein, the court identified that the four expert witnesses each had been studying fingerprint identification for several years, but never mentioned any testimony or other evidence concerning the reliability of fingerprint analysis itself. This would be akin to simply stating that experts had studied astrology, ignoring whether the science under study was reliable. Identification of a number of points of resemblance between prints (an issue on which the expert testimony varied) provides little evidence of identity without knowing how many points of resemblance are needed for a match, how likely it is for there to be a number of points of resemblance between different people, or how likely it is for experts to incorrectly identify points of resemblance. No evidence on these matters was provided.

Reading the *Jennings* opinion, one is left with the impression that the court was simply 'wowed' with the concept of fingerprint identification. Fingerprint identification was perceived to be an exciting new scientific ability and crime-fighting tool. The court, for instance, provided substantial description of the experts' qualifications and their testimony, despite its failure to discuss the reliability of fingerprint identification in the first instance. It is not surprising, considering the court's amazement with the possibility of fingerprint identification, that the court deferred to the experts in admitting the evidence

despite a lack of evidence of reliability and the experts' obvious self-interest in having the testimony admitted for the first time—this was, after all, their new line of employment.

The introduction of fingerprint evidence to establish identity in European courts, on which the *Jennings* courts relies, was not any more rigorous. Harry Jackson became the world's first person to be convicted based on fingerprint evidence when he was found guilty of burglary on 9 September 1902 and sentenced to seven years of penal servitude based on a match between his fingerprint and one found at the scene of the crime (Beavan 2001). The fingerprint expert in the Jackson case testified that he had examined thousands of prints, that fingerprint patterns remain the same (p. 236) throughout a person's life, and that he had never found two persons with identical prints. No documentary evidence or other evidence of reliability was introduced.

With respect to establishing identification in the *Jackson* case itself, the expert testified to three or four points of resemblance between the defendant's fingerprint and the fingerprint found at the scene and concluded, 'in my opinion it is impossible for any two persons to have any one of the peculiarities I have selected and described'. Several years later, the very same expert would testify in the first case to rely upon fingerprint identification to convict someone of murder that he had seen up to three points of resemblance between the prints of two different people, but never more than that (*Rex v Stratton and Another* 1905). The defendant in *Jackson* did not have legal representation, and consequently there was no significant cross-examination of the fingerprint expert. As in the *Jennings* case in the United States, the court in *Stratton* appeared impressed by the possibility and science of fingerprint identification and took its reliability largely for granted. One striking example of the court's lack of objectivity occurred when the court interrupted expert testimony to interject the court's own belief that the ridges and pattern of a person's fingerprints never change during a lifetime.

3.2 DNA Identification

Almost a century after the first fingerprint identification cases, courts faced the introduction of a new type of identification evidence in criminal cases: DNA typing. *State v Lyons* (1993) concerned the admissibility of a new method for DNA typing, the PCR replicant method. DNA typing is the technical term for 'DNA fingerprinting', a process for determining the probability of a match between a criminal defendant's DNA and DNA obtained at a crime scene.

Despite almost a century gap separating the *Jennings/Jackson/Stratton* and *Lyons* opinions, the similarity in deficiencies between the courts' analyses of the admissibility of new forms of scientific evidence are remarkable. In *Lyons*, the court similarly relies on the use of the method in question in other fields as a basis for its reliability in a criminal case. The PCR method had been used in genetics starting with Sir Alec Jeffreys at the University of Leicester in England, but only in limited ways in the field of forensics. No evidence was provided concerning the reliability of the PCR replicant method for identification under imperfect crime scene conditions versus its existing use in pristine laboratory

ry environments. The *Lyons* court also relied on the expert witness's own testimony that he followed proper protocols as evidence that there was no error in the identification and, even more problematically, that the PCR method itself was reliable. Finally, like the experts in *Jennings*, *Jackson*, and *Stratton* the PCR replicant method expert had a vested interest in the test being considered reliable—this was his line of employment. In each case (p. 237) the courts appear simply impressed and excited by the new technology and what it could mean for fighting crime. The *Lyons* decision includes not only a lengthy description of the PCR replicant method process, but also an extended discussion of DNA, all of which is irrelevant to the issue of reliability or the case.

In fairness to the courts, there was an additional similarity between *Jennings/Jackson/Stratton* and *Lyons*: in each case, the defence failed to introduce any competing experts or evidence to challenge the reliability of the new technological identification evidence. For DNA typing, this lapse may have been due to the fact that the first use of DNA typing in a criminal investigation took place in the United Kingdom to exonerate a defendant who had admitted to a rape and murder, but whose DNA turned out not to match that found at the crime scene (Butler 2005). In DNA typing cases, defence attorneys quickly learned to introduce their own experts to challenge the admissibility of new forms of DNA typing. These experts began to question proffered DNA evidence on numerous grounds, from problems with the theory of DNA identification (such as assumptions about population genetics) to problems with the method's execution (such as the lack of laboratory standards or procedures) (Lynch and others 2008). These challenges led geneticists and biologists to air disputes in scientific journals concerning DNA typing as a means for identification, and eventually to the US National Research Council convening two distinguished panels on the matter. A number of significant problems were identified concerning methods of DNA identification, and courts in some instances held DNA evidence inadmissible. Eventually, new procedures were instituted and standardized, and sufficient data was gathered such that courts around the world now routinely admit DNA evidence. This is where DNA typing as a means of identification should have begun—with evidence of and procedures for ensuring its reliability.

Ironically, the challenges to DNA typing identification methods in the 1990s actually led to challenges to the century-old routine admissibility of fingerprint identification evidence in the United States. The scientific reliability of forensic fingerprint identification was a question that still had never been adequately addressed despite its long use and mythical status in crime-solving lore. The bases for modern fingerprint identification challenges included the lack of objective and proven standards for establishing that two prints match, the lack of a known error rate and the lack of statistical information concerning the likelihood that two people could have fingerprints with a given number of corresponding features. In 2002, a district court judge in Pennsylvania held that evidence of identity based on fingerprints was inadmissible because its reliability was not established (*United States v Llera-Plaza* 2002). The court did allow the experts to testify concerning the comparison between fingerprints. Thus, experts could testify to similarities and differences between two sets of prints, but were not permitted to testify as to their opinion that a particular print was or was not the print of a particular person. This holding caused somewhat of an

uproar and the United States government filed a motion to reconsider. The (p. 238) court held a hearing on the accuracy of fingerprint identification, at which two US Federal Bureau of Investigation agents testified. The court reversed its earlier decision and admitted the fingerprint testimony.

The lesson learned from these cases for law and the regulation of technology is relatively straightforward: decision makers need to separate spectacular technological achievements from their appropriate legal implications and use. When judging new legal issues created by exciting technological advances, the wonder or promise of a new technology must not blind one from the reality of the situation and current scientific understanding. This is a lesson that is easy to state but more difficult to apply in practice, particularly when a technologically lay decision maker is confronted with the new technology for the first time and a cadre of experts testifies to its spectacular promise and capabilities.

4. New Technology Disputes Are Unforeseeable

The final lesson offered here for law and the regulation of technology may be the most difficult to implement: decision makers must remain cognizant of the limited ability to foresee new legal issues brought about by technological advance. It is often inevitable that legal disputes concerning a new technology will be handled under a pre-existing legal scheme in the early stages of the technology's development. At this stage, there usually will not be enough information and knowledge about a nascent technology and its legal and social implications to develop or modify appropriate legal rules, or there may not have been enough time to establish new statutes, regulations, or common law for managing the technology.

As the examples above indicate, there often appears to be a strong inclination towards handling new technology disputes under existing legal rules. Not only is this response usually the simplest approach administratively, there are also strong psychological influences that make it attractive as well. For example, availability and representativeness heuristics lead people to view a new technology and new disputes through existing frames, and the status quo bias similarly makes people more comfortable with the current legal framework (Gilovich, Griffin, and Kahneman 2002).

Not surprisingly, however, the pre-existing legal structure may prove a poor match for new types of disputes created by technological innovation. Often there will be gaps or other problems with applying the existing legal system to a new technology. The regulation of biotechnology provides a recent, useful set of examples.

(p. 239) 4.1 Biotechnology

Biotechnology refers to a variety of genetic engineering techniques that permit scientists to selectively transfer genetic material responsible for a particular trait from one living species (such as a plant, animal, or bacterium) into another living species. Biotechnology

has many commercial and research applications, particularly in the agricultural, pharmaceutical, and industrial products industries.

As the biotechnology industry developed in the early 1980s, the United States government determined that bioengineered products in the United States generally would be regulated under the already-existing statutory and regulatory structure. The basis for this decision, established in the Coordinated Framework for Regulation of Biotechnology (1986), was a determination that the process of biotechnology was not inherently risky, and therefore that only the products of biotechnology, not the process itself, required oversight.

This analysis proved questionable. As a result of the Coordinated Framework, biotechnology products in the United States are regulated under a dozen statutes and by five different agencies and services. Experience with biotechnology regulation under the Coordinated Framework has revealed gaps in biotechnology regulation, inefficient overlaps in regulation, inconsistencies among agencies in their regulation of similarly situated biotechnology products, and instances of agencies being forced to act outside their areas of expertise (Mandel 2004).

One of the most striking examples of the limited capabilities of foresight in this context is that the Coordinated Framework did not consider how to regulate genetically modified plants, despite the fact that the first field tests of genetically modified plants began in 1987, just one year after the Coordinated Framework was promulgated. This oversight was emblematic of a broader gap in the Coordinated Framework. By placing the regulation of biotechnology into an existing, complex regulatory structure that was not designed with biotechnology in mind, the Coordinated Framework led to a system in which the US Environmental Protection Agency (EPA) was not involved in the review and approval of numerous categories of genetically modified plants and animals that could have a significant impact on the environment. In certain instances, it was unclear whether there were sufficient avenues for review of the environmental impacts of the products of biotechnology by any agency. Similarly, it was unclear whether any agency had regulatory authority over transgenic animals not intended for human food or to produce human biologics, products that have subsequently emerged.

There were various inconsistencies created by trying to fit biotechnology into existing boxes as well. The Coordinated Framework identified two priorities for the regulation of biotechnology by multiple agencies: that the agencies regulating genetically modified products ‘adopt consistent definitions’ and that the agencies implement scientific reviews of ‘comparable rigor’ (Coordinated Framework for Regulation of Biotechnology 1986: 23, 302–303). As a result of constraints created (p. 240) by primary reliance on pre-existing statutes, however, the agencies involved in the regulation of biotechnology defined identical regulatory constructs differently. Similarly, the US National Research Council concluded that the data on which different agencies based comparable analyses, and the scientific stringency with which they conducted their analyses, were not comparably rigorous, contrary to the Coordinated Framework plan.

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Regulatory overlap has also been a problem under the Framework. Multiple agencies have authority over similar issues, resulting in inefficient duplication of regulatory resources and effort. In certain situations, different agencies requested the same information about the same biotechnology product from the same firms, but did not share the information or coordinate their work. In one instance, the United States Department of Agriculture (USDA) and the EPA reached different conclusions concerning the risks of the same biotechnology product. In reviewing the potential for transgenic cotton to cross with wild cotton in parts of the United States, the USDA concluded that '[n]one of the relatives of cotton found in the United States ... show any definite weedy tendencies' (Payne 1997) while the EPA found that there would be a risk of transgenic cotton crossing with species of wild cotton in southern Florida, southern Arizona, and Hawaii (Environmental Protection Agency 2000).

The lack of an ability to foresee the new types of issues created by technological advance created other problems with the regulation of biotechnology. For example, in 1998 the EPA approved a registration for StarLink corn, a variety of corn genetically modified to be pest-resistant. StarLink corn was only approved for use as animal feed and non-food industrial purposes, such as ethanol production. It was not approved for human consumption because it carried transgenic genes that expressed a protein containing some attributes of known human allergens.

In September 2000, StarLink corn was discovered in several brands of taco shells and later in many other human food products, eventually resulting in the recall of over three hundred food products. Several of the United States' largest food producers were forced to stop production at certain plants due to concerns about StarLink contamination, and there was a sharp reduction in United States corn exports. The owner of the StarLink registration agreed to buy back the year's entire crop of StarLink corn, at a cost of about \$100 million. It was anticipated that StarLink-related costs could end up running as high as \$1 billion (Mandel 2004).

The contamination turned out to be caused by the reality that the same harvesting, storage, shipping, and processing equipment are often used for both human and animal food. Corn from various farms is commingled as it is gathered, stored, and transported. In fact, due to recognized commingling, the agricultural industry regularly accepts about 2 per cent to 7 per cent of foreign matter in bulk shipments of corn in the United States. In addition, growers of StarLink corn had been inadequately warned about the need to keep StarLink corn segregated from other corn, leading to additional commingling in grain elevators.

(p. 241) Someone with a working knowledge of the nation's agricultural system would have recognised from the outset that it was inevitable that, once StarLink corn was approved, produced, and processed on a large-scale basis, some of it would make its way into the human food supply. According to one agricultural expert, '[a]nyone who understands the grain handling system ... would know that it would be virtually impossible to keep StarLink corn separate from corn that is used to produce human food' (Anthan

2000). Although the EPA would later recognize ‘that the limited approval for StarLink was unworkable’, the EPA failed to realize at the time of approval that this new technology raised different issues than they had previously considered. Being aware that new technologies often create unforeseeable issues is a difficult lesson to grasp for expert agencies steeped in an existing model, but it is a lesson that could have led decision makers to re-evaluate some of the assumptions at issue here.

4.2 Synthetic Biology

The admonition to be aware of what you do not know and to recognize the limits of foresight is clearly difficult to follow. This lesson does, however, provide important guidance for how to handle the legal regulation of new technology. Most critically, it highlights the need for legal regimes governing new technologies that are flexible and that can change and adapt to new legal issues, both as the technology itself evolves and as our understanding of it develops. It is hardly surprising that we often encounter difficulties when pre-existing legal structures are used to govern technology that did not exist at the time the legal regimes were developed.

Synthetic biology provides a prominent, current example through which to apply this teaching. Synthetic biology is one of the fastest developing and most promising emerging technologies. It is based on the understanding that DNA sequences can be assembled together like building blocks, producing a living entity with a particular desired combination of traits. Synthetic biology will likely enable scientists to design living organisms unlike any found in nature, and to redesign existing organisms to have enhanced or novel qualities. Where traditional biotechnology involves the transfer of a limited amount of genetic material from one species to another, synthetic biology will permit the purposeful assembly of an entire organism. It is hoped that synthetically designed organisms may be put to numerous beneficial uses, including better detection and treatment of disease, the remediation of environmental pollutants, and the production of new sources of energy, medicines, and other valuable products (Mandel and Marchant 2014).

Synthetically engineered life forms, however, may also present risks to human health and the environment. Such risks may take different forms than the risks presented by traditional biotechnology. Unsurprisingly, the existing regulatory (p. 242) structure is not necessarily well suited to handle the new issues anticipated by this new technology. The regulatory challenges of synthetic biology are just beginning to be explored. The following analysis focuses on synthetic biology governance in the United States; similar issues are also being raised in Europe and China (Kelle 2007; Zhang, Marris, and Rose 2011).

Given the manner in which a number statutes and regulations are written, there are fundamental questions concerning whether regulatory agencies have regulatory authority over certain aspects of synthetic biology under existing law (Mandel and Marchant 2014). The primary law potentially governing synthetic biology in the United States is the Toxic Substances Control Act (TSCA). TSCA regulates the production, use, and disposal of hazardous ‘chemical substances’. It is unclear whether living microorganisms created by syn-

thetic biology qualify as ‘chemical substances’ under TSCA, and synthetic biology organisms may not precisely fit the definition that the EPA has established under TSCA for chemical substances. Perhaps more significantly, EPA has promulgated regulations under TSCA limiting their regulation of biotechnology products to intergeneric microorganisms ‘formed by the deliberate combination of genetic material...from organisms of different taxonomic genera’ (40 CFR §§ 725.1(a), 725.3 (2014)). EPA developed this policy based on traditional biotechnology. Synthetic biology, however, raises the possibility of introducing wholly synthetic genes or gene fragments into an organism, or removing a gene fragment from an organism, modifying that fragment, and reinserting it. In either case, such organisms may not be ‘intergeneric’ under EPA’s regulatory definition because they would not include genetic material from organisms of different genera. Because EPA’s biotechnology regulations self-define themselves as ‘establishing all reporting requirements [for] microorganisms’ (40 CFR §§ 725.1(a) (2014)), non-‘intergeneric’ genetically modified microorganisms created by synthetic biology currently would not be covered by certain central TSCA requirements.

Assuming that synthetic biology organisms are covered by current regulation, synthetic biology still raises additional issues under the extant regulatory system. For example, field-testing of living microorganisms that can reproduce, proliferate, and evolve presents new types of risks that do not exist for typical field tests of limited quantities of more traditional chemical substances. In a separate vein, some regulatory requirements are triggered by the quantity of a chemical substance that will enter the environment, a standard that makes sense when dealing with traditional chemical substances that generally present a direct relationship between mass and risk. These assumptions, however, break down for synthetic biology microbes that could reproduce and proliferate in the environment (Mandel and Marchant 2014).

It is not surprising that a technology as revolutionary as synthetic biology raises new issues for a legal system designed prior to the technology’s conception. Given the unforeseeability of new legal issues and the unforeseeability of new technologies that create them, it is imperative to design legal systems that themselves can evolve and adapt. Although designing such legal structures presents a significant (p. 243) challenge, it is also a necessary one. More adaptable legal systems can be established by statute and regulation, developed through judicial decision-making or implemented via various ‘soft law’ measures. Legal systems that are flexible in their response to changing circumstances will benefit society in the long run far better than systems that rigidly apply existing constructs to new circumstances.

5. Conclusion

The succeeding chapters of Part III investigate how the law in many different fields is responding to myriad new legal requirements and disputes created by technological evolution. Despite the indescribably diverse manners of technological advance, and the correspondingly diverse range of new legal issues that arise in relation to such advance, the le-

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gal system's response to new law and technology issues reveals important similarities across legal and technological fields. These similarities provide three lessons for a general theory of the law and regulation of technology.

First, pre-existing legal categories may no longer apply for new law and technology disputes. In order to consider whether existing legal categories make legal and social sense under a new technological regime, it is critical to interrogate the rationale behind the legal categorization in the first instance, and then to evaluate whether it applies to the new dispute.

Second, legal decision makers must be mindful to avoid letting the marvels of new technology distort their legal analysis. This is a particular challenge for technologically lay legal decision makers, one that requires sifting through the promise of a developing technology to understand its actual characteristics and the current level of scientific knowledge.

Third, the types of new legal disputes that will arise from emerging technologies are often unforeseeable. Legal systems that can adapt and evolve as technology and our understanding of it develops will operate far more successfully than blind adherence to pre-existing legal regimes.

As you read the following law-and-technology case studies, you will see many instances of the types of issues described above and the legal system's struggles to overcome them. Though these lessons do not apply equally to every new law and technology dispute, they can provide valuable guidance for adapting law to a wide variety of future technological advances. In many circumstances, the contexts in which the legal system is struggling the most arise where the law did not recognize or respond to one or more of the teachings identified. A legal system that realizes the unpredictability of new issues, that is flexible and adaptable, and that recognizes that new issues produced by technological advance may not fit well into pre-existing (p. 244) legal constructs, will operate far better in managing technological innovation than a system that fails to learn these lessons.

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Notes:

(1.) Portions of this chapter are drawn from Gregory N Mandel, 'History Lessons for a General Theory of Law and Technology' (2007) 8 Minn JL, Sci, & Tech 551; Portions of section 4.2 are drawn from Gregory N Mandel & Gary E Marchant, 'The Living Regulatory Challenges of Synthetic Biology' (2014) 100 Iowa L Rev 155.

(2.) For discussion of additional contract issues created by technological advance, see Chapter 3 in this volume.

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Law and Technology in Civil Judicial Procedures

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Abstract and Keywords

This chapter analyses how technological systems shape the actions and the outcomes of judicial proceedings, through discussing the regulative regimes underpinning technical and legal deployment. The negotiation, mediation, or conflict between law and technology offer a new dimension to account for the digital transformation shaping the institutional settings and procedural frameworks of judicial institutions. These changes are not just instances of applied law, but are also the result of the transformation of law evolving into technological deployments. The chapter concludes that technological innovation in the judiciary unfolds in techno-legal assemblages. Technologies shape judicial institutions as they translate formal rules and existing practices into the code of technology. At the same time, technologies call for new regulations, which make legally compliant the use of given technological components within judicial proceedings. Such new techno-legal assemblages generate new institutional settings and profound changes in the administration of civil justice.

Keywords: e-justice, e-government, techno-legal assemblages, civil proceedings, court technology, case management systems, e-filing, integrated judicial systems

1. Introduction

ALL over the world, governments are investing in information and communication technology (ICT) to streamline and modernize judicial systems, by implementing administrative and organizational reforms and procedural rationalization by digitization.¹ The implementation of these reforms might foster administrative rationalization, but it also transforms the way in which public sector organizations produce and deliver services, and the way in which democratic institutions work (Fountain 2001; Castells and Cardoso 2005; Fountain 2005). This chapter discusses the effects that digital transformations in the judiciary have on the services provided. The chapter argues that the introduction of ICT in the judiciary is not neutral and leads to profound transformations in this branch of the administration. The digitalization of judicial systems and civil proceedings occurs in a peculiar institutional framework that offers a unique context in which to study the effects that

the imbrication of technological and legal systems have on the functioning of judicial institutions. (p. 247) The deep and pervasive layer of formal regulations that frames judicial proceedings shows that the intertwined dynamics of law and technology have profound impacts on the application of the law. In the context of the judiciary, law, and technology are moulded in complex assemblages (Lanzara 2009) that shape the interpretation and application of the law and hence the value generated by the action of the judiciary (Contini and Cordella 2015).

To discuss the effects of ICT on judicial action, this chapter outlines the general trends in e-justice research. It provides a detailed account of the reason why ICT in the judiciary has regulative effects that are as structural as those of the law. Examples from civil procedure law are discussed to outline how the imbrication of law and technology creates techno-legal assemblages that structure any digitized judicial proceeding. We then discuss the technological and managerial challenges associated with the deployment of these assemblages, and conclude.

2. E-justice: Seeking a Better Account of Law and Technology in Judicial Proceedings

E-justice plans have been mostly conceived as carriers of modernization and rationalization to the organization of judicial activities. Accordingly, e-justice is usually pursued in order to improve the efficiency and effectiveness of judicial procedure. Accordingly, e-justice literature has often failed to account for the institutional, organizational, and indeed judicial, transformations associated with the deployment of ICT in the judiciary (Nihan and Wheeler 1981; McKechnie 2003; Poulin 2004; Moriarty 2005). ICT adoptions in the public sector and in the judiciary carry political, social, and contextual transformation that calls for a richer explanation of the overall impacts that public sector ICT-enabled reforms have on the processes undertaken to deliver public services and on the values generated by these services (Cordella and Bonina 2012; Contini and Lanzara 2014; De Brie and Bannister 2015).

E-justice projects have social and political dimensions, and do not only impact on organizational efficiency or effectiveness (Fabri 2009a; Reiling 2009). In other words, the impact of ICT on the judiciary may be more complex and difficult to assess than the impact of ICT on the private sector (Bozeman and Bretschneider 1986; Moore 1995; Frederickson 2000; Aberbach and Christensen 2005; Cordella 2007). By failing to recognize this, e-justice literature and practice has largely looked at ICT only in terms of efficiency and costs rationalization. While valuable to assess (p. 248) the organizational and economic impacts of ICT in the private sector, these analyses fall short of fully accounting for the complexity of the impacts that ICT has on the transformation of the judiciary (Fountain 2001; Danziger and Andersen 2002; Contini and Lanzara 2008).

By addressing these impacts, this chapter discusses the digitalization of judicial procedures as context-dependent phenomena that are shaped by technical, institutional, and legal factors that frame judicial organizations and the services they deliver. Accordingly, ICT-enabled judicial reforms should be considered complex, context-dependent, techno-institutional assemblages (Lanzara 2009), wherein technology acts as a regulative regime 'that participates in the constitution of social and organizational relations along predictable and recurrent paths' (Kallinikos 2006: 32) just as much as the institutional and legal context within which it is deployed (Bourdieu 1987; Fountain 2001; Barca and Cordella 2006). E-justice reforms introduce new technologies that mediate social and organizational relations that are imbricated and therefore also mediated by context-dependent factors such as cultural and institutional arrangements as well as the law (Bourdieu 1987; Cordella and Iannacci 2010; De Brie and Bannister 2015).

To discuss these effects, the analysis offered by this chapter builds on the research tradition that has looked at the social, political, and institutional dimensions associated with the deployment of ICT in the public sector (Bozeman and Bretschneider 1986; Fountain 2001; Gil-Garcia and Pardo 2005; Luna-Reyes and others 2005; Dunleavy and others 2006). The chapter contributes to this debate by offering a theoretical elaboration useful for analysing and depicting the characteristics that make interactions between ICT and law so relevant in the deployment of e-justice policies.

To fulfil this task, we focus on the regulative characteristics of ICT, which emerge as the result of the processes through which ICT frames law and procedures and hence the action of public sector organizations (Bovens and Zouridis 2002; Luhmann 2005; Kallinikos 2009b). When e-justice literature has looked at the technical characteristics of technology, it has mostly considered ICT as a potential enabler of a linear transformation of judicial practices and coordination structures² (Layne and Lee 2001; West 2004). E-justice literature mainly conceives ICT as a tool to enhance the productivity processes in the judiciary providing a more efficient means to execute organizational practices while the same literature tends to neglect that ICT encompasses properties that frame the causal connection of the organizational practices, events, and processes they mediate (Kallinikos 2005; Luhmann 2005). Indeed, ICT does not simply help to better execute existing organizational activities but rather offers a new way to enframe (Ciborra and Hanseth 1998) and couple in a technically predefined logical sequences of actions the organizational procedures and practices they mediate (Luhmann 2005). Thus, ICT constructs a new set of technologically mediated interdependences that regulate the way in which organizational procedures and processes are executed. ICT (p. 249) structures social and organizational orders, providing stable and standardized means of interaction (Bovens and Zouridis 2002; Kallinikos 2005) shaped into the technical functionalities of the systems. Work sequences and flows are described in the technological functions, standardized and stabilized in the scripts and codes that constitute the core of the technological systems. The design of these systems does therefore exclude other possible functions and causalities by not including relational interdependencies into the scripts of the technology (Cordella and Tempini 2015).

When organizational activities or practices are incorporated into ICT, they are not rationalized in linear or holistic terms—as is assumed by the dominant instrumental perspective of technology—rather, they are reduced to a machine representable string, and coupled to accommodate the logic underpinning the technological components used by that computer system. Alternative underpinning logics, such as different ontological framings, vary as they structure the world in different logical sequences, so that the holistic concept of technical rationalization is useless once it is recognized that alternative technical artefacts reduce complexity into their different logical and functional structures. Work processes, procedures, and interdependences are accommodated within the functional logic of technology and, therefore, described to reflect the logical sequences that constitute the operational language of ICT. These work sequences are therefore redesigned in order to accommodate the requirements that are used to design ICT systems. Once designed, an ICT system clearly demarcates the operational boundaries within which it will operate, by segmenting the sequences of operations executed by the system and the domains within which these sequences will operate.

As a consequence, the work sequences, procedure, practices, and interdependences are functionally simplified to accommodate the language and logical structure underpinning the functioning of the chosen technology. Information technology not only creates these causal and instrumental relations but also stabilizes these relations into standardized processes that ossify the relations. Functional closure is the effect of the standardization of these relations into stable scripts: the creation of the kernel of the system (Kallinikos 2005). As a result, an ICT system becomes a regulative regime (Kallinikos 2009b) that structures human agencies by inscribing paths of actions, norms, and rules so that the organizations adopting these technologies will be regulated in their actions by the scripts of the ICT system, and the limitations of those scripts. In the context of e-justice, the regulative nature of technology must negotiate with the pre-existing regulative nature of the law, and with the new regulative frameworks enacted to enable the use of given technological components. These negotiations are very complex and have very important consequences on the effects of the action of the judiciary.

When studying and theorizing about the adoption of ICT in the judiciary, these regulative properties of ICT should be placed at the centre of the analysis in order to better understand the implications and possible outcomes of these ICT adoptions on (p. 250) the outcome of judicial practices and actions (Contini and Cordella 2015; Cordella and Tempini 2015).

3. Technology in Judicial Procedures

Judicial procedures are regulated exchanges of data and documents required to take judicial decisions (Contini and Fabri 2003; Reiling 2009). In a system of paper-based civil procedure, the exchange of information established by the rules of procedure is enabled by composite elements such as court rules, local practices, and tools like dockets, folders, forms with specific and shared formal and technical features. ICT developments in justice

systems entail the translation of such conventional information exchanges into digitally mediated processes. Technological deployments in judicial proceedings transform into standardized practices the procedural regulations that establish how the exchange shall be conducted. The exchange can be supported, enabled, or mediated by different forms of technologies. This process is not new, and not solely associated with the deployment of digital technologies.

Judicial procedures have in fact always been supported by technologies, such as court books or case files and case folders used to administrate and coordinate judicial procedures (Vismann 2008). The courtroom provides a place for the parties and the judge to come together and communicate, for witnesses to be sworn and to give evidence, and for judges to pronounce binding decisions. All these activities are mediated and shaped by the specific design of the courtroom. The bench, with its raised position, facilitates the judge's surveillance and control of the court. Frames in the courtroom often contain a motto, flag, or other symbol of the authority of the legal pronouncement (Mohr 2000; 2011). This basic set of technologies, associated with the well-established roles and hierarchical structure of judiciaries (Bourdieu 1987) have shaped the process by which the law is enforced and the way in which legal procedures are framed over many centuries (Garapon 1995). Even if the 'paperless' future, promised by some authors (Susskind 1998; Abdulaziz and Druke 2003), is yet to happen, ICT has proliferated in the judicial field. A growing number of tasks traditionally undertaken by humans dealing with the production, management, and processing of paper documents are now digitized and automatically executed by computers. Given the features of ICT, the way in which these procedures can be interpreted and framed is constrained by the technical features that govern the functionalities of these technologies (see section 2). These features are defined by technical standards, hardware, and software components, as well as by private companies involved in the development of the technology, and by technical (p. 251) bodies that establish e-justice action plans. The deployment of these ICT solutions might subvert the hierarchical relationships that have traditionally governed the judiciary, and hence deeply influence the power and authority relations that shape the negotiations and possible outcome of the interpretation of the law that the judiciary carries out. ICT ultimately defines new habitats within which the law is interpreted and hence the values it carries forward.

The many ICT systems that have been implemented to support, automate, or facilitate almost all the domains of judicial operations offer a very interesting ground to position the study of the impact that the adoption of ICT has had on the action and outputs of the judiciary.

4. The Imbrication of Law and Technology: Techno-Legal Assemblages

There is a plethora of technological systems implemented to support, rationalize, and automate judicial procedure. None of these systems are neutral in the impact they have on the organization and functioning of the judiciary. Legal information systems (LISs) pro-

vide up-to-date case law and legal information to citizens and legal professionals (Fabri 2001). LISs contribute to the selection of relevant laws, jurisprudence, and/or case law, shaping the context within which a specific case is framed. Case management systems (CMSs) constitute the backbone of judicial operation. They collect key case-related information, automate the tracking of court cases, prompt administrative or judicial action, and allow the exploitation of the data collected for statistical, judicial, and managerial purposes (Steelman, Goerdt, and McMillan 2000). Their deployment forces courts to increase the level of standardization of data and procedures. CMSs structure procedural law and court practices into software codes, and in various guises reduce the traditional influence of courts and judicial operators over the interpretation of procedural law. E-filing encompasses a broad range of technological applications required by case parties and courts to exchange procedural documents. E-filing structures the sequences of the judicial procedures by defining how digital identity should be ascertained, and what, how, and when specific documents can be exchanged and become part of the case. Integrated justice chains are large-scale systems developed to make interoperable (or integrated) the ICT architectures used by the different judicial and law enforcement agencies: courts, police, prosecutors' offices, and prisons departments (p. 252) might change the administrative responsibility on the management of the investigation and prosecutions when their actions are coordinated via integrated ICT architectures (Fabri 2007; Cordella and Iannacci 2010). Videoconference technologies provide a different medium to hold court hearings: witnesses can appear by video, and inmates can attend at the hearing from a remote position. They clearly change the traditional layout of court hearings and the associated working practices (Lanzara and Patriotta 2001; Licoppe and Dumoulin 2010) and ultimately the legal regime and conventions that govern hearings.

All these computer systems interact with traditional legal frameworks in different and sometimes unpredictable ways. They not only impact the procedural efficiency of legal proceedings, but can also shape their outcomes. These deeper impacts of LISs, CMSs, video technology, and e-filing systems will be considered in turn.

4.1 Legal Information Systems

LISs give rise to a limited number of regulatory questions, mainly related to the protection of the right to privacy of the persons mentioned in the judgments, balanced with the principle of publicity of judicial decisions. However, as LISs make laws and cases digitally available, this might affect the way in which laws and cases are substantively interpreted. It is easier for civil society and the media to voice their interpretation of the law on a specific case or to criticize a specific judgment based on pre-existing court decisions. This potentially affects the independence of the judiciary, since LISs are not necessarily neutral in the process by which they identify relevant case law and jurisprudence. They can promote biased legal interpretations, or establish barriers to access to relevant information, becoming an active actor in the concrete application of the law. Once the search engine and the jurisprudential database are functionally simplified and closed in a search al-

gorithm, it can become extremely difficult to ascertain whether the search system is truly neutral, or the jurisprudence database complete.

4.2 Case Management Systems

CMSs are mainly developed to automate existing judicial procedures. The rules established by the code of procedure are deployed in the system to standardize the procedural flow. This reduces the different interpretations of procedural laws made by judges and clerks to those functionally simplified and closed into the software code and system architecture. The use of discretion is further reduced by interfaces that force organizational actors to enter the data as requested by the system. The (p. 253) interfaces also force users to follow specific routines, or to use pre-established templates to produce judicial documents.

The implications of such changes are numerous. A more coherent application of procedural law can be consistent with the principle of equality. A more standardized data collection is a prerequisite for reliable statistical data. However, there can also be critical issues. The additional layer of standardization imposed by technology can make the application of the judicial procedure to local constraints difficult. This may lead to 'work-arounds' to bypass the technological constraints and allow execution of the procedure (Contini 2000). CMSs also increase the transparency of judicial operations, leading to increased control of judges, prosecutors and the administrative staff.

4.3 Video Technologies

The use of video technologies, particularly videoconferencing, changes the well-established setting of court hearings. Court hearings are not akin to standard business videoconferences. Legal and functional requirements, easily met in oral hearings, are difficult to replicate in videoconference-mediated hearings. For example, parties must be able to monitor whether a witness is answering questions without external pressures or suggestions; private communication between the lawyer and the defendant shall be guaranteed; all the parties involved in the hearing must have the same access and complete understanding of ongoing events. To meet these conditions, specific technological and institutional arrangements are needed (Rotterdam and van den Hoogen 2011). These arrangements are usually authorized by legal provisions; legislators can also detail the features or the functional requirements to be fulfilled by technologies to guarantee that videoconference hearings comply with the requirements as mentioned, and the right to a fair trial.

4.4 E-filing Systems

The imbrications of law and ICT, which clearly emerge in the discussion of the effects of the aforementioned e-justice systems, are modest in comparison to those found when e-filing is concerned. In these cases, the introduction of electronic documents and identification creates a new context where the authenticity, integrity, and non-repudiation of the electronic documents, along with the issue of identification, have to be managed. E-filing

introduces the need for interoperability and data and document interchange across different organizations, which must be addressed by finding solutions that suit all the technological architectures and the procedural codes that are in use within the different organizations.

(p. 254) The identification of the parties is the first formal step needed to set up any civil judicial proceeding and must be ascertained in a formal and appropriate manner such as by authorized signatures on the proper procedural documents, statements under oath, identity cards, and so on. Any procedural step is regulated by the code of procedure and further detailed by court rules. When e-filing is deployed, it is difficult and challenging to digitize these procedures without negotiating the pre-existing requirements imposed by the law with the constraints imposed by the technological design and the need of interoperability across the different organization sharing the system.

In Europe, for example, digital signatures based on Directive 1999/93/EC are often identified as the best solution to guarantee the identity of the parties, check their eligibility to file a case, authenticity, and non-repudiation of the documents exchanged (Blythe 2005). They are therefore one of the pre-requisites for e-filing in a large number of European countries. Given the legal value associated with the digital signature, the standards and technological requirements are often imposed by national laws (Fabri 2009b). The implementation of these legal standards has frequently been more difficult than expected, and required not only challenging software development, but also a long list of legislative interventions needed to guarantee the legal compliance of a digital signature. In Italy, for example, it took about eight years to develop the e-filing system along with the necessary legislative requirements (Carnevali and Resca 2014). Similar complex developments occurred in Portugal (Fernando, Gomes, and Fernandes 2014) and France (Velicogna, Errera, and Derlange 2011). These cases are good examples that reflect the imbrication of law and technology when e-justice is concerned.

4.5 Integrating Justice Systems

The integration of judicial systems to facilitate the coordination of activities across different judicial offices can even redefine the legal arrangements that govern the roles and jurisdiction of each office, and thus the overall organization of the judiciary. An example of these potential effects is the case of the 'gateway' introduced in England and Wales to facilitate the exchange of information across the criminal justice chain. The gateway has led to a profound transformation of the role of the police and the Crown Prosecution Service (CPS) in the investigation of criminal activities. The gateway, providing updated investigative information to prosecutors, has changed the relationship in the judicial system. This new configuration is such that not the Police but the CPS leads investigation, de facto changing the statutory law and hence imposing a 'constitutional transformation' in the England and Wales constitutional arrangements (Cordella and Iannacci 2010).

(p. 255) The analysis of the imbrications of law and technology in the judiciary in this section highlights two parallel phenomena. Technology functionally simplifies and closes the

interpretation and application of the law reducing legal code into the code of technology (Lessig 2007). At the same time, the technology, to have legal value and hence to be effective, needs to be supported by a legal framework that authorizes the use of the technological components, and therefore enforces the technological mediated judicial procedure. This dual effect is peculiar to the judiciary and needs to be taken into serious consideration where the digitalization of legal procedures is concerned. Technology and law must support the same procedures and guarantee cross-interoperability. If a technology works (i.e. produces the desired outcomes) but it is not supported by the legal framework, it will not produce any procedural effect. The nature of the judiciary necessitates the alignment of both law and technology to guarantee the effectiveness of judicial proceedings (see section 5). The search for this alignment might lead to the creation of more complex civil judicial procedures that are harder to manage.

5. Techno-Legal Assemblages: Design and Management Issues

As we have seen, the implementation of new technological components often requires the deployment of new statutes or regulations to accommodate the use and functioning of the ICT system, as for example in the case of the video technologies. In this context, as noted in the study of Henning and Ng (2009), law is needed to authorize hearings based on videoconferencing, but the law itself is unable to guarantee a smooth functioning of the technology. Indeed, it can be difficult, if not impossible, to regulate, *ex ante*, innovative ICT-based working practices, such as the one that has emerged with the use of videoconferencing systems (Lanzara 2016). Furthermore, technological systems are not always stable and reliable. They frequently 'shift and drift' making it difficult to maintain the alignment between ICT-enabled working practices and legal constraints (Ciborra and others 2000). *Ex ante* regulation, therefore, cannot be exhaustive and the actual outcome is mediated by the way in which ICT deploys the regulation.

Every regulation of technology is composed of technical norms, established within technical domains to specify the technical features of the systems, but also of rules designed to inform the adoption of the technology that clearly demarcate the boundaries of what ICT shall or shall not do. Thus, technology does not reduce the level of regulation leading to more efficient and hence more effective judicial procedures. (p. 256) Rather, the development of technology to enable judicial proceedings calls for new regulations creating a more complex and not necessarily a more efficient judicial system. The digitization of judicial practices deals with two distinct domains of complexity to be managed. The first domain concerns the adoption or the development of the technological standards needed to establish the connection and to enable technical interoperability across the technological architecture. These developments concern the definition of the technological components needed to allow the smooth circulation of bits, data, and information. The development of this technological interoperability, which would be sufficient in other domains, does not guarantee the efficacy of judicial procedures. The procedural regulation imposed by the

technological systems and architectures in fact needs to comply with and guarantee ‘interoperability’ with the regulatory requirements of the principles of the law that govern a given judicial activity or process. Technology cannot be arbitrarily introduced in judicial proceedings, and the effects of technology into proceedings have to be carefully ascertained. Technology needs to comply with the prescription of the law, and its legal compliance is a prerequisite of its effectiveness. In the judiciary, effectiveness of technology relates not only to the technical ability of the system to support and allow for the exchanges of bits, data, and information, but also to the capacity of the system and hence of ICT generally to support, enable, and mediate actions that produce the expected legal outcome within the proceedings. Technology-enabled procedural steps must produce the legal outcomes prescribed by the legal system and the legal effects must be properly signalled to all those involved in the procedure (Contini and Mohr 2014).

To achieve this result, it is not enough to design a technological solution that guarantees the needed functionalities to collect and transfer the data and the pieces of information required to fulfil a specific task in judicial proceedings. Given the legal constraints, various standard technological components ubiquitously used, such as email or secured websites, may not work for judicial procedures. When this occurs, ad hoc developments are needed to make the technological solution compliant with the legal architecture. The need to guarantee technical and legal interoperability, which is ultimately a requirement of an effective e-judicial system, may increase the architectural complexity, making more difficult the identification of solutions that are technically sound and compliant with legal constraints. Given the complexity of the legal and technological domains in the context of e-justice, this equilibrium is difficult to achieve and maintain.

The search for technical interoperability can lead to the introduction of technologically mediated procedural actions, which do not fulfil the legal requirements governing the relevant judicial procedure. Every action enabled, recorded, and circulated through e-filing, CMSs, or videoconferencing must comply with pre-established procedural rules provided by judicial laws and regulations. These laws and regulations have often been framed with paper-based or oral procedures in mind. ICT changes the sequence and the nature of many procedures. (p. 257) This technologically mediated procedural flow can contrast with the logics that govern paper-based or oral proceedings and hence be incompatible with the legal norms and regulations established to govern these proceedings. Tasks and operations prescribed by pre-existing legal texts can be difficult to inscribe into ICT. Procedures designed to work in a conventional domain based on paper and face-to-face relations are not necessarily compatible with those rationalized into the logics of ICTs. As previously noted, the migration of a simple gesture, as the signature, from paper to digital form proved to be particularly complex to be accommodated into the law.

In some cases, as with the Finnish e-filing system, the English Money Claims Online, and more recently with the Slovenian Central Department for Enforcement (COVL), the necessary techno-legal interoperability has been achieved by reforming the legal framework along with the design of the technology to guarantee technological as well as legal interoperability and compliance (Kujanen and Sarvilinna 2001; Kallinikos 2009a; Strojin 2014).

In these three cases, the handwritten signature foreseen in the old paper-based procedure has been replaced by ad hoc solutions that allow for different signature modes. These solutions have made e-filing applications accessible to lawyers and citizens, finding a sustainable mediation between the legal and technological requirements.

There are, conversely, many cases where the pre-existing procedural framework remained unchanged, so that very complex technological architectures had to be designed to comply with the legal and procedural architectures (Contini and Mohr 2014). Most of the cases of high technological complexity of e-justice solutions, especially where e-filing is concerned, are a consequence of the need to guarantee the legal interoperability of the digital mediated proceedings with pre-existing procedural frameworks designed only to enable a paper-based or oral proceeding. The search for the interoperability across legal and technological architectures may become particularly complex and difficult to deploy, maintain, and sustain over time (Lanzara 2014). Moreover, it can lead to the design of configurations that are cumbersome and difficult to use. An example is the case of the multimillion-pound failures of EFDm and e-Working at the Royal Courts of Justice in London. The systems became extremely complex, expensive, and difficult to use as a consequence of the complexity embedded into the architecture to maintain technological and legal interoperability and compliances (Jackson 2009; Collins-White 2011; Hall 2011).

In order to maintain legal and technological interoperability in parallel with the development or deployment of e-justice solutions, reconfiguration of the pre-existing legal and procedural framework is needed. This reconfiguration must enforce the alignment of the technological and legal constraints. This alignment is the result of an ongoing negotiation between ICT and pre-existing institutional and legal components (formal regulations in particular), which is always needed to maintain interoperability across the regulative regimes imposed by both the technology and the law.

(p. 258) In the case of civil proceedings, ICT is designed to execute tasks and procedures that are largely—but neither exclusively nor unequivocally—derived from legal texts, code of procedures, and other formal rules. Once legally regulated tasks are functionally simplified and closed into the technological architecture, they might change the way in which judicial procedures are executed, and might also change the interpretation of the law. As discussed in section 2, technology functionally simplifies and closes the execution of tasks imposing its one regulative regime. As noted by Czarniawska and Joerges (1998), with technological deployment:

societies have transferred various institutional responsibilities to machine technologies and so removed these responsibilities from everyday awareness and made them unreadable. As organised actions are externalised in machines, and as these machineries grow more complicated on even larger scale, norms and practices of organizing progressively devolve into society's material base: inscribed in machines, institutions are literally 'black boxed'. (Czarniawska and Joerges 1998: 372)

In other terms, once a procedure is inscribed into the ICT, it may become very difficult to challenge the technologically mediated procedure. Therefore, ICT acts as an autonomous regulative regime (Kallinikos 2009b), on the one hand triggering various processes of statutory and regulative changes, and leading to different interpretation of the pre-existing legal framework on the other. Therefore, such assemblages intrinsically produce unstable outcomes (Contini and Cordella 2015). This instability is the result of two distinct phenomena: first, the technology and the law both create path dependences, and, second, technology and law remain as autonomous regulative regimes.

The technological deployments in specific court operations (such as case tracking and legal information) create the need for technological deployments in other areas of court operations, as well as the implementation of updated technological systems across a court's offices. Looking at the last 20 years of ICT development in judicial systems, there is clear technological path dependence that began with the deployment of simple databases used for tracking cases and evolved into integrated justice chains (Contini 2001; Cordella and Iannacci 2010) that are now unfolding in transnational integrated judicial systems such as e-Codex in the European Union (Velicogna 2014).

In parallel, national and European regulators are constantly implementing new legislation that, in a paradoxical manner, requires new regulations to be implemented effectively. This is the case, for example, of the implementation of the European small claim, or of the European order for payment regulations, which have required national changes in the code of procedure and in by-laws. The law, parallel to the technology, creates path dependences that demand constant intervention to maintain them. Even if law and technology are designed to affect or interact with external domains, they largely remain autonomous systems (Ellul 1980; Fiss 2001).

(p. 259) As noted above, each new normative (or technological) development is path dependent in relation to pre-existing normative or technological developments. In other words, they are two different regulative regimes (Hildebrandt 2008; Kallinikos 2009b). The two regimes have autonomous evolutionary dynamics that shape the nature of the techno-legal assemblages enabling civil proceedings. Legislative changes may require changes in technologies already in use or even to 'wipe out' systems that function well (Velicogna and Ng 2006). Similarly, new technologies cannot be adopted without the implementation of changes to the pre-existing legal frameworks.

Three cases are discussed in the next section as explicit alternative approaches suitable for managing the complexity associated with the independent evolutionary dynamics of law and technology when techno-legal assemblages are concerned in the context of civil justice (Lanzara, 2009: 22).

6. Shift and Drift in Techno-legal Assemblages

The Italian Civil Trial Online provides the first example of how independent evolutionary dynamics in techno-legal assemblages can change the fate of large-scale e-justice projects. Since the end of the 1990s, the Italian Ministry of Justice has attempted to develop a comprehensive e-justice platform to digitize the entire set of civil procedures, from the simplest injunctive order to the most demanding high-profile contentious cases. The system architecture designed to support such an ambitious project was framed within a specific legal framework and by a number of by-laws, which further specified the technical features of the system. To develop the e-justice platform within the multiple constraints of such a strict legal framework took about five years, and when, in 2005, courts were ready to use the system, an unexpected problem emerged. The local bar associations were unable to bear the cost needed to design and implement the interface required by lawyers to access the court platforms. This led the project to a dead end (Fabri 2009b). The project was resuscitated and became a success when ‘certified email’ was legally recognized by a statutory change promoted by the government IT agency (Aprile 2011).

Registered electronic mail³ offered a technological solution to allow lawyers to access the court platform. The IT department of the Ministry of Justice decided to change the architecture (and the relative legislation) to adopt the new technological solution granting lawyers access to the court platform (Carnevali and Resca 2014). (p. 260) Such a shift in the techno-legal architecture reduced the complexity and the costs of integration, enabling swift adoption of the system. As a result, in 2014 the Civil Online Trial has become mandatory for civil proceedings.

The development of e-Barreau, the e-filing platform of French courts, showed a similar pattern. A strict legal framework prescribed the technologies to be used (particularly the digital signature based on EU Directive 1999/93/EC) to create the system. Various by-laws also specified technical details of the digital signature and of other technological components of the system. Changes to the code of procedures further detailed the framework that regulated the use of digital means in judicial proceedings. Once again, problems emerged when the national bar association had to implement the interface needed to identify lawyers in the system and to exchange procedural documents with the courts. Again, the bar association chose a solution too expensive for French lawyers. Moreover, the chosen solution, based on proprietary technologies (hardware and software) did not provide higher security than other less expensive systems. The result was a very low uptake of the system. The bar of Paris (which managed to keep an autonomous system with the same functionalities running at a much lower cost) and the bar of Marseille (who found a less expensive way to use the technological solution of the National bar association) showed alternative and more effective ways to develop the interoperability required (Velicogna, Errera, and Derlange 2011). This local development raised conflicts and legal disputes between the national bar, the service provider, and the local bar associations. As a result, the system failed to take off for a long time (Velicogna 2011). In this case, the existence of different technological solutions that were legal compliant and with similar

functionalities, but different costs and sponsors, made it difficult to implement a suitable solution for all the parties involved. Also, where rigid legal frameworks exist to regulate the technology, it might be difficult to limit the choice of the technology to one solution. This case shows that legal regulation is therefore not enough to guarantee technological regulation.

The case of e-Curia, at the Court of Justice of the European Union, highlights a different approach to e-justice regulation. The Court of Justice handles mainly high-profile cases, in multilingual procedures, with the involvement of parties coming from different European countries. This creates a very demanding framework for e-justice development, since parties' identification, and exchange of multilingual procedural documents, generates a high level of information complexity to be dealt with by ICT-enabled proceedings. However, despite the complexity and the caseload profile, e-Curia has successfully supported e-filing and the electronic exchange of procedural documents since 2011. The approach to technology regulation adopted by the Court is one of the reasons for this success. In 2005, a change in the Court's rules of procedure set up the legal framework for the technological development. This framework established that the Court might decide the criteria (p. 261) for the electronic exchange of procedural documents, which 'shall be deemed to be the original of that document' (CJEU 2011, art 3). Unlike the Italian and French cases discussed, the provision is general and does not identify the use of specific technological solutions, not even those foreseen by the EU. This legal change provided an open legal framework for the development of the e-justice platform. Indeed, system development was not guided by statutes or legal principles, but by other design principles: the system had to be simple, accessible, and free of charge for the users. The security level had to be equivalent to the level offered by conventional court proceedings based on exchange of documents through European postal services (Hewlett, Lombaert, and Lenvers 2008).

However, also in e-Curia the development of the e-justice system was long and difficult. This was mainly caused by the challenges faced in translating the complex procedures of the court into the technological constraints of digital media. In 2011, after successful tests, the Court was ready to launch e-Curia to the external users. This approach, with ICT development carried out within a broad and unspecific legal framework, can raise questions about accountability and control. This risk was faced with the involvement of the stakeholders, namely the 'working party of the Court of Justice'. This working party—composed of representatives of EU member states—has a relevant say on the rules concerning the Court of Justice, including the rules of procedure. The working party followed the development of e-Curia in its various stages, and, after assessing the new system, endorsed and approved its deployment. As a result, the Court authorized the use of e-Curia to lodge and serve procedural documents through electronic means. Moreover, the Court approved the conditions of use of e-Curia to establish the contractual terms and conditions to be accepted by the system's users. The decision established the procedures to be followed to become a registered user, to have access to e-Curia, and to lodge procedural documents. In this case, the loose coupling between law and technology provided the context for a simpler technological development (Contini 2014). Furthermore, it eases the capacity of the system to evolve and to adapt; the Court can change the system architecture

or take advantage of specific technological components without having to change the underpinning legal framework.

The three cases discussed in this section highlight the complex and variegated practices needed to develop and maintain effective techno-legal assemblages. Given the heterogeneous nature of legal and technological configurations, it is not possible to prescribe the actions required to effectively manage a given configuration. Moreover, configurations evolve over time and require interventions to maintain effective techno-legal assemblages and the procedures they enable. Shift and drifts are common events that unfold in the deployment of techno-legal assemblages. These shifts and drifts should not be considered as abnormal but rather as normal patterns that characterize the successful deployment of e-justice configurations.

(p. 262) 7. Final Remarks

ICT systems, as well as legal systems, have regulative properties that shape the actions and the outcomes of judicial proceedings. This chapter has examined how the two regulative regimes are intertwined into heterogeneous techno-legal assemblages. By recognizing the regulative regimes underpinning technical and legal deployment, and their entanglements into techno-legal assemblages, it is possible to better anticipate the effects that the digitalization of civil judicial procedures have on the delivery of judicial services, as well as the institutional implications of ICT-driven judicial reforms.

This analysis of law and technology dynamics in civil proceedings complements the established body of research, which highlights that institutional and organizational contexts are important factors to be accounted for when the deployment of ICT systems in the public sector is concerned (Bertot, Jaeger, and Grimes 2010). The imbrication of formal regulations and technology, as well as the dynamics (of negotiation, mediation, or conflict) between the two regulative regimes, offer a new dimension to account for the digital transformation shaping the institutional settings and procedural frameworks of judicial institutions. These changes are not just instances of applied law, but are also the result of the transformation evolving into techno-legal assemblages. Procedural actions are enabled by technological deployments that translate formal regulations into standardized practices, governed, and mediated by ICT systems. Therefore, technologies shape judicial institutions as they translate rules, regulations, norms, and the law into functionally simplified logical structures—into the code of technology. At the same time, technologies call for new regulations, which make the use of given technological components within judicial proceedings legally compliant, and allow them to produce expected outcomes. Both law and technology, as different regulative regimes engage ‘normativity’ but they constitute distinct modes of regulation, and operate in different ways (Hildebrandt 2008). Technology is outcome-oriented: it either works, which is to say that it produces expected outcomes, or it does not work (Weick 1990: 3–5; Lanzara 2014). It is judged teleologically. A given e-filing application is good from a technological point of view if it allows users to send online files to the court; that is to say, it allows the transfer of bits and data. What

works from a technological perspective does not necessarily comply with the legal requirement to execute proceedings. Formal regulations are judged deontologically: they separate the legal from the illegal, and as the examples show, what works from a legal perspective may not work from a technological one. Finally, whatever technologies the legal process relies upon, it must be judged teleologically for its effect, and deontologically for its legitimacy (Kelsen 1967: 211–212; Contini and Mohr 2014: 58). The complexity (p. 263) of techno-legal assemblages, which makes e-justice reforms a high-risk endeavour, stems from the need to assemble and constantly reassemble these two major regulative regimes. The imbrications between law and technology may increase complexity, pushing the system development or its use to the point where a threshold of maximum manageable complexity has to be considered (Lanzara 2014). This is the case when the law prescribes the use of technological components that may become difficult to develop or use as in the Trial on Line or e-Barreau cases. However, as the case of e-Curia demonstrates, even in demanding procedural settings, it is possible to assemble techno-legal components that are effective from a technological point of view, legitimate from a legal perspective, and simple to use. The management of these scenarios, and the search for functional and legitimate solutions, is indeed the most demanding challenge of contemporary ICT-enabled civil judicial proceedings.

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Notes:

(1.) This can be easily appreciated considering national and European e-Justice plans. See Multiannual European e-Justice action plan 2014–2018 (2014/C 182/02), or the resources made available by the National Center for State Courts, <http://www.ncsc.org/Topics/Technology/Technology-in-the-Courts/Resource-Guide.aspx> accessed 25 January 2016.

(2.) See, for instance, the Resource Guide 'Technology in the Courts' made available by the National Center for State Courts <http://www.ncsc.org/Topics/Technology/Technology-in-the-Courts/Resource-Guide.aspx> accessed 25 January 2016.

(3.) The registered electronic mail is a specific email system in which a neutral third party certifies the proper exchange of the messages between senders and receivers. For the Italian legislation, it has the same legal status of the registered mail. Italian Government, *Decreto legislativo 7 marzo 2005 n. 82. Codice dell'amministrazione digitale* (Gazzetta Ufficiale n. 112 2005).

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Conflict of Laws and the Internet

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Abstract and Keywords

This chapter documents the extreme stresses that cyberspace applies to state law by examining how private international law, or conflict of laws, has responded to the online global world. This highlights both the penetration of globalization into the ‘private’ sphere and the strongly ‘public’ or collective political nature of much of the ‘private’ ordering through national law. The chapter shows that the nation state is asserting itself against the very phenomenon—globalization (through cyberspace)—that threatens its existence, and does not shy away from accepting the fragmentation of this global cyberspace along traditional political boundaries as collateral damage to its own survival. Yet, the frequent appeal to international human rights normativity in recent conflicts jurisprudence suggests an awareness of the unsuitability and illegitimacy of nation state law for the global online world.

Keywords: conflict of laws, private international law, private and public interests, human rights, targeting, territoriality, convergence, internet, cyberspace

1. Introduction

THIS chapter explores the effect and counter-effect of the Internet as a global medium on private international law (or conflict of laws) as a highly state-centric body of law. Paradoxically, although private international law is designed for the very purpose of accommodating global activity across and within a patchwork of national or sub-national legal units, the scale of the Internet’s global reach is testing it to and beyond its limits. Arguably, the Internet exceeds the (national) frame of reference of private international law, which is based on the background assumption that geographically delimited activity within a state’s territory is the norm and transnationality the exception.

In many ways, private international law is the most quintessential national law of all. Not only is it part of national law rather than international law (except for the treaties that harmonize state conflict rules) and has been treated as such for a century or so (Paul

1988), but its very purpose is to decide which state is the most closely linked to a transnational occurrence so that its court procedures and laws should govern it. Conflicts law is state-centric in outlook and perceives international human interactions and relations, including problems facing humanity as a whole, as essentially *transnational* or *cross-border*, rather than as global, regional, or local (Mills 2006: 21). Conflict rules are meta-rules that are based on the legitimacy of (p. 270) national law as governing international relationships and activities, redefining their global character by localizing them in a particular state. A related aspect in which private international law is strongly state-centric is its exclusive focus on 'private' or 'civil' disputes, that is, on the relations between private individuals with each other as governed by domestic or national rules on contract or tort, on property or intellectual property rights, or on family relations. Thus, private international law is premised on the acceptance of the private-public dichotomy, in which the 'public' part of law includes the state and its relations with its people (regulated by criminal and public law), and with other states (regulated by *public* international law). Both of these relationships are also governed by special meta-rules in the cross-border context, that is, the heads of jurisdiction under public international law. The separation and 'nationalization' of the private legal sphere emerged as the nation state established itself as the key player in the international legal order within the positivist reconstruction of international law (Paul 1988: 161; Mills 2006). One of the foundational and reinforcing effects of the conceptual dichotomy between private and public international law is that it underplays the significant interest and role of the state in the governance of (transnational) private relations. The underlying assumption is that conflicts rules have neutrally and 'naturally' emerged in response to transnational problems, with the State apparatus working in the background as a facilitator, with no (strong) *public* interest pervading them. A corollary at the international level is that the actions and interactions of 'private' individuals are *prima facie* removed from the 'public' global sphere.

By focusing on private international law and not parallel competence dilemmas in criminal or public law, this chapter may appear to perpetuate this questionable public-private law division in the jurisdictional realm (Muir Watt 2014; Mills 2009; Kohl 2007). That is not the intention. The chapter's focus on the interactions between the Internet and private international law may be justified, first as a case study to show the generic difficulties of coordinating national law responses to global activity and the effects of doing so. Second, given that private international law, as domestic law, has not been dependent on reaching international consensus and is overtly more concerned with providing justice in an individual case than asserting state interests against competing interests by other states, it has developed more comprehensive rules for its coordination project than the thin and more conservative jurisdictional regime under public international law. Thus, the focus on private international law tests these more detailed, and more sophisticated, responses against the rigours of cyber-transnationality.

The third reason for focusing on private international law is due to the nature of relations formed through Internet interactions. It is precisely in the traditional private sphere that the Internet has deepened globalisation: 'there is a general consensus that contemporary globalisation processes seem more potent in their degree of penetration into the

rhythms of daily life around the world' (Wimmer & Schiller (p. 271) 2002: 323). For legal purposes, it is not particularly significant that the Internet has penetrated everyday life per se, but rather that many interactions are not so private—here meaning personal—as to fall below the regulatory radar. Indeed, online activity has challenged existing legal boundaries in this context, pushing formerly personal communications into the regulated realm. The same conversation is of heightened legal interest if it occurs on a social media site rather than in the pub.¹ The Internet gives the common man a mass audience and thereby, at least in theory, power. This empowerment necessarily creates a public identity and potentially a threat to the political establishment. More generally, the Internet's empowerment of individuals in the public sphere creates the potential of harm to others, attracting greater regulatory oversight. This shines through the famous words of Judge Dalzell in the US case of *ACLU v Reno*, calling the Internet:

[the] most participatory marketplace of *mass* speech that this country – and indeed the world – has yet seen. The plaintiff ... describes the 'democratizing' effects of Internet communication: individual citizens of limited means can speak to a world-wide audience ... Modern-day Luthers still post their theses, but to electronic bulletin boards rather than the door of the Wittenberg Schlosskirche

(*American Civil Liberties Union v Reno* 1996: 881).

And the vast majority of daily online interactions are of a direct cross-border nature, thus activating private (or public) international law. Anything written online—a blog, a tweet, a social media post, or a comment on a news site that is publicly accessible—creates an international communication because of its *prima facie* global accessibility. Even without actually publishing anything online, a transnational communication occurs every time a user clicks on a Facebook Like, uses the Uber app for car sharing, listens to a song on Spotify, does a Google search (even on the country-specific Google site), or sends an email via Hotmail or Yahoo!. This is by virtue of the location of the provider, the location of the digital processing, or the contractual terms of the service provider, all of which implicate foreign laws, and often US law. In every one of these activities, an international interaction is present, even if the substantive exchange is entirely domestic: the car share occurs locally and the Facebook Like may be for a local friend's post. This is not to suggest that the vast majority of these cross-border interactions will generate a dispute, but simply to underscore the pervasiveness of online events and relationships that in principle engage private international law. On the Internet, transnational interactions are the norm, not the exception. Cyberspace has reversed the prior trend of global interactivity that was mediated through corporate bottlenecks that localized interactions for legal purposes, for example the trade in goods (such as a Nike distributor or McDonalds franchise) or communications (such as cinemas or sellers of music or films) within the state of the consumer. Thus, for the consumer, these transactions were domestic, not implicating private international law. The Internet has not just brought mass-communication to the masses, but *transnational* mass-communication to the masses.

(p. 272) Finally, the focus on private international law and its all too frequent mobilization in Internet disputes raises questions about the adequacy of private international law, as well as the adequacy of substantive national law, and its legitimate role in online governance. The existential pressures on national law from global online activity bring to the fore the significant public interests underlying the private laws of states (Walker 2015: 109; Smits 2010). They also highlight how the demands and needs for order on the Internet may be, and are in fact, met through avenues that are partially or wholly outside state-based normativity. The overall question addressed in this chapter is to what extent private (international) law has been cognizant of this existential threat to its own legitimacy and relevance, and the laws it seeks to coordinate.

The chapter is structured around three trends or themes in the development of private international law in response to online transnationality. The first trend lies in the overt perpetuation of traditional private international law through the forceful application of private law and procedures to Internet activities, despite its problematic consequences for online communications. In light of this, it can be seen that, through private law cases, the State is asserting its continued right to regulate online as much as offline, and by implication its continued relevance as an economic, political, and social unit. Yet, there are also signs of a more internationalist spirit emerging from national conflicts standards, which reflects a more cooperative position and a conscious regard for the interests of foreign private actors, other states, and cyberspace itself. The second trend is related and marks the rise of human rights rhetoric in conflicts cases, raising the normative stakes of transnational private disputes. A close reading of key judgments shows that human rights arguments are invoked by States to legitimize the application of national law to the global online world by reference to higher global normativity, often against the invocation of human rights by corporate actors to de-legitimize that application. In this respect, the entry of human rights rhetoric into conflicts cases may be seen as symptomatic of the embattled state of national law in relation to global communication. The chapter concludes with a third theme, which draws on the limits of private international law (and more generally national law). It highlights that the demand for online 'order' is frequently met outside State-based normativity, for example, by global corporate players who provide many of the day-to-day 'solutions' at the quasi-law-making, adjudication, and enforcement stage, acting only to a small extent in the shadow of State law.

There is a large body of literature on transnational or global law that documents the fragmentation of the Westphalian nation-state juridical order and its supersession by legal pluralism as a way of responding to varying economic, social, cultural, and environmental transnational phenomena (Teubner 1997; Tamanaha 2007; Brousseau et al. 2012; Muir Watt 2014; Halliday & Shaffer 2015; Walker 2015). This chapter reflects that debate, in a preliminary way, by honing in on the method (private international law) that the Westphalian order relies on to control activities (p. 273) (transnational activities) that do not fit its statist design, demonstrating the stresses on, failings of, and adaptations within, that method. The discussion also shows how the Westphalian nation-state is asserting itself by

imposing fragmentation on the very global phenomenon that threatens its existence, in this case, cyberspace.

2. Continuation and Convergence of Conflicts Rules

For quite some time, private international law has dealt with deeply global phenomena, whether in the form of migration, communication, trade and finance, or environmental pollution. At the same time, there has been a long-standing dissatisfaction with its highly complex and inefficient nature: 'conflicts revolution has been pregnant for too long. The conflicts misery index, which is the ratio of problems to solutions, or of verbiage to result, is now higher than ever' (Kozyris 1990: 484). The essential problem underlying this dissatisfaction is that conflicts law, much like the conflicting substantive laws it coordinates, remains deeply anchored in territorialism of both actors and acts (sometimes in the guise of more flexible open-ended functional tests and standards) (Dane 2010):

The name of the game is location, location, location: location of events, things, persons ... [and] the greater the mobility of persons and events, the lesser the isolation of national spaces ... the less suitable is any local-national law to provide a satisfactory exclusive answer to a legal question ... we do have an inherent imperfection that is beyond the capability of conflicts to redress

(*Kozyris 2000*: 1164–1166).

Whenever there are competing normative orders, any regime whose task it is to coordinate or bridge them is bound to come up against difficult choices, but those difficulties are increased immensely if these competing orders lose their natural fields of application. More concretely, private international law can just about cope with the task of coordinating between competing sets of national laws in respect of transnational activities, as long as activities are by and large territorially delimited so as *not* to invoke it. In other words, conflicts law is in its very design the gap filler or the emergency crew to accommodate the aberrant and anomalous scenario of transnationality, but is inherently unsuited for an environment where that exceptional scenario is a normality, that is, when activity is routinely and systematically transnational.

On their face, transnational Internet disputes do not appear to be so very different from transnational disputes more generally. They tend to involve two parties located in different states with each arguing that it is the courts and substantive laws (p. 274) of their home turf that should govern the dispute. This image of two opposing sides as the focus of the action is deceptive. As every law student learns, any judgment has forward-looking implications in addition to resolving the actual dispute between the parties; it sets a precedent for similar cases in the future, which in turn often triggers defensive strategies by similarly situated parties and is, in fact, designed to do so. In that respect, civil law,

much like criminal law, fulfils an important regulatory function, as acknowledged by a 'governance-oriented analysis of transnational law' (Whytock 2008: 450).

This governance-oriented perspective is particularly apt in the context of the key conflicts query that humble transnational Internet cases have triggered and the attendant precedent that has systematically been under contestation: does the accessibility of a website in a State expose its provider to the State's procedural or substantive laws? If answered in the affirmative, as has often been the case, that precedent entails that every site operator has to comply with the laws of *all* states:

[A]ssertion of law-making authority over Net activities on the ground that those activities constitute 'entry into' the physical jurisdiction can just as easily be made by any territorially-based authority ... All such Web-based activity, in this view, must be subject simultaneously to the laws of all territorial sovereigns

(Johnson and Post 1996: 1374).

Compliance with the laws of all states could, generally and theoretically, be achieved by complying with the lowest common denominator of all laws. Alternatively, site operators can take special technological measures to restrict or ring-fence their site territorially through geo-blocking. Either strategy is certainly problematic for the online world as a global public good, apart from the high legal burden they impose on site operators. The question is whether and when national courts and legislatures have, in fact, asserted the power to regulate online events on the basis of the *mere* accessibility of a site on their territory. The following sub-sections examine two lines of reasoning that have emerged in this respect across a number of States and subject areas, within which different traditions and justifications of conflicts analysis are perpetuated. The first line of reasoning pays no heed at all to the drastic consequences of imposing territorially based normativity on global activity, with focus only on local interests as affected by foreign based sites. The second, less prominent, approach takes a more enlightened internationalist outlook and shows an appreciation of the costs for the network of letting local interests trump all else, even if, in the final analysis, it too is stuck in traditional conflicts territorialism.

2.1 Parochialism: 'Mere Accessibility' as the Trigger for Global Legal Exposure

Transnational internet claims based on defamation, privacy, or intellectual property law have had to locate the tort or quasi-tort committed online in the physical (p. 275) world in order to decide: (1) whether a particular court had personal jurisdiction over the foreign defendant and whether it should exercise it (as part of the *forum non conveniens* inquiry); and (2) which substantive law should be applied to the case. The question at the heart of both inquiries has invariably been *where* the injury has occurred—the assumption being, if there is a local injury, then local law will apply (*lex loci delicti*) and the local court has jurisdiction and, in all likelihood, should exercise it. In the Internet context, the question has thus been whether the foreign-based website has caused local harm. An early Australian defamation case started an approach that would subsequently become very com-

mon. In *Dow Jones and Company Inc v Gutnick* (2002), the High Court of Australia (HCA) held that the US publisher Dow Jones could be sued in a Victorian court (applying Victorian law) in respect of its online journal in which Mr Gutnick, an Australian business man with links to the US, had allegedly been defamed. Personal jurisdiction of the court was *prima facie* established as Gutnick had suffered damage to his reputation in Victoria. Furthermore, Victoria was not an inconvenient forum, because, according to the court, the claim *only* concerned Victoria and only engaged its laws:

Mr Gutnick has sought to confine his claim ... to the damage he alleges was caused to his reputation *in Victoria* as a consequence of the publication that occurred *in that State*. The place of commission of the tort for which Mr Gutnick sues is then readily located as Victoria. That is where the damage to his reputation of which he complains in this action is alleged to have occurred, for it is there that the publications of which he complains were comprehensible by readers. It is his reputation *in that State*, and only that State, which he seeks to vindicate' [emphasis added]

(*Dow Jones and Company Inc v Gutnick* 2002: [48]).

It did not matter that, of the over half a million subscribers to the website, the vast majority came from the US and only 1700 from Australia and a few hundred from Victoria, which was the jurisdiction that mattered (*Gutnick v Dow Jones & Co Inc* 2001: [1]–[2]). If Gutnick suffered damage in Victoria, that was all that was needed to make this a Victorian claim. Very much in the same vein, in the English case of *Lewis v King*,² the court allowed what 'was really a USA case from first to last' (*Lewis & Ors v King* 2004: [13]) to go ahead in England. By focusing exclusively on the harm that King, a well-known US boxing promoter, had suffered in England (as a result of defamatory statements on two US websites, fightnews.com and boxingtalk.com), the case became a purely local case: 'English law regards the particular publications which form the subject matter of these actions as having occurred in England' (*King v Lewis & Ors* 2004: [39]). The court rejected 'out of hand' the proposition (as adopted elsewhere) that courts from jurisdictions not 'targeted' by the site should not be considered a convenient forum to hear the dispute because 'it makes little sense to distinguish between one jurisdiction and another in order to decide which the defendant has "targeted", when in truth he has "targeted" every jurisdiction where his text may be downloaded' (*Lewis & Ors v King* 2004: [34]). In other words, a site provider is *prima facie* subject to the laws of every State (p. 276) where the site can be accessed and the laws of the State(s) that will in fact make themselves felt are those where harm has been suffered.

The primary focus on the location of harm as a way of settling the issue of jurisdiction of the court (and often also the applicable law) in transnational cases has also been fairly pervasive under EU conflicts jurisprudence, across the spectrum of torts and intellectual property actions. Under Article 7(2), formerly Article 5(3), of the EU Jurisdiction Regulation 2012,³ a court has jurisdiction in the place of the 'harmful event', which covers both the place *where the damage occurred* and the place of the event giving rise to it, so that

the defendant may be sued in either place (*Shevill and Others* 1995: [20]f). In the joint defamation/privacy cases of *eDate Advertising and Martinez* 2011, the CJEU held that, if personality rights are infringed online, an action for all the damage can be brought either where the publisher is established or where the victim has its centre of interests. Alternatively, an action also lies in each Member State in respect of the specific damage suffered in that Member State when the offending online content has been accessible there. In *Martinez*, this meant that the UK defendant publishing company MGN (Mirror Group Newspapers Limited) could be sued for an offending article on sundaymirror.co.uk by a French actor in a French court. This is the EU law equivalent of *Gutnick and Lewis*, and the same approach has now been extended to transnational trademark disputes (see *Wintersteiger v Products 4U Sondermaschinenbau GmbH* 2012) and transnational copyright disputes (see *Pinckney v KDG Mediatech* 2013).⁴ In each of these cases, the national legal order grants full and uncompromised protection to local stakeholders, with no regard being paid to the interests of foreign providers or the international (online) community as a whole.

There are many other cases along those lines. They deny the transnational nature of the case and implicitly the global nature of the medium. This occurs by focusing purely on the local elements of the dispute and discounting the relevance of the ‘foreign’ data to the resolution of the conflicts inquiry. This approach fits with the main theories of private international law—whether rule- or interest-based. Thus, on Beale’s or Dicey’s classic theory of vested rights, according to which rights vest in tort in the location and moment an injury is suffered, the court in these cases is simply recognizing these pre-existing vested rights (Beale 1935; Dicey 1903). By focusing on the location of the last act necessary to complete the cause of action, the vested rights theory does not encounter a ‘conflict’ of laws because the activity is only connected to the ‘last’ territory (Roosevelt III 1999). Even under a modernist interest-based theory—such as Brainerd Currie’s (1963) governmental interest theory—the approach in these cases would still appear to stand. Both *Gutnick* and *Lewis* could be considered types of ‘false conflicts’,⁵ as in neither case, as seen through the court’s eyes, would or could there be a competing governmental interest by another state in regulating the particular territorially delimited online publication. Both courts stressed that they *only* dealt with the local effect of the foreign site.

(p. 277) Therefore, neither the classic nor the modernist approach to private international law would appear to offer a perspective that counters this parochial outlook.

Traditionally, in the offline world, it could simply be assumed that if harm has been caused in a particular place, the defendant must have knowingly and intentionally pursued activity in that location in the first place. In such a case, the laws of that place would be foreseeable to that defendant, albeit not on the basis of the injury as such, but on the basis of his or her pursuit of activities there. In relation to Internet activity, this match is not necessarily present, as the intentional act is simply that of going online or placing information online, rather than doing so in particular territory, and so harm may occur in all sorts of unforeseeable locations. In short, the existence of harm or injury does not, of itself, provide a stable and foreseeable criterion to trigger legal exposure online, even though it seems a self-evident and self-justifying basis from the forum’s perspective, i.e. a

parochial perspective. Notably, however, even offline, local harm never really triggers legal exposure, and the reverse is the case; 'harm' is created by culture and law:

there is nothing 'natural' about the diagnosis and rhetorical construction of a social behaviour as a problem ... Behaviours may exist for a very long time before they are thought to be problematic by one or another actor ...

(Halliday & Shaffer 2015: 5).

So, then, what type of harm (as an objective pre-legal fact) may be recognized as harm in law varies across ages and cultures, and its existence as understood by one culture and defined by its legal system, is not necessarily foreseeable to an online provider from a very different (legal) culture. Under Chinese law, it is possible to defame the dead and thus, for example, criticism of Mao Zedong causes 'harm' in China, but none in Mongolia, and this is not because Mao is only dead in China. By focusing only on local harm and thereby disregarding the global nature of the offending online communications, courts do the very thing they claim not to do. They purport to be moderate by avoiding undue extra-territoriality, when, in fact, the narrow focus on state law and state-based injuries imprints a very territorial stamp on global communications. Note that, if a territorially limited remedy is used to justify a wide assumption of jurisdiction (here based on the mere accessibility of the site), the limited scope of the remedy does not 'neutralize' the initial excess. How could a US online publisher comply with, or avoid the application of, the defamation standards of Australia, or England and Wales? This judicial stance incentivizes solid cyber-borders that match political offline borders.

In light of this critique, could the judges have adopted different reasoning in the cases above? Perhaps the legislative provisions in Europe or common-law precedents forced them down the 'nationalistic' route. This argument is not, however, convincing. For example, the Advocate General in *Wintersteiger* offered an internationalist interpretation of Article 5(3), by examining the defendant's conduct in addition to identifying the risk of infringement, or 'injury', to the local trademark:

(p. 278)

It is not sufficient if the content of the information leads to a risk of infringement of the trade mark and instead it must be established that there are objective elements which enable the identification of conduct which is in itself intended to have an extraterritorial dimension. For those purposes, a number of criteria may be useful, such as the language in which the information is expressed, the accessibility of the information, and whether the defendant has a commercial presence on the market on which the national mark is protected.

(Opinion of AG Cruz Villalón in *Wintersteiger* 2012: [28]).

Many long-arm statutes of US states do exactly the same. For example:

New York courts may exercise jurisdiction over a non-domiciliary who commits a tortious act without the state, causing injury to person or property within the state. However, once again the Legislature limited its exercise of jurisdictional largess ... to persons who *expect or should reasonably expect* the tortious act to have consequences in the state and in addition derive substantial revenue from interstate commerce

[emphasis added] (*Bensusan Restaurant Corp v King* 1997: [23]).

On these views, a focus on harm can (and should) be coupled with an inquiry into the extent to which that harm was foreseeable from the perspective of an outsider in the defendant's position. This could be considered a legitimate expectation arising from the rule of law in the international setting, that is, the foreseeability of law. More fundamentally, it would testify to the ability and willingness of domestic judges and regulators to see their territorially based legal order from the outside, through the lens of a transnational actor or, rather, to see the state from a global (online) perspective. Metaphorically, it would be like eating fruit from the tree of knowledge and recognizing one's nakedness. Such an external perspective also goes some way towards a moderate conflicts position that attempts to accommodate the coexistence of state-based territorial normativity and the Internet as a global communication medium.

In any event, the internal parochial perspective of courts such as the HCA in *Gutnick* has retained a strong foothold in private international law, despite its limitations in a tightly interconnected world. In legal terms, it reflects the traditional construction of conflicts law as a purely domestic body of law with no accountability to the higher authority of the international community (Dane 2010: 201). In political terms, it embodies the defence of the economic interests and cultural and political values of territorial communities against the actual or perceived threat to their existence from the outside.

2.2 Internationalism: 'Targeting' as the Trigger for Limited Legal Exposure

Parochialism asserting itself via harm-focused conflicts rules has not been the only way in which private international law has responded to online transnationality. (p. 279) A more internationalist conflicts jurisprudence for Internet cases has developed as a counterforce across jurisdictions and subject areas. In the specific context of the Internet, this alternative approach accepts that not every website creates equally strong links with every State and, in deciding whether a local court has jurisdiction over a foreign website and whether local law is applicable to it, the law must consider the real targets of the site. The following factors are thus relevant in determining the objective intention of the site provider as externalized by the site: language, subject matter, URL, and other indicia. Only those States that are objectively targeted by the site should be able to make regulatory claims over it. This approach has the virtues of allowing for remedies in cases of 'to-be-expected' harm, making the competent courts and applicable laws both foreseeable and manageable for site providers, and preserving the openness of the Internet. Content providers

and other online actors need not technologically ring-fence their sites from territories that are not their objective targets. It does, however, require legal forbearance by non-targeted States even when harm has occurred locally.

In the EU, the most prominent example of this internationalist approach is the treatment of consumer contracts, where the protective provisions for jurisdiction and applicable law—created specifically with online transactions in mind—only apply if the foreign online business had ‘directed’ its activities to the consumer’s State and the disputed consumer contract falls within the scope of those activities.⁶ In *Pammer/Alpenhof*, the CJEU specifically clarified that the mere use of a website by a trader does not by itself mean that the site is ‘directed to’ other Member States; more is needed to show the trader’s objective intention to target those foreign consumers commercially, such as an express mentioning of the targeted states on, or paying search engines to advertise the goods and services there. Other more indirect factors for determining the territorial targets of a website are: the international nature of the activity (for example tourism); the use of telephone numbers with the international code; the use of a top-level domain name other than that of the state in which the trader is established or the use of neutral top-level domain names; the mention of an international clientele; or the use of a language or a currency other than that generally used in the trader’s state (*Peter Pammer v Reederei Karl Schlüter GmbH & Co KG* 2010; *Hotel Alpenhof GesmbH v Oliver Heller* 2010). The targeting standard has also made an appearance in the EU at the applicable law stage in transnational trademark disputes. In *L’Oréal SA and Others v eBay International AG and Others*,⁷ the CJEU held that the right of trademark owners to offer goods under the sign for sale is infringed as ‘as soon as it is clear that the offer for sale of a trade-marked product located in a third State is targeted at consumers in the territory covered by the trade mark’ (*L’Oréal SA and Others v eBay International AG and Others* 2011: [61]). Following *Pammer/Alpenhof*, the court reasoned:

Indeed, if the fact that an online marketplace is accessible from that territory were sufficient for the advertisements displayed there to be within the scope of ... [EU trademark (p. 280) law], websites and advertisements which, although obviously targeted solely at consumers in third States, are nevertheless technically accessible from EU territory would *wrongly be subject to EU law* [emphasis added]

(*L’Oréal SA and Others v eBay International AG and Others* 2011: [64]).

These are strong words from the CJEU to delegitimize the regulatory involvement by non-targeted states as undue extra-territoriality. For the same reasons, it makes also sense that the targeting standard was mooted as a possibility for the General Data Protection Regulation and its application to non-European online providers (Opinion of AG Jääskinen in *Google Inc* 2013: [56]).

That being said, the legal positions in this field are conflicting, with parochialism and internationalism sitting at times uncomfortably side by side. While, according to *L’Oréal*, European trademark standards only apply to sites targeted at Europe (based on substantive trademark law), the EU Regulation on the Law Applicable to Non-Contractual Obliga-

tions (Rome II) (2007)⁸ makes the location of the damage the primary focus of the applicable law inquiry for tort. Yet, it supplements this test with a more flexible test looking for the state that is ‘manifestly more closely connected with a country’, which may allow for a targeting standard to be applied. This flexible fallback test accompanying a strict rule-based test resonates with the approach taken in the French copyright case of *Société Éditions du Seuil SAS v Société Google Inc, Société Google France* (2009),⁹ where French publishers complained that Google infringed French copyright law because it ‘made available to the French public’ online excerpts of French books without the rights-holders’ authorization. The French court rejected the argument by Google that US copyright law, including its fair use doctrine, should govern the dispute. As this case concerned a ‘complex’ tort (the initiating act and the result were in different countries), the *lex loci delicti* test was difficult to apply and the court looked for the law with which the dispute had the ‘most significant relationship’. This was found to be French law because Google was delivering excerpts of French works to French users, on an fr. site, using the French language, and one of the defendants was a French company. Notably, although the court did not adopt a ‘targeting’ test, the ‘most significant relationship’ test supported a similar type of reasoning. The ‘most significant relationship’ test—which originates from, and is well established in, US conflicts law and associated Currie’s ‘governmental interest’ analysis (Restatement of the Law of Conflict Laws 1971: § 145)—may be seen as a more general test which encompasses the targeting test. Both tests engage in an impressionist assessment of the relative strength of the link between the disputed activity and the regulating state and, implicitly, in a comparative analysis between the relative stakes of the competing States. Thus, unlike the vested rights theory, the interest analysis is arguably internationalist in its foundations. At the same time, cases like the above copyright dispute underscore the huge economic stakes that each State seeks to protect through civil law and which make regulatory forbearance economically and politically difficult.

(p. 281) 2.3 Legal Convergence in Conflicts Regimes

The body of conflicts cases that has emerged as a result of online transnationality has crystallized strong concurrent themes in the legal assertions by States over cross-border activity, and these themes have transcended subject-matters as well as national or regional conflicts traditions. For example, although the European Commission resisted the proposal of the EU Parliament to refer specifically to ring-fencing attempts in the ‘directing’ provision for consumer contracts as being too American,¹⁰ the CJEU’s reasoning on the ‘directing’ concept in *Pammer/Alpenhof* would not look out of place within US jurisprudence on personal jurisdiction generally, and in Internet cases more specifically. This jurisprudence, which builds on intra-state conflicts within the US, has long absorbed temperance as the key to successful co-ordination of competing normative orders. Since *International Shoe Co v Washington* (1945),¹¹ personal jurisdiction of the court over an out-of-state defendant has been dependent on establishing that the defendant had ‘minimum contacts’ with the forum, such that an action would not offend ‘traditional notions of fair play and substantial justice’. Half a century and much case authority later, this test allowed judges to differentiate between websites depending on the connections they estab-

lished with the forum state. For example, in *Bensusan Restaurant Corp v King*¹² the owner of a New York jazz club 'The Blue Note' objected to the online presence of King's small but long established club in Missouri of the same name, and alleged that, through this online presence, King infringed his federally registered trademark. The US District Court for New York held that it had no jurisdiction over King because he had done no business (nor sought any) in New York simply by promoting his club through the online provision of general information about it, a calendar of events and ticketing information:

Creating a site, like placing a product into the stream of commerce, may be felt nationwide — or even worldwide — but, without more, it is not an act purposefully directed toward the forum state ... [and then importantly] This action ... contains no allegations that King in any way *directed* any contact to, or had any contact with, New York or intended to avail itself of any of New York's benefits (*Bensusan Restaurant Corp v King* 1996: 301).

This early case has been followed in many judgments deciding when particular online activity is sufficiently and knowingly directed or targeted at the State to make the court's exercise of personal jurisdiction fair.¹³ There is certainly some convergence of conflicts jurisprudence in the US and EU towards a 'targeting' standard, and this might be taken to signal, that this should and will be the future legal approach of States towards allocating global (online) activity among themselves. Such conclusion is too hasty.

First, the 'targeting' standard has not emerged 'naturally' in response to transnationality per se, but has been mandated top-down within federal or quasi-federal legal systems (that is, within the US by the Constitution,¹⁴ and within the EU by (p. 282) internal market regulations), against the background of relative legal homogeneity. That prescription is primarily intended to stimulate cooperation in those internal spheres of multilevel governance, but has at times spilled beyond that sphere. The application of the cooperative standard within an internal sphere of governance also guarantees reciprocity of treatment. It allows states to trade legal forbearance over foreign providers against reciprocal promises by the partner vis-à-vis their domestic actors. In the absence of such a promise, states have insisted, via a harm-focused territorialism, on *strict* compliance with domestic defamation, privacy, trademark, or copyright law—an approach that offers immediate gains, accompanied by only diffuse long-term costs for a diffuse group of beneficiaries. There are undoubtedly parallels to the problem of the tragedy of the commons in the context, for example, of environmental regulation.

Second, and in the same vein, for all its support of the enlightened 'targeting' approach, the US has proven strongly reluctant to enforce foreign civil judgments against its Internet corporate powerhouses. In the infamous, by now unremarkable, case of *Yahoo! Inc v La Ligue Contre le Racisme et l'Antisemitisme* (2001),¹⁵ a US court declared as unenforceable the French judgment against Yahoo! in which the company had been ordered to block French users from accessing yahoo.com's auction site that offered Nazi memorabilia in contravention of French law. Although the French order neither extended to, nor affected, what US users would be able to access on that site and, although the US court ac-

knowledge of 'the right of France or any other nation to determine its own law and social policies,' the order was still considered inconsistent with the First Amendment by 'chilling protected speech that occurs simultaneously within our borders.' Although Yahoo! was, under US law, formally relieved from complying with French law, and international law restricts enforcement powers to each State's territory,¹⁶ it cleaned up its auction site in any event in response to market forces (Kohl 2007). The US judicial unwillingness to cooperate is not extraordinary, either by reference to what went before or after.¹⁷ In 2010, the US passed a federal law entitled the SPEECH Act 2010 (Securing the Protection of our Enduring and Established Constitutional Heritage Act). It expressly prohibits the recognition and enforcement of foreign defamation judgments against online providers, unless the defendant would have been liable under US law, including the US Constitution, its defamation law, its immunity for Internet intermediaries, and its due process requirement; the latter refers to the minimum contacts test which, online, translates into the targeting approach. Thus different approaches to Internet liability from that provided for under US law are not tolerated.

From the perspective of legal convergence towards the 'targeting' stance, it shows that this cooperative approach only flourishes in particular circumstances. Especially in the international—rather than federal or quasi-federal—context, this approach does not fit well with the self-interest of States.

(p. 283) **3. Public Interests, Private Interests, and Legitimacy Battles invoking Human Rights**

3.1 Private versus Public Interests as Drivers of Conflicts Jurisprudence

Conflicts law occupies an ambiguous space at the cross-section of private and public interests and laws. It has long been recognized that public interests underpin much of private international law, most expressly through Currie's governmental interest theory according to which the State is 'a parochial power giant who ... in every case of potential choice of law, would chase after its own selfish "interests" ' (Kozyris 2000: 1169). Conflicts jurisprudence relating to online transnationalism is often motivated by the collective interests of States in defending, often aggressively so, local economic interests as well as its peculiar cultural and political mores. This can be seen, for example, in different conceptions of defamation or privacy laws. As one commentator puts it:

One does not have to venture into the higher spheres of theory on the evolution of human knowledge and scientific categories ... to observe that, what at face value may be characterised as 'personal' or 'private' is not only politically relevant but actually shaping collective reflection, judgement and action

(Kronke 2004: 471).

Furthermore, while the above cases fall within the heartland of conflicts law, there are other borderline areas of law regulating Internet activity, which cannot easily be classified as either 'private' or 'public' law. Data protection law allows for 'civil' claims by one private party against another. At the same time, it would be difficult to deny the public or regulatory character of a data protection case like *Google Spain SL, Google Inc v AEPD* (2014), in which the CJEU extended EU law to Google's search activities in response to an enforcement action by the Spanish Data Protection Authority. This involved no conventional conflicts analysis. Instead, the CJEU had to interpret Article 4 of the Data Protection Directive (1995) dealing with the Directive's territorial scope. The Court decided that the Directive applied to Google because its local marketing subsidiaries, which render it economically profitable, are 'establishments', and their activities are 'inextricably linked' to the processing of personal data when it deals with search queries (*Google Inc* 2014: [55]f). This interpretation of the territorial ambit of local legislation does not fit standard conflicts analysis, which appears to involve 'choices' between potentially applicable laws (Roosevelt III 1999). Yet, as discussed, conflicts inquiries often intentionally avoid acknowledging conflicts and simply ask—much like in the case (p. 284) of interpreting the territorial ambit of a statute—whether local substantive tort or contract law can legitimately be applied or *extended* to the dispute. Furthermore, the answer to that question is frequently driven by reference to the inward-looking consequences of *not* extending the law to the transnational activity: would local harm go un-remedied? Similarly, in *Google Spain*, the CJEU, and subsequently the Article 29 Working Party, used the justification of seeking 'effective and complete protection' for local interests to forcefully impose local law, in this case EU law, on Google's search activities, without making any concession to the global nature of the activity (Article 29 Data Protection Working Party 2014: [27]). Thus the classification of conflicts law as being peculiarly occupied with 'private interests' artificially excludes much regulatory legislation that provides private parties with remedies and which approaches transnationalism in much the same way as conventional conflicts law.

It has been shown that the categorization of certain laws as 'private' and others as 'public' in the transnational context has ideological roots in economic liberalism. This approach allowed economic activity to become part of the exclusive internal sphere of state sovereignty away from global accountability:

The general division between 'public' and 'private' which crystallized in the 19th century has long been considered problematic ... [It] implements the liberal economic conception of private interactions as occurring in an insulated regulatory space. At an international level, the 'traditional' division ... has similarly isolated private international interactions from the subject matter of international law ... [and] may therefore be viewed as an implementation of an international liberalism which seeks to establish a protected space for the functioning of the global market. Thus it has been argued that the public/private distinction operates ideologically to obscure the operation of private power in the global political market.

(Mills 2006: 44).

Paradoxically, this suggests that economic relations were removed from the legitimate purview of the international community not because they were too unimportant for international law, but rather because they were too important to allow other States to meddle in them. As borne out by the jurisprudence on disputes in online transnational contexts, through the analysis of private international law, States make decisions on matters of deep public significance. They delineate their political influence over the Internet vis-à-vis other States and also allocate and re-allocate economic resources online and offline, for example, through intellectual property, competition claims, or data protection law.

In light of this, it is surprisingly not the role of public interests within private international law that requires asserting. Rather, it is its private character that is being challenged. In this respect, it might be posited that, to the extent that private international law is indeed preoccupied with private interests and values (in, for example, having a contract enforced, in protecting property or conducting one's business, in upholding one's dignity, reputation, or privacy), the tendency of conflicts law should be fairly internationalist. If the interests of parties to an (p. 285) action are taken seriously not because they represent some collective interest of the State of the adjudicating court, then the foreign parties' competing private interests should, by implication, be taken equally seriously. In that sense '[governmental] interest analysis has done a disservice to federalism and internationalism by relentlessly pushing a viewpoint which inevitably leads to conflicts chauvinism or, more accurately, tribalism in view of the emphasis on the nation being a group of people' (Kozyris 1985: 457). This applies to the online world all the more given that foreign parties are, on the whole, private individuals and not just large corporate players that can comply with, defend against and accommodate multiple legal regimes. Yet, as discussed, Internet conflicts jurisprudence is frequently highly parochial and thus does not vindicate such an internationalist conclusion.

3.2 The Rise of Human Rights in Conflicts Jurisprudence

A development that, at least partially, recognizes the centrality of 'private' rights and interests in this sphere is the entry of human rights rhetoric into conflicts jurisprudence. This might seem natural given that human rights law and private international law make the individual and his or her rights the centre of their concerns. Yet, the historic preoccupation of human rights law with civil and political rights and its foundation in public international law meant that it was not at all a natural match for transnational economic activity regulated by domestic law (Muir Watt 2015). The rise of the *public* and *international* discourse of human rights law in the *private* and *national* sphere of commercial activities and communications governed by conflicts law is a novel phenomenon. International human rights language is now regularly used to resist or bolster accountability claims in transnational Internet disputes. These human rights arguments invariably involve distinct national interpretations of international human rights standards. One might even say that private international law is called upon to resolve 'human rights' conflicts.

Given the nature of the Internet as a communication medium, freedom of expression and privacy have been the prime contenders as relevant human rights norms in this field. For example, in *LICRA & UEJF v Yahoo! Inc & Yahoo France*, which concerned the legality of selling Nazi memorabilia on Yahoo.com's auction website to French users contrary to French law, the commercial sale between private parties turned into a collision of the legitimate limits on freedom of expression, between France as 'a nation profoundly wounded by the atrocities committed in the name of the Nazi criminal enterprise',¹⁸ and the US, as a nation with a profound distrust of government and governmental limits imposed on speech (Carpenter 2006). The French court justified its speech restriction on the basis of localizing (p. 286) harm in French territory, invoking this international politicized language, while the US court refused all cooperation in the enforcement of the judgment as the order was 'repugnant' to one of its most cherished constitutional values (*Yahoo! Inc v La Ligue Contre le Racisme et l'Antisemitisme* 2001). In *Gutnick*, concerning a private defamation action, the defendant US publisher reminded the court 'more than once that ... [the court] held the fate of freedom of dissemination of information on the Internet in ... [its] hands'.¹⁹ Yet, the Australian judge rejected the argument that the online publication should be localised for legal purposes only where it was uploaded on the ground that that human rights argument was:

primarily policy-driven, by which I mean policies which are in the interests of the defendant and, in a less business-centric vein, perhaps, by a belief in the superiority of the United States concept of the freedom of speech over the management of freedom of speech in other places and lands

(*Gutnick v Dow Jones & Co Inc* 2001: [61]).

It may be argued that the invocation of human rights standards in transnational private disputes is neither new nor peculiar to the Internet, and that such values have, for a long time, found recognition, for example, under the public policy exception to choice of law determinations (Enonchong 1996). This is a fair analysis. Internet conflicts cases continue and deepen pre-existing trends. However, the public policy exception itself had, even in the relatively recent past, a parochial outlook, justifying overriding otherwise applicable foreign law by reference to the 'prevalent values of the community' (Enonchong 1996: 636). Although some of these values corresponded to modern human rights, framing them as part of the human rights discourse implicitly recognizes *universal* human rights normativity, even if interpreted differently in different states. For example, France has, since the 1990s, recognized that otherwise applicable foreign law could *only* be excluded if it was contrary to *ordre public international*, including human rights law, as opposed to *ordre public interne*. (Enonchong 1996). Similarly, references to 'international comity' within Anglo-American conflicts law have in the past shown an internationalist spirit—and in the words of the House of Lords, a move away from 'judicial chauvinism' (*The Abidin Daver* 1984)—but that spirit was expressed through recognizing and enforcing the law of other states, rather than through deferring to any higher international law. This is or was in line with the positivist view of international law as being voluntary and only horizontally binding between States, excluding private relations from its ambit and making the recognition

of foreign law discretionary. Furthermore, human rights discourse has infiltrated conflicts cases far beyond the public policy exception and is now often at the heart of the conflicts analysis. In cases like *Gutnick*, it fed into the jurisdiction and choice of law inquiries, which indirectly pitched divergent national limits on freedom of expression against each other. Both Australia and France imposed greater limits on that freedom than the US.

(p. 287) In other Internet cases, human rights are encountered within private international law not only as part of its toolkit, but also as its subject. In *Google Inc v Vidal-Hall* (2015), the English Court of Appeal had to decide whether Google, as a US company, could be made to defend proceedings in England in the case of ‘misuse of private information’ and a breach of data protection rules, both of which are founded on the right to privacy in Article 8 of the European Convention on Human Rights. The action arose because Google had, without the English claimants’ knowledge and consent, by-passed their browser settings and planted ‘cookies’ to track their browsing history to enable third-party targeted advertising. The case had all the hallmarks of a typical Internet dispute in being transnational, involving competing interests in personal data, as well as the existence of minor harm spread among a wide group of ordinary users. The technical legal debate centred around whether the new English common law action on the ‘misuse of private information’ could be classified as a tort for conflicts purposes and whether non-pecuniary damage in the form of distress was by itself sufficient to found a claim for damages in a breach of common law privacy or data protection rules. On both counts, the court approved fairly drastic changes to English law and legal traditions. For example, in relation to the move from an equitable action to a tort claim, the court cited with approval the lower court’s reasoning that just because ‘dogs evolved from wolves does not mean that dogs are wolves’ (*Google Inc* 2015: [49]). Still, it means they are wolf-like. From a common law court with a deeply ingrained respect for precedents, such radical break with tradition is astounding. The judgment was driven by the desire to bring the claim within the jurisdiction of the English court and thus let it go ahead. Substantively, European privacy and data protection law supplied key arguments to fulfil the conditions for jurisdiction, which in turn meant that the foreign corporation could be subjected to European human rights law. Thus, conflicts law was informed by, and informed, the intersections between English law, EU law, and European human rights law as derived from international law.

The centrality of human rights discourse is not peculiar to Internet conflicts disputes or Internet governance. Human rights discourse is a contemporary phenomenon across a wide field of laws (Moyn 2014). Still, the application of (private or public) national law to global Internet activity is especially problematic given that it invariably restricts freedom of communications across borders. While those restrictions may be justified under the particular laws of the adjudicating State, the collateral damage of hanging onto one’s local legal standards online is a territorially segregated cyberspace where providers have to ring-fence their sites or create different national or regional versions based on different territorial legalities. Such collateral damage affecting the ‘most participatory marketplace of mass speech’ (*ACLU v Reno* 1996) requires strong justification. Courts have sought to boost the legitimacy of their decisions based on national or regional laws by re-

sorting to human rights justifications. Typically, as stated earlier, in *Google Spain* (2014), the CJEU repeatedly asserted that its decision to make Google subject to (p. 288) EU data protection duties was necessary to ensure ‘effective and complete protection of the fundamental rights and freedoms of natural persons’ (*Google Spain* 2014: [53], [58]). Arguably, nothing short of such a human rights-based justification could ever ground a state-based legal imposition on global online conduct, and even that may not be enough.

Finally, the human rights battles fought in online conflicts cases crystallize not only the competing interests of States in upholding their conceptions of human rights on behalf of their subjects, but also point to what might in fact be the more significant antagonism within the global communications space: corporations vis-à-vis States. The phenomenon of the sharing economy has shown how profoundly online corporations can unsettle national local industries, e.g. Uber and local taxi firms, Airbnb and the local hotel industries, or Google Books or News and publishing or media industries (Coldwell 2014; Kassam 2014; Auchard and Steitz 2015). To describe such competition as occurring between state economies does not adequately capture the extent to which many of these corporations are deeply global and outside the reach of any State. Coming back to human rights discourse in conflicts cases, courts, as public institutions, have employed human rights arguments either where the cause of action implements a recognized right or where it creates an inroad into such right. In both cases, human rights norms are alleged to support the application of territorially based laws to online communications. Conversely, corporations have used human rights arguments, especially freedom of expression, to resist those laws and have argued for an open global market and communication place using rights language as a moral or legal shield. For them, rights language supports a deregulatory agenda; *the devil cites Scripture for his purpose*. On a most basic level, this suggests that fundamental rights can be all things to all people *and* may often be indeterminate for the resolution of conflicts disputes. Nonetheless, their use demonstrates in itself the heightened normative interests in these disputes that may otherwise look like relatively trivial private quarrels. However, it is still doubtful that piecemeal judicial law-making, even if done with a consciousness of human rights concerns, can avert the danger of the cumulative territorializing impact on the Internet arising out of innumerable national courts passing judgment on innumerable subjects of national concern. Human rights rhetoric used both by corporate actors and courts highlights their need for legitimacy against the highest global norms for the ultimate judgment of their online and offline communities. That legitimacy is not self-evident in either case, and is often hotly contested, given that the activities of global Internet corporations tend to become controversial precisely because of their high efficiency, the empowerment of the ordinary man, and the resulting huge popularity of online activities (Alderman 2015). Any legal restriction imposed on these activities based on national law, including private law, treads on difficult social, economic, and legal ground.

(p. 289) **4. Conclusion: The Limits of the Conflict of Laws Online**

The emerging body of judicial practice that applies national law to global online communications, using private international law as a toolkit, has a convoluted, twisted, and often contradictory narrative. First, it pretends that nothing much has changed, and that online global activity raises no profound questions of governance so long as each State deals only with its 'local harm'. Private cases mask the dramatic impact of this position on online operators, partly because the body of law downplays the significant public interests driving it and partly because the main focus of the actions are the parties to the disputes, which diverts from their forward-looking regulatory implications. However, there are also cracks in the business-as-usual veneer. The internationalist approach promoted through application of a targeting standard provides a sustained challenge to the parochial stance of conflicts law by insisting that some regulatory forbearance is the price to be paid for an open global internet. More poignantly, the frequent appeal to international normativity in the form of human rights law in recent conflicts jurisprudence suggests an awareness of the unsuitability and illegitimacy of nation-state law for the global online world. Private international law has long been asked to do the impossible and to reconcile the 'national' with the 'global', yet the surreal nature of that task has been exposed, as never before, by cyberspace. The crucible of internet conflicts jurisprudence has revealed that the real regulatory rivalry is perhaps not state versus state, but rather state versus global corporate player, and that those players appeal to the ordinary user for their superior mandate as human rights champions and regulatory overlords.

In 1996, Lessig prophesied:

[c]yberlaw will evolve to the extent that it is easier to develop this separate law than to work out the endless conflicts that the cross-border existences here will generate ... The alternative is a revival of conflicts of law; but conflict of law is dead – killed by the realism intended to save it

(Lessig 1996: 1407).

Twenty years later, that prophecy appears to have been proven wrong. If anything, the number of transnational Internet cases on various subjects suggests that private international law is experiencing a heyday. Yet, appearances can be deceptive. Given the vast amount of transnational activity online, are the cases discussed in this chapter really a representative reflection of the number of cross-border online disputes that must be occurring every day?

As argued earlier, each decided case or legislative development has a forward-looking impact. It is unpicked by legal advisers of online providers and has a ripple effect beyond the parties to the dispute. Online behaviour should gradually (p. 290) internalize legal expectations as pronounced by judges and legislators. Furthermore, these legal expectations are, on the whole, channelled through large intermediaries, such as search engines,

social networking sites, or online marketplaces, so that much legal implementation occurs away from public view in corporate head offices, drafting Terms and Conditions, complaint procedures, national customized platforms, and so on. In fact, it is the role and power of global online intermediaries that suggests that there is a parallel reality of online normativity. This online normativity does not displace the State as a territorially based order, but overlaps and interacts with it. This is accounted for by explanations of emerging global regulatory patterns that construct societies not merely or mainly as collectives of individuals within national communities, but as overlapping communicative networks:

a new public law (beyond the state) must proceed from the assumption that with the transition to modern society a network of autonomous 'cultural provinces', freed from the 'natural living space' of mankind, has arisen; an immaterial world of relations and connections whose inherent natural lawfulness is produced and reproduced over each specific selection pattern. In their respective roles for example as law professor, car mechanics, consumer, Internet user or member of the electorate, people are involved in the production and reproduction of this emergent level of the collective, but are not as the 'people' the 'cause' of society ... [These networked collectives] produce a drift which in turn leads to the dissolution of all traditional ideas of the unity of the society, the state, the nation, democracy, the people ...

(Vesting 2004: 259).

The focus on communications, rather than individuals, as constituting societies and regulatory zones, allows a move away from a construction of law and society in binary national-international terms (Halliday & Shaffer 2015). This perspective is also useful for making sense of cyberspace as the very embodiment of a communicative network, both in its entirety as well as through sub-networks, such as social media platforms with their innumerable sub-sub-networks, with their own normative spheres.

But how, if at all, does online normativity, as distinct from state-based order, manifest itself? Online relations, communications and behaviours are ordered by Internet intermediaries and platforms in ways that come close to our traditional understanding of law and regulation in three significant legal activities: standard setting, adjudication, and enforcement. Each of these piggybacks on the 'party autonomy' paradigm that has had an illustrious history as quasi-regulation within private international law (Muir Watt 2014). Large online intermediaries may be said to be involved in standard setting, when they draft their Terms and Conditions or content policies and, while these policies emerge to some extent 'in the shadow of the law' (Mnookin & Kornhauser 1979; Whytock 2008), they are also far removed from those shadows in important aspects, creating semi-autonomous legal environments. First, corporate policies pay regard to national norms, but transcend national orders in order to reach global or regional uniformity. Long before the Internet, David Morley and Kevin Robins said that '[t]he global corporation ... looks to (p. 291) the nations of the world not for how they are different but how they are alike ... [and] seeks

constantly in every way to standardise everything into a common global mode' (Morley & Robins 1995: 15). Facebook's global 'Community Standards' fall below many of the legal limits, for example, on obscenity or hate speech as understood in each national community where its platform is accessible. At the same time, Facebook's platform also exceeds other national or regional limits, such as EU data protection rules (Dredge 2015; Gibbs 2015). Whether these corporate standards match national legal requirements is often no more than an academic point. For most intents and purposes, these are the real standards that govern its online community on a day-to-day basis. Second, corporate standards on content, conduct, privacy, intellectual property, disputes, membership, and so on, transcend state law in so far the corporate provider is almost invariably the final arbiter of right and wrong. Their decisions are rarely challenged in a court of law (as in *Google Spain* or *Vidal*) for various reasons, such as intermediary immunity, the absence of financial damage, or the difficulty of bringing a class action. The cases discussed in this chapter are exceptional. Corporate providers are generally the final arbiters because they provide arbitration or other complaints procedures that are accessible to platform users and which enjoy legitimacy among them. For example, eBay, Amazon, and PayPal have dispute resolution provision, and Facebook and Twitter have report procedures. Finally, the implementation of notice and takedown procedures vests wide-ranging legal judgment and enforcement power in private corporate hands. When Google acts on millions of copyright or trademark notices or thousands of data protection requests, it responds to legal requirements under state law, but their implementation is hardly, if at all, subject to any accountability under national law. The point here is not to evaluate the pros and cons of private regulation, for example, on grounds of due process or transparency, but simply to show that any analysis of conflicts rules that see the world as a patchwork of national legal systems that are competing with each other and coordinated through them, is likely to miss the growth of legal or quasi-legal private global authority and global law online. These online private communication platforms, which are fiercely interacting with the offline world, are operating partially in shadow of the State, and partially in the full sun.

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Notes:

- (1.) See CPS, *Guidelines on prosecuting cases involving communications sent via social media* (2013), especially its advice about the traditional target of 'public order legislation' and its application to social media.
- (2.) See also *Berezovsky v Michaels and Others; Glouchkov v Michaels and Others* [2000] UKHL 25.
- (3.) EC Regulation on Jurisdiction and the Recognition and Enforcement of Judgments in Civil and Commercial Matters 1215/2012, formerly EC Regulation on Jurisdiction and the Recognition and Enforcement of Judgments in Civil and Commercial Matters 44/2001.
- (4.) See also Case C-441/13 *Hejduk v EnergieAgentur.NRW GmbH* (CJEU, 22 January 2015).
- (5.) Note 'false conflicts', as described by Currie, were cases where the claimant and the defendant were of a common domicile. The equivalent focusing on an 'act' rather than 'actors' is when all the relevant activity occurs in a single jurisdiction.
- (6.) Article 17(1)(c) of EC Regulation on Jurisdiction and the Recognition and Enforcement of Judgments in Civil and Commercial Matters 1215/2012 (formerly Art 15(1)(c) of the EC Regulation on Jurisdiction and the Recognition and Enforcement of Judgments in Civil and Commercial Matters 44/2001); Art 6(1)(b) of the EU Regulation 593/2008 of the European Parliament and of the Council of 17 June 2008 on the law applicable to contractual obligations (Rome I).
- (7.) Contrast to jurisdiction judgement in Case C-523/10 *Wintersteiger v Products 4U Sondermaschinenbau GmbH* [2012] ECR I-0000.
- (8.) Art 4 of EC Regulation 864/2007 of the European Parliament and of the Council of 11 July 2007 on the law applicable to non-contractual obligations (Rome II), which incidentally excludes from its scope violations of privacy and defamation (see Art 1(2)(g)). See also Art 8 for intellectual property claims.
- (9.) *Société Editions du Seuil SAS v Société Google Inc* (TGI Paris, 3ème, 2ème, 18 December 2009, n° 09/00540); discussed in Jane C Ginsberg, 'Conflicts of Laws in the Google Book Search: A View from Abroad' (*The Media Institute*, 2 June 2010) <http://www.mediainstitute.org/IPI/2010/060210_ConflictOfLaws.php> accessed 4 February 2016.
- (10.) Amended Proposal for a Council Regulation on Jurisdiction and the Recognition and Enforcement of Judgments in Civil and Commercial Matters (OJ 062 E, 27.2.2001 P 0243-0275), para 2.2.2.

(11.) See also *Hanson v Denckla* 357 US 235 (1958) and *Calder v Jones* 465 US 783 (1984).

(12.) See also *Zippo Manufacturing Co v Zippo Dot Com, Inc* 952 F Supp 1119 (WD Pa 1997); *Young v New Haven Advocate* 315 F3d 256 (2002); *Dudnikov v Chalk & Vermilion*, 514 F 3d 1063 (10th Cir 2008); *Yahoo! Inc v La Ligue Contre Le Racisme et l'antisemitisme*, 433 F 3d 1199 (9th Cir 2006).

(13.) Contrast to cases based on *in rem* jurisdiction, for example, alleged trademark infringement through a domain name in *Cable News Network LP v CNNews.com* 177 F Supp 2d 506 (ED Va 2001), *affirmed in* 56 Fed Appx 599 (4th Cir 2003).

(14.) 'Due process' requirement under the Fifth and Fourteenth Amendment to the US Constitution, concerning the federal and state governments respectively.

(15.) *Yahoo! Inc v La Ligue Contre Le Racisme et L'Antisemitisme* F Supp 2d 1181 (ND Cal 2001), reversed, on different grounds, in 433 F3d 1199 (9th Cir 2006) (but a majority of the nine judges expressed the view that if they had had to decide the enforceability question, they would not have held in its favour).

(16.) See also Julia Fioretti, 'Google refuses French order to apply "right to be forgotten" global' (*Reuters*, 31 July 2015). When the French data protection authority in 2015 ordered Google to implement a data protection request globally, Google refused to go beyond the local Google platform on the basis that '95 percent of searches made from Europe are done through local versions of Google ... [and] that the French authority's order was an [excessive] assertion of global authority.'

(17.) For example, *Matusevitch v Telnikoff* 877 F Supp 1 (DDC 1995).

(18.) *LICRA v Yahoo! Inc & Yahoo France* (Tribunal de Grande Instance de Paris, 22 May 2000).

(19.) See also *Dow Jones & Co Inc v Jameel* [2005] EWCA Civ 75.

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Technology and the American Constitution

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Abstract and Keywords

This chapter examines how the structural provisions of the American Constitution and the federalist system of government they create uniquely shape the landscape of regulation for technology in the United States. The chapter's inquiry focuses on the biomedical technologies associated with assisted reproduction and embryo research. These areas present vexing normative questions about the introduction and deployment of these technologies, showing the mechanisms, dynamics, virtues, and limits of the federalist system of government for the regulation of technology. In particular, the differing jurisdictional scope of federal and state regulation results in overlap and interplay between the two regulatory systems. The consequence of this dynamic is often a wide divergence in judgments about law and public policy. The chapter's review of the constitutionally fragmented regime currently regulating different biotechnologies questions whether such a decentralized approach is well suited to technologies that involve essential moral and ethical judgments about the human person.

Keywords: United States Constitution, federalism, regulation, biotechnology, embryonic stem cell research, human cloning, assisted reproduction

1. Introduction

THE regulation of technology, as the content of this volume confirms, is a vast, sprawling, and complex domain. It is a multifaceted field of law that encompasses legislative, executive, and judicial involvement in areas including (though certainly not limited to) telecommunications, energy, the environment, food, drugs, medical devices, biologics, transportation, agriculture, and intellectual property (IP). What role does the United States Constitution play in this highly complicated and diverse regulatory landscape? Simply put, the US Constitution, as in any system of law, is the foundational source of law that establishes the structures, creates the sources of authority, and governs the political dynamics that make all of it possible. Thus, the US Congress, acting pursuant to powers explicitly enumerated by the Constitution, has enacted a wide variety of statutes that provide a web of regulatory oversight over a wide array of technologies.¹ The Executive Branch of the

US Government (led by the President of the United States), acting through various administrative agencies, provides more fine-grained regulatory guidance and rulemaking under the auspices (p. 297) of the statutes they are charged with administering. When agencies go beyond their statutory mandate, or if Congress oversteps its constitutional warrant, the federal judiciary ostensibly intervenes to restore order. For their part, the individual US States pass and enforce laws and regulations under their plenary 'police power' to safeguard the 'health, welfare, and morals' of their people. Thus, the regulation of technology is fundamentally constituted by the federalist system of government created by the US Constitution.

This chapter explores the effects and consequences of the unique structural provisions of the US Constitution for the regulation of technology. It will examine the role played by federalism and separation of powers (both between the state and federal governments, and among the co-equal branches of the federal government). It touches briefly on the provisions of the Constitution that relate to individual rights and liberties—although this is a relatively minor element of the Constitution's regulatory impact in this field. It also reflects on the virtues and limits of what is largely a decentralized and pluralistic mode of governance.

The chapter takes the domain of biotechnology as its point of departure. More specifically, the focus is on the biotechnologies and interventions associated with embryo research and assisted reproduction. The chapter focuses on these techniques and practices for three reasons. First, an examination of these fields, which exist in a controversial political domain, demonstrates the roles played by all of the branches of the federal government—executive (especially administrative agencies), legislative, and judicial—as well as the several states in the regulation of technology. Public debate coupled with political action over, for example, the regulation of embryo research has involved a complicated 'thrust and parry' among all branches of the federal government, and has been the object of much state legislation. The resulting patchwork of federal and state legislation models the federalist system of governance created by the Constitution. Second, these areas (unlike many species of technology regulation) feature some involvement of the Constitution's provisions concerning individual rights. Finally, embryo research and assisted reproduction raise deep and vexed questions regarding the propriety of a largely decentralized and pluralistic mode of regulation for technology. These areas of biotechnology and biomedicine concern fundamental questions about the boundaries of the moral and legal community of persons, the meaning of procreation, children, family, and the proper relationship between and among such goods as personal autonomy, human dignity, justice, and the common good.

The chapter is structured in the following way. First, it offers a brief overview of the Constitution's structural provisions and the federalist system of government they create. Next, it provides an extended discussion of the regulation of embryonic stem cell research (the most prominent issue of public bioethics of the past eighteen years), with special attention paid to the interplay among the federal branches, as well as between the federal and state governments. The chapter conducts a similar analysis with regard to hu-

man cloning and assisted reproductive technologies. (p. 298) It concludes by reflecting on the wisdom and weaknesses of the US constitutional framework for technology regulation.

2. An Introduction to the US Constitutional Structure

The American Constitution establishes a system of federalism whereby the federal government acts pursuant to limited powers specifically enumerated in the Constitution's text, with the various state governments retaining plenary authority to regulate in the name of the health, welfare, and morals of their people, provided they do not violate their US constitutional rights in doing so (*Nat'l Fed'n of Indep Bus v Sebelius* 2012; Barnett 2004: 485). In enacting law and policy, both state and federal governments are limited by their respective jurisdictional mechanisms. Whereas the federal government is consigned to act only pursuant to powers enumerated in the Constitution, state governments enjoy wide latitude to legislate according to localized preferences and judgments. States can thus experiment with differing regulatory approaches, and respond to technological developments and changing societal needs. This division of responsibility allows for action and reaction between and among federal and state governments, particularly in response to the array of challenges posed by emerging biotechnologies. This dynamic also allows for widely divergent normative judgments to animate law and public policy.

Similarly, the horizontal relationship among the co-equal branches of the federal government affects the regulatory landscape. Each branch must act within the boundaries of its own constitutionally designated power, while respecting the prerogatives and domains of the others. In the field of public bioethics, as in other US regulatory domains, the President (and the executive branch which he leads), Congress, and the federal courts (including the Supreme Court) engage one another in a complex, sometimes contentious, dynamic that is a central feature of the American constitutional design. The following paragraphs outline the key constitutional roles of these three branches of the US federal government, which provide the foundational architecture for the regulation of technology in the United States.

The principal source of congressional authority to govern is the Commerce Clause, which authorizes congressional regulation of interstate commerce (US Const art I, § 8, cl 3). Congress can also use its power under the Spending Clause to influence state actions (US Const art I, § 8, cl 1). An important corollary to this power is the capacity to condition receipt of federal funds, allowing the national government to (p. 299) influence state and private action that it would otherwise be unable to affect directly. Alternatively, Congress often appropriates funds according to broad mandates, allowing the Executive branch to fill in the specifics of the appropriations gaps. The funding authorized by Congress flows through and is administered by the Executive Branch, which accordingly directs that money to administrative agencies and details the sanctioned administrative ends.

The Executive branch is under the exclusive authority and control of the President, who is tasked with faithfully interpreting and implementing the laws passed by Congress (US Const art II, § 3). As head of the Executive branch, the President, has the power to enforce the laws, to appoint agents charged with the duty of such enforcement, and to oversee the administrative agencies that implement the federal regulatory framework.

The Judiciary acts as a check on congressional and executive power. Federal courts are tasked with pronouncing ‘what the law is’ (*Marbury v Madison* 1803), and that duty sometimes involves resolving litigation that challenges the constitutional authority of one of the three branches of government (*INS v Chadha* 1983). But, even as federal courts may strike down federal laws on constitutional or other grounds, judicial affirmation of legislative or executive action can serve to reaffirm the legitimacy of regulatory measures. United States Supreme Court precedent binds lower federal courts, which must defer to its decisions. State Supreme Courts have the last word on matters relating to their respective state’s laws, so long as these laws do not conflict with the directives of the US Constitution. This jurisdictional demarcation of authority between the federal and state supreme courts frames the legislative and policy dynamics between state and federal governments.

3. Embryonic Stem Cell Research

The moral, legal, and public policy debate over embryonic stem cell research has been the most prominent issue in US public bioethics since the late 1990s. It has been a common target of political activity; national policies have prompted a flurry of state legislation as some states have affirmed, and others condemned, the approach of the federal government. Examination of embryonic stem cell research regulation offers insight into the operation of concurrent policies at the state and federal level and the constitutional mechanisms for action, specifically the significance of funding for scientific and medical research. It thus provides a poignant case study of how US constitutional law and institutional dynamics serve to regulate, directly or indirectly, a socially controversial form of technology.

(p. 300) The American debate over embryo research reaches back to the 1970s. According to modern embryologists, the five-to-six-day-old human embryo used and destroyed in stem cell research is a complete, living, self-directing, integrated, whole individual (O’Rahilly and Muller 2001: 8; Moore 2003: 12; George 2008). It is a basic premise of modern embryology that the zygote (one-cell embryo) is an organism and is totipotent (that is, moves itself along the developmental trajectory through the various developmental stages) (Snead 2010: 1544).² The primary question raised by the practice of embryonic stem cell research is whether it is morally defensible to disaggregate, and thus destroy, living human embryos in order to derive pluripotent cells for purposes of research that may yield regenerative therapies. Pluripotent cells, or stem cells, are particularly valuable because they are undifferentiated ‘blank’ cells that do not have a specific physiological function (Snead 2010: 1544). Where adult stem cells—which occur naturally in the

body and are extracted harmlessly—can differentiate into a limited range of cell types based on their organ of origin, embryonic stem cells have the capacity to develop into any kind of tissue in the body. This unique functionality permits them to be converted into any specialized cell types, which can then potentially replace cells damaged or destroyed by diseases in either children or adults.³ Typically, the embryos used in this kind of research are donated by individuals or couples who conceived them through assisted reproductive treatment but who no longer need or want them. But there are also reports of researchers creating embryos by in vitro fertilization (IVF) solely for research purposes (Stolberg 2001).

Because embryonic stem cells are the earliest stage of later cell lineages, they offer a platform for understanding the mechanisms of early human development, testing and developing pharmaceuticals, and ultimately devising new regenerative therapies. Few quarrel over the ends of such research, but realizing these scientific aspirations requires the use and destruction of human embryos. Prominent researchers in this field assert that the study of all relevant diseases or injuries, which might benefit from regenerative cell-based therapy, requires the creation of a bank of embryonic stem cell lines large enough to be sufficiently diverse. Given the scarcity of donated IVF embryos for this purpose, these researchers argue that creating embryos solely for the sake of research (by IVF or cloning) is necessary to realizing the full therapeutic potential of stem cell research (Snead 2010: 1545).

Much of the legal and political debate over stem cell-related issues has focused on the narrow question of whether and to what extent to fund such research with taxpayer dollars. The US government is a considerable source of funding for biomedical technologies and research, and federal funding has long been a de facto means of regulating activities that might otherwise lie beyond the enumerated powers of the federal government for direct regulation. Article I, Section 8 of the United States Constitution gives Congress the power ‘to lay and collect taxes, duties, imposts, and excises, to pay the debts and provide for the common defense and general welfare of the United States’. Pursuant to the Spending Clause, Congress may appropriate (p. 301) federal funds to stem cell research and may condition receipt of such funds on the pursuit of specific research processes and objectives (*South Dakota v Dole* 1987). And as head of the Executive branch, constitutionally tasked with ensuring the laws are faithfully executed, the President may allocate the appropriated funding according to the Administration’s priorities (US Const art II, § 3). Federal funding allocations serve as compelling indicators of governmental countenance or disapproval of specific conduct, and can confer legitimacy on a given pursuit, signalling its worthiness (moral or otherwise). Alternatively, the withholding or conditioning of federal funds can convey moral caution or aversion for the activity in question (Snead 2009: 499–aver).

The recurrent issue of federal funding for embryo research has varied, often significantly, across presidential administrations. For nearly forty years, the political branches have been locked in a stalemate on the issue. Different American presidents—through their di-

rectives to the National Institutes of Health (NIH), which is responsible for a large portion of federal research funding—have taken divergent positions.

The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, created by the National Research Act, recommended that Congress charter a permanent body known as the Ethics Advisory Board (EAB) to review and approve any federally funded research involving in vitro embryos.⁴ Thereafter, this requirement was adopted as a federal regulation. While the EAB issued a report in 1979 approving, as an abstract ethical matter, the funding of research involving the use and destruction of in vitro embryos, its charter expired before it had the opportunity to review and approve any concrete proposals. Its membership was never reconstituted, but the legal requirement for EAB approval remained in place. Thus, a de facto moratorium on the funding of embryo research was sustained until 1993, when Congress (at the urging of the newly elected President Clinton) removed the EAB approval requirement from the law (National Institutions of Health Revitalization Act 1993).

President Clinton thereafter directed the NIH to formulate recommendations governing the federal funding of embryo research. The NIH Human Embryo Panel convened and issued a report in 1994 recommending federal funding for research involving the use and destruction of in vitro embryos—including research protocols in which embryos were created solely for this purpose (subject to certain limitations). President Clinton accepted most of these recommendations (though he rejected the panel's approval for funding projects using embryos created solely for the sake of research), and made preparations to authorize such funding. Before he could act, however, control of Congress shifted from Democrat to Republican, and the new majority attached an appropriations rider to the 1996 Departments of Labor, Health and Human Services, Education, and Related Agencies Appropriations Act. The amendment forbade the use of federal funds to create, destroy, or harm embryos for research purpose.⁵

(p. 302) This amendment (known as the Dickey Amendment, after its chief sponsor), which has been reauthorized every year since, appeared to short-circuit the Clinton Administration's efforts to fund embryo research. Following the derivation of human embryonic stem cells in 1998, however, the General Counsel of President Clinton's Department of Health and Human Services issued an opinion interpreting the Dickey Amendment to permit the funding of research involving stem cells that had been derived from the disaggregation of human embryos, so long as the researchers did not use federal funds to destroy the embryos in the first instance. In other words, since private resources were initially used to destroy the relevant embryos, subsequent research that involved the relevant stem cell lines did not qualify as research 'in which' embryos are destroyed.

Before the Clinton Administration authorized any funding for such research, however, President Bush was elected and ordered suspension of all pending administrative agency initiatives for review (including those relating to funding embryo research). The Bush Administration eventually rejected such a permissive interpretation and instead authorized federal funding for all forms of stem cell research that did not create incentives for the

destruction of human embryos, limiting federal funds to those embryonic stem cell lines derived prior to the date of the announced policy. He took the position that the intentional creation of embryos (by IVF or cloning) for use and destruction in research is, *a fortiori*, morally unacceptable.

As a legal matter, President Bush agreed with his predecessor that the Dickey Amendment, read literally, did not preclude funding for research where embryos had been destroyed using private resource. But he adopted a policy, announced on 9 August 2001, whereby federal funding would only flow to those species of stem cell research that did not create future incentives for destruction of human life in the embryonic stage of development. Concretely, this entailed funding for non-embryonic stem cell research (for example, stem cells derived from differentiated tissue—so-called ‘adult’ stem cell research), and research on embryonic stem cell lines that had been derived before the announcement of the policy, that is, where the embryos had already been destroyed.

When President Bush announced the policy, he said that there were more than sixty genetically diverse lines that met the funding criteria. In the days that followed, more such lines were identified, bringing the number to seventy-eight. Though seventy-eight lines were eligible for funding, only twenty-one lines were available for research, for reasons relating both to scientific and IP-related issues. As of July 2007, the Bush Administration had made more than \$3.7 billion available for all eligible forms of research, including more than \$170 million for embryonic stem cell research. Later in his administration, partly in response to the development of a revolutionary technique to produce pluripotent cells by reprogramming (or de-differentiating) adult cells (that is, ‘induced pluripotent state cells’ or iPS cells), without need for embryos or ova, President Bush directed the NIH to broaden the focus of its funding efforts to include any and all promising avenues of pluripotent (p. 303) cell research, regardless of origin. In this way, President Bush’s policy was designed to promote biomedical research to the maximal extent possible, consistent with his robust principle of equality regarding human embryos.

Congress tried twice to override President Bush’s stem cell funding policy and authorize federal taxpayer support of embryonic stem cell research by statute. President Bush vetoed both bills. Relatedly, a bill was introduced to formally authorize support for research on alternative (that is, non-embryonic) sources of pluripotent cells. It passed in the Senate with seventy votes, but was killed procedurally in the House of Representatives.

Apart from the White House and NIH, official bodies within the Executive branch promoted the administration’s policy regarding stem cell research funding. The President’s Council on Bioethics produced a report exploring the arguments for and against the policy (as well as three reports on related issues, including cloning, assisted reproductive technologies and alternative sources of pluripotent cells). The FDA issued guidance documents and sent letters to interested parties, including government officials, giving assurances that the agency foresaw no difficulties and was well prepared to administer the approval process of any therapeutic products that might emerge from research using the approved embryonic stem cell lines.

On 9 March 2009, President Obama rescinded all of President Bush's previous executive actions regarding funding for stem cell research, and affirmatively directed the NIH to fund all embryonic stem cell research that was 'responsible, scientifically worthy ... to the extent permitted by law'. He gave the NIH 120 days to provide more concrete guidelines. In July of that year, the NIH adopted a policy of federal funding for research involving cell lines derived from embryos originally conceived by IVF patients for reproductive purposes, but now no longer wanted for such purposes. The NIH guidelines restrict funding to these kinds of cell lines on the grounds that there is, as yet, no social consensus on the morality of creating embryos solely for the sake of research (either by IVF or somatic cell nuclear transfer, also known as human cloning). Additionally, the NIH guidelines forbid federal funding of research in which human embryonic stem cells are combined with non-human primate blastocysts, and research protocols in which human embryonic stem cells might contribute to the germline of nonhuman animals. The final version of the NIH guidelines explicitly articulates the animating principles for the policy: belief in the potential of the research to reveal knowledge about human development and perhaps regenerative therapies, and the embryo donor's right to informed consent. Neither President Obama nor the NIH guidelines have discussed the moral status of the human embryo.

Soon after the Obama Administration's policy was implemented, two scientists specializing in adult stem cell research challenged it in federal court. In *Sherley v Sebelius*, the plaintiff-scientists argued that the policy violated the Dickey Amendment's prohibition against federal funding 'for research in which embryos are created or destroyed' (*Sherley v Sebelius* 2009), and sought an injunction to (p. 304) prohibit the administrative agencies from implementing any action pursuant to the guidelines. The district court agreed, finding immaterial the distinction between research done on embryonic stem cell lines and research that directly involves the cells from embryos, and enjoined the NIH from implementing the new guidelines (*Sherley v Sebelius* 2010). On appeal, however, the DC Circuit determined that the NIH had reasonably interpreted the amendment and vacated the preliminary injunction (*Sherley v Sebelius* 2011). Therefore, while the Dickey Amendment continues to prohibit the US government from funding the direct act of creating or destroying embryos (through cloning), the law is understood to allow for federal funding for research on existing embryonic stem cell lines, which includes embryonic stem cells derived from human cloning.

Even without federal funding for certain types of embryonic stem cell experimentation, the possibility of financial gain and medical advancement from new technologies has led to private investment in such research and development. Embedded in these incentives is the possibility of IP right protections through the patent process. The Constitution empowers Congress to grant patents for certain technologies and inventions. Article I, Section 8, Clause 8 provides Congress the power to 'promote the progress of science and useful arts, by securing for limited time to authors and inventors the exclusive rights to their respective writings and discoveries'.

Out of this constitutional authority, Congress acted legislatively and established the Patent Act of 1790, creating a regulatory system to promote the innovation and commercialization of new technologies. To qualify for patentability, the claimed invention must, in part, comprise patentable subject matter. Cellular product that occurs in nature, which is subject to discovery rather than invention, is not considered patentable subject matter. But biological product that results from human input or manipulation may be patentable; inventors may create a valid claim in a process that does not naturally occur. For example, patents have been issued for biotechnologies that involve specific procedures for isolating and purifying human embryonic stem cells, and patents have been granted for embryonic stem cells derived through cloning (Thomson 1998: 1145). The federal government, however, may limit the availability of these patent rights for particular public policy purposes, including ethical judgments about the nature of such technologies.

In an effort to strengthen the patent system, Congress passed the America Invents Act 2011, and directly addressed the issue of patenting human organisms. Section 33(a) of the Act dictates that ‘no patent may issue on a claim directed to or encompassing a human organism’ (also known as the Weldon Amendment). Intended to restrict the use of certain biomedical technologies and prohibit the patenting of human embryos, the amendment demonstrates that federal influence and regulation of embryonic stem cell research is exerted through the grant or denial of patents for biotechnological developments that result from such research.⁶

(p. 305) Although federal policy sets out ethical conditions on those practices to which it provides financial assistance, it leaves state governments free to affirm or reject the policy within their own borders. States are provided constitutional space to act in permitting or limiting embryonic stem cell research. According to the Constitution’s Tenth Amendment, the ‘power not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people’. Traditionally, states retain the power to regulate matters that concern the general welfare of their citizens. Some states ban or restrict embryonic stem cell research, while other states, such as California, have expressly endorsed and funded such research, including funding embryonic stem cell research and cloning that is otherwise ineligible for federal funds (Fossett 2009: 529). California has allocated \$3 billion in bonds to fund stem cell research, specifically permitting research on stem cells derived from cloned embryos and creating a committee to establish regulatory oversight and policies regarding IP rights. And California is not alone in its endorsement of cloning-for-biomedical research. New Jersey has similarly permitted and funded research involving the derivation and use of stem cells obtained from somatic cell nuclear transfer.

State funding and regulation, however, which runs counter to federal policy, is not without risks. Congress has the constitutional authority to exert regulatory influence over states through a conditional funding scheme. By limiting the availability of federal funds to those states that follow federal policy on stem cell research—such as prohibiting the creation and destruction of embryos for research—Congress can effectively force state compliance, even in areas where Congress might not otherwise be able to regulate. For

example, as a condition of receiving Medicare funds, the federal government may impose regulations on a variety of medical and scientific activities.

This section has demonstrated that the Constitution shapes federal and state oversight of embryonic stem cell research in a variety of ways, mostly through indirect regulatory control. Federal regulation of embryonic stem cell research, in particular, involves all three branches of government. The tensions between these branches of government in regulating the use of stem cells reflects the division among the American public on the question of the moral status of human embryos. This state of affairs not only encourages critical reflection on the scientific and ethical means and ends of such research, but it also serves to promote industry standards and practices. While presidential executive orders have shaped much of the federal policy on embryonic stem cell research, federal regulation of innovation through the patent system functions to condone and restrict certain types of biotechnologies. Judicial power also serves to countenance administrative action, interpreting and applying the law in ways that shape the regulatory regime. Regulation of embryonic stem cell research also reflects the jurisdictional nexus between the federal and state governments as demarcated in the Constitution. State regulation not only supplants (p. 306) the gaps that exist in federal funding and oversight, but also expresses local preferences and ethical judgments.

4. Human Cloning

Cloning—the use of somatic cell nuclear transfer to produce a cloned human embryo—is closely tied to embryonic stem cell research. As will be discussed, American regulation of human cloning reflects the same federal patchwork as embryo research, but because of its connection to human reproduction (as one of the applications of somatic cell nuclear transfer could be the gestation and birth of live cloned baby), any regulatory scheme will implicate the issue of whether and to what extent the US Constitution protects procreative liberty for individuals. Such constitutional protection can work to limit federal and state action, as potential regulations may implicate the unique constitutional protections afforded to reproductive rights. Accordingly, human cloning provides an interesting window into how the US Constitution shapes the governance of biotechnology.

Somatic cell nuclear transfer entails removing the nucleus (or genetic material) from an egg and replacing it with the nucleus from a somatic cell (a regular body cell, such as a skin cell, which provides a full complement of chromosomes) (Forsythe 1998: 481). The egg is then stimulated and, if successful, begins dividing as a new organism at the earliest, embryonic stage. The result is a new living human embryo that is genetically identical to the person from whom the somatic cell was retrieved. The cloned human embryo, produced solely for eventual disaggregation of its parts, is then destroyed at the blastocyst stage, five to seven days after its creation, to derive stem cells for research purposes (so called ‘therapeutic cloning’).⁷ One of the medical possibilities most commonly cited as justification for pursuing embryo cloning is the potential for patient-specific embryonic stem cells that can be used in cell-replacement therapies, tissue transplantation, and

gene therapy—potentially mitigating the likelihood of immune responses and rejection post-implantation. Researchers in regenerative therapy contend that cloning-for-biomedical-research facilitates the study of particular diseases and provides stem cells that more faithfully and efficiently mimic human physiology (Robertson 1999: 611).

The ethical goods at stake in cloning for biomedical research, however, involve the respect owed human life at all its development stages. Such cloning necessitates the creation of human embryos to serve as raw materials for biomedical research, despite the availability of alternative methods for deriving stem cells (including patient-specific cells, as in iPS research). Cloning-for-biomedical-research is also (p. 307) profoundly close to cloning to produce children; indeed, the only difference is the extent to which the embryo is allowed to develop, and what is done with it.

In the context of the American constitutional system, human cloning is not an obvious federal concern. Federal efforts to restrict human cloning, whether for biomedical research or to produce children, have been largely unsuccessful—despite repeated congressional attempts to restrict the practice in different ways (Keiper 2015: 74–201). No federal law prohibits human cloning. Similar to federal regulation of embryonic stem cell research, federal influence is predominantly exerted through funding, conditioning receipt of federal funds upon compliance with federal statutory directives. For example, Congress could require that the Department of Health and Human Services (HHS) refuse funding through the National Institutes of Health for biomedical research projects in states where cloning is being practiced or where cloning or other forms of embryo-destruction research have not been expressly prohibited by law (Keiper 2015: 83).⁸ In addition to the Spending Clause, other constitutional provisions offer potential avenues for federal oversight (Forsythe 1998; Burt 2009).

Article I of the Constitution empowers Congress to regulate interstate commerce (US Const art I, § 8, cls 1, 3). This broad enumerated power has been interpreted expansively by the United States Supreme Court to allow for regulation of the ‘channels’ and ‘instrumentalities’ of interstate commerce, as well as ‘activities that substantially affect interstate commerce’ (*United States v Lopez* 1995: 558–59). An activity is understood to ‘substantially’ affect interstate commerce if it is economic in nature and is associated with interstate commerce through a causal chain that is not attenuated (*United States v Morrison* 2000). Human cloning, both for research and producing children, qualifies as an economic activity that substantially affects interstate commerce and any regulation would presumptively be a valid exercise of Congress’ commerce power.⁹ Cloning-to-produce-children would involve commercial transactions with clients. Cloning-for-biomedical research involves funding and licensing. Both forms of human cloning presumably draw scientists and doctors from an interstate market, involve purchases of equipment and supplies from out-of-state vendors, and provide services to patients across state lines (Human Cloning Prohibition Act 2002; Lawton 1999: 328). A federal ban on human cloning, drafted pursuant to congressional authority under the Commerce Clause, undoubtedly regulates an activity with significant commercial and economic ramifications.¹⁰

Nationwide prohibition or regulation of cloning in the private sector likely passes constitutional muster under the Commerce Clause.

There may be those who would argue that restricting cloning to produce children implicates the same constitutionally protected liberty interests (implicit in the Fifth and Fourteenth Amendments' guarantee of Due Process) that the Supreme Court has relied upon to strike down bans against the sale of contraceptives, abortion, and other intimate matters related to procreation, but this is not a mainstream jurisprudential view that would likely persuade a majority of current Supreme Court Justices. (p. 308) This argument, however, illustrates how individual constitutional rights (enumerated and un-enumerated) also play a potential role in the regulation of biotechnology.

As an alternative means of federal regulation, Congress could also consider exerting greater legislative influence over the collection of human ova needed for cloning research. Federal law prohibits the buying and selling of human organs (The Public Health and Welfare 2010). This restriction, however, does not apply to bodily materials, such as blood, sperm, and eggs. IVF clinics typically compensate \$US5000 per cycle for egg donation. Federal law mandates informed consent and other procedural conditions, but federal regulation that tightens restrictions on egg procurement could be justified because of the potential for abuse, the risks it poses to women, and the ethical concerns raised by the commercialization of reproductive tissue.

Given federal inertia in proscribing cloning in any way, a number of states have enacted laws directly prohibiting or expressly permitting different forms of cloning. Seven states ban all forms of human cloning, while ten states prohibit not the creation of cloned embryos, but the implantation of a cloned embryo in a woman's uterus (Keiper 2015: 80). California and Connecticut, for example, proscribe cloning for the purpose of initiating a pregnancy, but protect and fund cloning-for-biomedical research. Other states' laws indirectly address human cloning, either by providing or prohibiting funding for cloning research, or by enacting conscience-protections for healthcare professions that object to human embryo cloning. Louisiana law includes 'human embryo cloning' among the health care services that 'no person shall be required to participate in'. And the Missouri constitution prohibits the purchase or sale of human blastocysts or eggs for stem cell research, burdening cloning-for-biomedical research. Currently, more than half of the fifty states have no laws addressing cloning (Keiper 2015: 80). Oregon, where stem cells were first produced from cloned human embryos, has no laws restricting, explicitly permitting, or funding human cloning (Keiper 2015: 80).

The lack of a comprehensive national policy concerning cloning sets the United States apart from many other countries that have banned all forms of human cloning (The Threat of Human Cloning 2015: 77). Despite the lack of a national prohibition on human cloning, the Constitution offers the federal government some jurisdictional avenues to regulate this ethically fraught biomedical technology. Federal inaction here is not a consequence of deficiency in the existing constitutional and legal concepts—the broad power of Congress to regulate interstate commerce is likely a sufficient constitutional justification.

The lack of federal legislation restricting the practice of human cloning is more significantly a consequence of disagreement of the form and content of regulation.

States are also granted constitutional authority to act in relation to human cloning. Given the dearth of federal involvement in cloning, states have enacted a variety of legislation to regulate the practice. These efforts, however, have created a (p. 309) patchwork of regulation. While federal law primarily addresses funding of research and other practices indirectly connected to cloning, states have passed laws that either directly prohibit or expressly permit different forms of cloning. This divergent state action results, in part, from responsiveness to different value judgments and ethical preferences, and serves to demonstrate the constitutional space created for such localized governance.

5. Assisted Reproductive Technologies

Assisted reproductive technologies (ART) largely exist in a regulatory void. But the political pressures surrounding embryonic stem cell research and human cloning have enhanced public scrutiny of this related technology and led to calls for regulation. Technological developments in ART may have outpaced current laws, but the American constitutional framework offers a number of tools for prospective regulation, including oversight of ART clinics and practitioners. This regulatory context also highlights the unique opportunities and consequences resulting from the decentralized federalist system. Regulation of the assisted reproduction industry exposes the challenges that arise when federal and state governments are confronted with a technology that itself is difficult to characterize. ART is both a big business, as well as a fertility process, that implicates the reproduction decisions of adults, the interests of children, and the moral status of embryos.

In its most basic form, assisted reproduction involves the following steps: the collection and preparation of gametes (sperm and egg), fertilization, transfer of an embryo or multiple embryos to a woman's uterus, pregnancy, and delivery (The President's Council on Bioethics 2004: 23). The primary goals of reproductive technologies are the relief (or perhaps circumvention) of infertility, and the prevention and treatment of heritable diseases (often by screening and eliminating potentially affected offspring at the embryonic stage of development). Patients may choose to use assisted reproduction to avoid the birth of a child affected by genetic abnormalities, to eliminate risky pregnancies, or to freeze fetal tissue until a more convenient time for childrearing. Cryopreservation of embryos—a sophisticated freezing process that in the main safely preserves the embryos—has become an integral part of reproduction technology, both because it allows additional control over the timing of embryo transfer and because, in many cases, not all embryos are transferred in each ART cycle. Unused embryos may remain in cryostorage, eventually being implanted, donated to another person or to research, or thawed and destroyed (The President's Council on Bioethics 2004: 34).

(p. 310) Despite the goods of assisted reproduction, its practice raises a variety of ethical concerns, including patient vulnerability (both gamete donors and prospective parents), the risks of experimental procedures, the use and disposition of human embryos, and the

criteria for genetic screening and selection (allowing individuals to control the *kinds* of children they have). These concerns have, in part, animated the current regulatory regime, and offer incentives to further pursue governmental regulation.

The federal statute that directly regulates assisted reproduction is the Fertility Clinic Success Rate and Certification Act of 1992. The Act requires fertility clinics to report treatment success rates to the Centers for Disease Control and Prevention (CDC), which publishes this data annually. It also provides standards for laboratories and professionals performing ART services (Levine 2009: 562). This model certification programme for embryo laboratories is designed as a resource for states interested in developing their own programs, and thus its adoption is entirely voluntary (The President's Council on Bioethics 2004: 50).

Additional federal oversight is indirect and incidental, and does not explicitly regulate the practice of assisted reproduction. Instead, it provides regulation of the relevant products used. For example, the Food and Drug Administration (FDA) is a federal agency that regulates drugs, devices, and biologics that are marketed in the United States. It exercises regulatory authority as a product of congressional jurisdiction under the interstate commerce clause, and is principally concerned with the safety and efficacy of products and public health. Through its power to prevent the spread of communicable diseases, the FDA exercises jurisdiction over facilities donating, processing, or storing sperm, ova, and embryos. Products used in ART that meet the statutory definitions of drugs, devices, and biologics must satisfy relevant FDA requirements. Once approved, however, the FDA surrenders much of its regulatory control. The clinicians who practice IVF are understood to be engaged in the practice of medicine, which has long been regarded as the purview of the states and beyond the FDA's regulatory reach.

One explanation for the slow development of ART regulation is that many view the practice, ethically and constitutionally, through the prism of the abortion debate (Korobkin 2007: 184). The Due Process Clause of the Fourteenth Amendment has been held to protect certain fundamental rights, including rights related to marriage and family.¹¹ The Court has reasoned that '[i]f the right to privacy means anything, it is the right of the individual ... to be free from unwarranted governmental intrusion into matters so fundamentally affecting a person as the decision whether to bear or beget a child' (*Eisenstadt v Baird* 1972: 453). The Supreme Court has never directly classified IVF as a fundamental right, yet embedded in the technology of assisted reproduction are similarly intimate and private decisions related to procreation, family, reproductive autonomy, and individual conscience. The right to reproductive freedom, however, is not absolute, and the Court has recognized that (p. 311) it may, in some instances, be overridden by other government interests, such as the preservation of fetal life, the protection of maternal health, the preservation of the integrity of the medical profession, or even the prevention of the coarsening of society's moral sensibilities. In the context of ART, regulation focuses on the effectiveness of the procedure, the health of the woman and child, and the ethical treatment of the embryo.

These kinds of governmental interests—which the Court has held to justify interference with individuals’ reproductive rights—fall squarely within the broad police powers of the states. Moreover, under the police power of states, the regulation of medical and scientific discovery falls within the traditional confines of the state’s regulatory authority. Assisted reproduction has become part of the practice of medicine, which is principally regulated at the state level through state licensing and certification of physicians, rather than by reference to specific legislative proscriptions. In the medical context, applicable also to the practice of assisted reproduction, state statutory standards mandate that patients provide informed consent to medical treatments and procedures, and that practitioners operate under designated licensing, disciplinary, and credentialing schemes. State regulation is also focused on ensuring access to fertility services (for example, insurance coverage of IVF), defining parental rights and obligations, and protecting embryonic human life. Florida, for example, prohibits the sale of embryos, and mandates agreements to provide for the disposition of embryos in the event of death or divorce (Bennett Moses 2005: 537). But a consequence of this state-level system is that clinics, practitioners, and researchers can engage in forum shopping, seeking states with less restrictive laws in order to pursue more novel and perhaps questionable procedures.

Aside from regulation through positive law, assisted reproduction (like the field of medicine more generally) is governed by operation of the law of torts—more specifically, the law of medical malpractice. And like the field of medicine generally, assisted reproduction is governed largely by private self-regulation, according to the standards of relevant professional societies (for example, the American Society for Reproductive Medicine), which focus primarily on the goods of safety, efficacy, and privacy of the parents involved.

In the context of assisted reproduction, the regulatory mechanisms empowered by the federal Constitution serve as a floor rather than a ceiling. Traditional state authority to regulate for health, safety, and welfare, specifically in the practice of medicine, offers the primary regime of governance for this biotechnology, including the medical malpractice legal regime in place across the various states. Because state regulation predominates, the resulting regulatory landscape is varied. This diversity enables states to compare best practices, but it also enables practitioners and researchers that wish to pursue more controversial technologies to seek out states that have less comprehensive regulatory schemes.

(p. 312) 6. Reflection and Conclusion

The foregoing discussion of the governance of embryo research, human cloning, and assisted reproduction shows that the US Constitution plays a critical role in shaping the regulation of technology through the federalist system of government that divides and diffuses powers among various branches of US government and the several states. The most notable practical consequence of this arrangement is the patchwork-like regulatory landscape. The Constitution endows the federal government with discrete authority. Congress, the Executive Branch (along with its vast administrative state), and the Judiciary

lack general regulatory authority, and are limited by their constitutional grants of power. Although the Spending Clause and the expansive authority of the Commerce Clause have allowed Congress to enhance its regulatory powers, federalism principles continue, in part, to drive US regulatory oversight of biotechnologies. States serve as laboratories of democracy, tasked with experimenting, through a variety of policy initiatives, to arrive at certain best practices that balance competing needs and interests. State regulation locates policy-making closer to the ground and takes advantage of the fewer legal, structural, and political constraints. State experimentalism empowers those closest to the technologies to recognize problems, generate information, and fashion regulation that touches on both means and ends.

The United States constitutional system not only decentralizes power, but it also creates a form of governance that allows for diverse approaches to the normative questions involved. There is a deep divide within the American polity on the question of what is owed to human embryos as a matter of basic justice. Federalism—and the resulting fragmented and often indirect character of regulation—means that different sovereigns within the US (and indeed different branches of the federal government itself) can adopt laws and policies that reflect their own distinctive positions on the core human questions implicated by biotechnologies concerning the beginnings of human life, reproductive autonomy, human dignity, the meaning of children and family, and the common good. In one sense, this flexible and decentralized approach is well suited to a geographically sprawling, diverse nation such as the United States.

On the other hand, the questions at issue in this sphere of biotechnology and biomedicine are vexed questions about the boundaries of the moral and legal community. Who counts as a member of the human family? Whose good counts as part of the common good? The stakes could not be higher. Individuals counted among the community of ‘persons’ enjoy moral concern, the basic protections of the law, and fundamental human rights. Those who fall outside this protected class can be created, used, and destroyed as any raw research materials might for the (p. 313) benefits of others. Should the question of how to reconcile the interests of living human beings at the embryonic stage of development with those of the scientific community, patients hoping for cures, or people seeking assistance in reproduction, be subject to as many answers as there are states in America? Despite its federalist structure, the United States (unlike Europe) is one unified nation with a shared identity, history, and anchoring principles. The question of the boundaries of the moral and legal community goes to the root of the American project—namely, a nation founded on freedom and equal justice under law. A diversity of legal answers to the question of ‘Who counts as one of us?’ could cause fractures in the American polity. Having said that, the imposition of one answer to this question by the US Supreme Court in the abortion context (namely, that the Constitution prevents the legal protection of the unborn from abortion in most cases),¹² has done great harm to American politics—inflicting Presidential and even US Senatorial elections with acrimony that is nearly paralysing.

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These are difficult and complex questions deserving of further reflection, but beyond the scope of the current inquiry. Suffice it to say that the American system of regulation for technology, in all its complexity, wisdom, and shortcomings, is a direct artefact of the unique structural provisions of the US Constitution, and the federalist government they create.

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Notes:

(1.) See, for example, Telecommunications Act, Food Drug and Cosmetic Act, Clean Water Act, Clean Air Act, Energy Policy and Conservation Act, Federal Aviation Administration Modernization and Reform Act, Farm Bill, and the Patent and Trademark Act.

(2.) For a general overview of the developmental trajectory of embryos, see The President's Council on Bioethics, *Monitoring Stem Cell Research* (2004) <<https://bioethicsarchive.georgetown.edu/pcbe/reports/stemcell/>> accessed 8 June 2016.

(3.) Recent work with induced pluripotent stem cells suggests that non-embryonic sources of pluripotent stem cells may one day obviate the need for embryonic stem cells. In November 2007, researchers discovered how to create cells that behave like embryonic stem cells by adding gene transcription factors to an adult skin cells. This technique converts routine body cells, or somatic cells, into pluripotent stem cells. These reprogrammed somatic cells, referred to as induced pluripotent stem cells, appear to have a non-differentiation and plasticity similar to embryonic stem cells. See Kazutoshi Takahashi and others, 'Induction of Pluripotent Stem Cells from Adult Human Fibroblasts by Defined Factors' (2007) 131 Cell 861, 861.

(4.) This discussion of federal research funding for embryonic stem cells originally appeared in Snead 2010: 1545-1553.

(5.) The language of the Amendment forbade federal funding for: 'the creation of a human embryo or embryos for research purposes; or [for] research in which a human embryo or embryos are destroyed, discarded, or knowingly subjected to risk of injury or death greater than that allowed for research on fetuses in utero [under the relevant human subjects protection regulations]', Balanced Budget Downpayment Act (1996) Pub L No 104-99, § 128.

(6.) Notably, a recent ruling from the United States Court of Appeals for the DC Circuit suggests that specific cloned animals may not be patentable. The court ruled that the genetic identity of Dolly, the infamous cloned sheep, to her donor parents rendered her unpatentable; the cloned sheep was not 'markedly different' from other sheep in nature. The

court did find, however, that the method used to clone Dolly was legitimately patented. In *re Roslin Institute (Edinburgh)* (2014) 750 F3d 1333; see also *Consumer Watchdog v Wisconsin Alumni Research Foundation* (2014) 753 F3d 1258, 1261.

(7.) The phrase ‘therapeutic cloning’ is used in contrast to ‘reproductive cloning’—the latter refers to the theoretical possibility that a cloned human embryo could be implanted in a uterus and allowed to develop into a child—even as both result in the creation of human embryos. Both terms are problematic, and it is more accurate to refer to these techniques, respectively, as ‘cloning for biomedical research’ and ‘cloning to produce children’, as these expressions better capture the realities of the science at present, and the objectives of the relevant actors involved.

(8.) But see *Nat’l Fed of Indep Bus v Sebelius* (2012) 132 S Ct 2566, 2602.

(9.) The Food and Drug Administration (FDA) has stated that attempts to clone humans would come within its jurisdictional authority, grounded in the power of the federal government to regulate interstate commerce, but this assertion of regulatory authority has neither been invoked in practice nor tested. The FDA has never attempted to regulate human cloning. See Gregory Rokosz, ‘Human Cloning: Is the Reach of FDA Authority too Far a Stretch’ (2000) 30 Seton Hall L Rev 464.

(10.) There is relevant, analogous precedent under the commerce clause for finding that reproductive health facilities are engaged in interstate commerce. The Partial-Birth Abortion Ban Act of 2003, signed into law by President Bush, bans the use of partial-birth abortions except when necessary to save the life of the mother. Specifically, section 1531(a) provides that: ‘Any physician who, in or affecting interstate or foreign commerce, knowingly performs a partial-birth abortion, and thereby kills a human fetus shall be fined under this title or imprisoned not more than 2 years, or both’, 18 USC § 1531(a). See also *Gonzales v Carhart* (2007) 550 US 124.

(11.) See *Planned Parenthood of Southeastern Pa v Casey* (1992) 505 US 833, 846–854; *Roe v Wade* (1973) 410 US 113, 152; *Griswold v Connecticut* (1965) 381 US 479, 483.

(12.) This is the result of both the Supreme Court’s ‘substantive due process’ jurisprudence and *Roe v Wade*’s (and its companion case of *Doe v Bolton*’s) requirement that any limit on abortion include a ‘health exception’ that has been defined so broadly as to encompass any aspect of a woman’s well-being (including economic and familial concerns), as determined by the abortion provider. As a practical matter, the legal regime for abortion has mandated that the procedure be available throughout pregnancy—up to the moment of childbirth—whenever a pregnant woman persuades an abortion provider that the abortion is in her interest. There have been certain ancillary limits on abortion permitted by the Supreme Court (e.g. waiting periods, parental involvement, informed consent laws, and restrictions on certain particularly controversial late term abortion procedures), but no limits on abortion as such.

Technology and the American Constitution

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Contract Law and the Challenges of Computer Technology

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Abstract and Keywords

Many aspects of contract law, developed before the age of computer technology, require re-evaluation in the twenty-first century. The following matters will be considered: the postal acceptance rule in the digital age; e-mail messages, in particular whether a name or initial typed in the message constitutes a 'signature' for all purposes, and whether the sender's name in the address does so; clicking on a box on a computer screen as manifestation of assent, and whether it satisfies express statutory or contractual requirements of 'signature'; sealed instruments in the computer age; use of a website as manifestation of assent ('browse-wrap' so-called); and, more generally, problems of standard form contracts, consumer protection, and unfair terms, exacerbated (I would argue), though not originated, by computer technology. Illustrations are drawn both from English and from Canadian law.

Keywords: contract law, standard form, boilerplate, unconscionability, electronic contracts, consumer protection

1. Introduction

THIS chapter addresses some issues that have arisen in Anglo-Canadian law from the use of electronic technology in the making of contracts. The first part of the chapter deals with particular questions relating to contract formation, including the time of contract formation, and requirements of writing and signature. The second part addresses the more general question of the extent of the court's power to set aside or to modify contracts for reasons related to unfairness, or unreasonableness. In one sense these questions are not new to the electronic age, for they may arise, and have arisen, in relation to oral agreements and to agreements evidenced by paper documents, but, for several reasons, as will be suggested, problems of unfairness have been exacerbated by the use of electronic contracting. This chapter focuses on the impact of computer technology on contract formation and enforceability.

(p. 318) **2. The Postal Acceptance Rule in the Twenty-First Century**

Changes in methods of communication may require changes in the rules relating to contract formation. Where contractual negotiations are conducted by correspondence by parties at a distance from each other, difficulties arise in ascertaining the moment of contract formation. A rule developed in the nineteenth century established that, in English and in Anglo-Canadian law, a mailed acceptance was effective at the time of mailing. This rule had the effect of protecting the offeree against revocation of the offer during the time that the message of acceptance was in the post. The rule, which was extended to telegrams, also had the effect of protecting the offeree where the message of acceptance was lost or delayed. The question addressed here is whether the postal acceptance rule applies to modern electronic communications. An examination of the nineteenth-century cases shows that the rule was then developed because it was thought to be necessary in order to protect an important commercial interest, for reasons both of justice to the offeree, and of public policy. It will be suggested that, in the twenty-first century, these purposes can be achieved by other means, and that the postal acceptance rule is no longer needed.

A theory of contract law based on will, or on mutual assent, was influential in nineteenth-century England, due in large part to Pothier's treatise on Obligations, published in translation in England in 1806 (Pothier 1806). If mutual assent were strictly required, it would seem that, in case of acceptance by mail, the acceptance was not effective until it reached the offeror. This conclusion would leave an offeree, the nature of whose business required immediate reliance, vulnerable to the risk of receiving notice of revocation while the message of acceptance was in transit. From early in the century a rule was devised to protect the interest of the offeree (*Adams v Lindsell* 1818). The rule was confirmed by the House of Lords in a Scottish case of 1848, where Lord Cottenham LC said that '[c]ommon sense tells us that transactions cannot go on without such a rule' (*Dunlop v Higgins* 1848). Later cases made it clear that the chief reason for the rule was to protect the reliance of the offeree, even where it did not correspond with the intention of the offeror, enabling the offeree, as one case put it, to go 'that instant into the market' to make sub-contracts in firm reliance on the effectiveness of the mailed acceptance (*Re Imperial Land Co; Harris's Case* 1872: 594). The reason for the rule ('an exception to the general principle') was 'commercial expediency' (*Brinkibon v Stahag Stahl GmbH* 1983: 48 per Lord Brandon). In *Byrne v van Tienhoven* (1880), Lindley J made it clear that protection of the offeree's reliance lay behind both the rule requiring communication of revocation, and the rule that acceptances were effective on mailing:

(p. 319)

Before leaving this part of the case it may be as well to point out the extreme injustice and inconvenience which any other conclusion would produce. If the defendants' contention were to prevail, no person who had received an offer by post

and had accepted it would know his position until he had waited such a time as to be quite sure that a letter withdrawing the offer had not been posted before his acceptance of it.

He added that:

It appears to me that both legal principles, and practical convenience require that a person who has accepted an offer not known to him to have been revoked, shall be in a position safely to act upon the footing that the offer and acceptance constitute a contract binding on both parties

(*Byrne & Co v Leon van Tienhoven & Co* 1880: 348).

The references to ‘extreme injustice and inconvenience’, and the conjunction of ‘legal principles and practical convenience’ show that principle was, in Lindley’s mind, inseparable both from general considerations of justice between the parties and from considerations of public interest.

Frederick Pollock, one of the most important of the nineteenth-century treatise writers, strongly influenced at the time of his first edition by the ‘will’ theory of contract, thought that the postal acceptance rule was contrary to what he called ‘the main principle ... that a contract is constituted by the acceptance of a proposal’ (Pollock 1876: 8). In that edition he said that the rule had consequences that were ‘against all reason and convenience’ (Pollock 1876: 11). In his third edition, after the rule had been confirmed by a decision of the Court of Appeal (*Household Fire v Grant* 1879), Pollock retreated, reluctantly accepting the decision: ‘the result must be taken, we think, as final’ (Pollock 1881: 36).

Pollock eventually came to support the rule on the basis that a clear rule one way or the other was preferable to uncertainty (Pollock 1921: vii–viii), and Sir Guenter Treitel has said that ‘The rule is in truth an arbitrary one, little better or worse than its competitors’ (Treitel 2003: 25). But, historically, as the cases just discussed indicate, the rule was devised for an identifiable commercial purpose, that is, to protect what were thought to be the legitimate interests of the offeree.

Turning to instantaneous communications, we may note the decision of the English Court of Appeal in *Entores (Entores Ltd v Miles Far East Corp)* 1955), a case concerned not with attempted revocation by the offeror, but with a question of conflict of laws: an acceptance was sent by telex from Amsterdam to London, and the issue was *where* the contract was made, a point relevant to the jurisdiction of the English court. Denning LJ said that the contract was not complete until received, drawing an analogy with the telephone, but his reasoning depended on his assumption (dubious, as a matter of fact, even at the time) that the telex was used as a two-way means of communication, and he supposed that the offeree would have immediate reason to know of any failure of communication, as with the telephone, because ‘people usually say something to signify the end of the conversation’. Attention to this reasoning, therefore, leaves room for the argument that, if (as was (p. 320) more usual) the telex was used as a one-way means of communication, like a

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telegram, there was no reason why the postal acceptance rule should not apply, since it was possible for the message to be lost or delayed, and for the offeree's reasonable reliance to be defeated. In a later case, this possibility was recognized by Lord Wilberforce in the House of Lords:

The general principle of law applicable to the formation of a contract by offer and acceptance is that the acceptance of the offer by the offeree must be notified to the offeror before a contract can be regarded as concluded... The cases on acceptance by letter and telegram constitute an exception to the general principle of the law of contract as stated above. The reason for the exception is commercial expediency... That reason of commercial expediency applies to cases where there is bound to be a substantial interval between the time when an acceptance is sent and the time when it is received. In such cases the exception to the general rule is more convenient, and makes on the whole for greater fairness, than the general rule itself would do. In my opinion, however, that reason of commercial expediency does not have any application when the means of communication employed is instantaneous in nature, as is the case when either the telephone or telex is used.

But Lord Wilberforce went on to point out that the telex could be used in various ways, some of which were more analogous to the telegram than to the telephone, adding that:

No universal rule can cover all such cases; they must be resolved by reference to the intentions of the parties, by sound business practice, and in some cases by a judgment where the risks should lie (

Brinkibon v Stahag Stahl GmbH 1983: 42).

In the Ontario case of *Eastern Power* the Ontario Court of Appeal held that a fax message of acceptance completed the contract only on receipt, but it should be noted that the issue was *where* the contract was made, for purposes of determining the jurisdiction of the Ontario court; there was no failure of communication (*Eastern Power Ltd v Azienda Comundale Energia & Ambiente* 1999).

It could, therefore, be argued that, in the case of an e-mail message of acceptance, the postal acceptance rule still applies, so that, in case of failure of the message, reliance by the offeree could be protected. This conclusion was rejected by the English High Court (*Thomas v BPE* 2010: [86]), but has been supported on the ground that it would 'create factual and legal certainty and ... thereby allow contracts to be easily formed where the parties are at a distance from one another' (Watnick 2004: 203).

The Ontario Electronic Commerce Act provides that

Electronic information or an electronic document is presumed to be received by the addressee ... if the addressee has designated or uses an information system for the purpose of receiving information or documents of the type sent, when it en-

ters that information system and becomes capable of being retrieved and processed by the addressee

(Electronic Commerce Act: s 22(3)).

(p. 321) This provision would probably not apply to a case where the transmission of the message failed, because it could not in that case be said that the message became 'capable of being retrieved and processed by the addressee'. In *Coco Paving* where the contract provided that a 'bid must be received by the MTO servers' before a deadline, it was held that sending a bid electronically did not amount to receipt (*Coco Paving (1990) Inc v Ontario (Transportation)* 2009).

The various modern statements to the effect that instantaneous communications are only effective on receipt, though, as we have seen, not absolutely conclusive, seem likely to support the conclusion that the postal acceptance rule is obsolete in the twenty-first century. A trader who needs 'to go that instant into the market' can ask for confirmation of receipt of the message of acceptance. It might possibly be objected that a one-way confirmation (for example an e-mail message) would leave the moment of contract formation uncertain, since the offeror, on being asked for confirmation, would be unsure whether the offeree intended to proceed with the transaction until he or she knew that the confirmation had been received. But this spectre of an infinite regress seems unlikely to cause problems in practice: the offeror, having sent a confirmation, actually received and relied on by the offeree, would scarcely be in a position to deny the existence of the contract. If it were essential for both parties to know at the same instant that each was bound, a two-way means of communication, such as the telephone, or video-link, could be used for confirmation.

3. Assent by Electronic Communication

Let us turn now to the impact of technology on formal requirements. With certain exceptions, formalities are not required in Anglo-Canadian law for contract formation. Offer and acceptance, therefore, may generally be manifested by any means, including electronic communication. The Ontario Electronic Commerce Act confirms this:

19(1) An offer, the acceptance of an offer or any other matter that is material to the formation or operation of a contract may be expressed,

- (a) by means of electronic information or an electronic document; or
- (b) by an act that is intended to result in electronic communication, such as,
 - (i) touching or clicking on an appropriate icon or other place on a computer screen, or
 - (ii) speaking

(p. 322) The Ontario Act contains a quite elaborate provision, which appears to allow for rescission of a contract for errors in communications by an individual to an electronic agent (defined to mean ‘a computer program or any other electronic means used to initiate an act or to respond to electronic documents or acts, in whole or in part, without review by an individual at the time of the response or act’):

21 An electronic transaction between an individual and another person’s electronic agent is not enforceable by the other person if,

- (a) the individual makes a material error in electronic information or an electronic document used in the transaction;
- (b) the electronic agent does not give the individual an opportunity to correct the error;
- (c) in becoming aware of the error, the individual promptly notifies the other person; and
- (d) in a case where consideration is received as a result of the error, the individual,
 - (i) returns or destroys the consideration in accordance with the other person’s instructions or, if there are no instructions, deals with the consideration in a reasonable manner, and
 - (ii) does not benefit materially by receiving the consideration.

Since the overall thrust of the statute is to facilitate and to enlarge the enforceability of electronic contracts, it is somewhat surprising to find in this context what appears to be a consumer protection provision, especially one that apparently provides a much wider defence for mistake than is part of the general law. It seems probable that the provision will be narrowly construed so as to be confined to demonstrable textual errors. The comment to the Uniform Electronic Commerce Act states that the provision is intended to protect users against accidental keystrokes and to encourage suppliers to include a check question (for example, ‘you have agreed x at \$y; is this correct?’) before finalizing a transaction (Uniform Law Conference of Canada 1999).

Some cases have held that assent may be inferred from mere use of a website, without any click on an ‘accept’ box (sometimes called ‘browse-wrap’). An example is the British Columbia case of *Century 21 Canada*, where continued use of a website was held to manifest assent to the terms of use posted at the bottom of the home page. In this case the defendant was a sophisticated user, using the information on the website for commercial purposes. The court expressly reserved questions of sufficiency of notice and reasonableness of the terms:

While courts may in the future face issues such as the reasonableness of the terms or the sufficiency of notice given to users or the issue of contractual terms exceeding copyright (or Parliament may choose to legislate on such matters), none of those issues arises in the present case for the following reasons:

- (p. 323) **i.** the defendants are sophisticated commercial entities that employ similar online Terms of Use themselves;
- ii.** the defendants had actual notice of Century 21 Canada's Terms of Use;
- iii.** the defendants concede the reasonableness of Century 21 Canada's Terms of Use, through their admissions on discovery and by their own use of similar Terms of Use

(*Century 21 Canada Ltd Partnership v Rogers Communications Inc 2011*: [120]).

The case falls short, therefore, of holding that a consumer user would be bound by mere use of the website, or that any user would be bound by unreasonable terms. It will be apparent from these instances that questions of contract formation cannot be entirely dissociated from questions of mistake and unfairness.

4. Writing

We turn now to consider writing requirements. Not uncommonly, statutes or regulations expressly require certain information to be conveyed in writing. The Electronic Commerce Act provides (s 5) that 'a legal requirement that a person provide information or a document in writing to another person is satisfied by the provision of the information or document in an electronic form,' but this provision is qualified by another provision (s 10(1)) that 'electronic information or an electronic document is not provided to a person if it is merely made available for access by the person, for example on a website'. In *Wright*, the court had to interpret provisions of the Ontario Consumer Protection Act (ss 5 and 22) requiring that certain information be provided to the consumer 'in writing' in a 'clear, comprehensible and prominent' manner in a document that 'shall be delivered to the consumer'... 'in a form in which it can be retained by the consumer'. These requirements had not been satisfied by the paper documents, and the question was whether the defendant could rely on the Electronic Commerce Act. The judge held that the Consumer Protection Act provisions prevailed:

In effect, UPS [the defendant] is suggesting that the very clear and focused disclosure requirements in the Consumer Protection Act are subject to and therefore weakened by the *Electronic Commerce Act*. I was provided with no authority to support this position. In my view, the *Electronic Commerce Act* does not alter the requirements of the *Consumer Protection Act*. This would be contrary to the direction that consumer protection legislation 'should be interpreted generously in favour of consumers'... In any event, I do not agree that the *Electronic Commerce*

Act assists UPS. Information about (p. 324) the brokerage service and the additional fee was 'merely made available' for access on the website.

Disclosure on the UPS website or from one of the other sources is not 'clear, comprehensible and prominent'. In effect, the information is hidden on the website. There is nothing in the waybill or the IPSO that alerts the standard service customer to the fact that a brokerage service will be performed and an additional fee charged or to go to the UPS website for information

(*Wright v United Parcel Service* 2011: [608]-[609]).

This conclusion seems justified. The requirement of writing in the Consumer Protection Act is designed to protect the interests of the consumer by drawing attention in a particular way to the contractual terms, and by providing an ample opportunity to consider both the existence of contractual terms and their content. A paper document will often serve this purpose more effectively than the posting of the terms on an electronic database, to which the consumer may or may not in fact secure access. In other contexts, however, where consumer protection is not in issue, and where there might be no reason to suppose that the legislature intended to require the actual use of paper, a different conclusion might be expected.

In respect of deeds, the Electronic Commerce Act provides that:

11 (6): The document shall be deemed to have been sealed if,

- (a) a legal requirement that the document be signed is satisfied in accordance with subsection (1), (3) or (4), as the case may be; and
- (b) the electronic document and electronic signature meet the prescribed seal equivalency requirements.

Power is given (s 32(d)) to prescribe seal equivalency requirements for the purpose of this subsection, but no regulations have been passed under the Act. From this omission it might possibly be argued that every electronic document is deemed to be under seal. This conclusion would have far-reaching and surprising consequences, and the more plausible interpretation is that the legislature intended that electronic documents should not take effect as deeds unless some additional formal requirements were met in order to serve the cautionary, as well as the evidentiary function of legal formalities. Since no such additional formalities have been prescribed, the conclusion would be that electronic documents cannot take effect as deeds.

In case of a contractual provision that certain material be submitted or presented 'in writing', it will be a matter of contractual interpretation whether an electronic document would suffice. Since it would be open to the contracting parties to specify expressly that a document should be supplied in paper form, it must also be open to them to agree to the same thing by implication and it will depend on the circumstances whether they have

done so, according to the usual principles of contractual interpretation. The Electronic Commerce Act provision would be relevant, but not, it is suggested, conclusive.

(p. 325) 5. Express Requirement of Signature

Where there is an express statutory requirement of signature, for example under consumer protection legislation, or under the Statute of Frauds, the question arises whether an email message constitutes a signature for the purpose of the relevant statute. It may be argued that any sort of reference to the sender's name at the end of an e-mail message constitutes a signature, or that the inclusion in the transmission of the sender's email address, even if not within the body of the message, is itself sufficient. In *J Pereira Fernandez SA v Mehta* (2006) it was held that the address was insufficient to satisfy the Statute of Frauds requirement of signature. The court observed that the address was 'incidental' to the substance of the message, and separated from its text. In the New Brunswick case of *Druet v Girouard* (2012), again involving the Statute of Frauds in the context of a sale of land, it was held that a name at the end of the message was also insufficient, on the ground that the parties would have contemplated the use of paper documents before a binding contracts arose. The decision thus turns on general contract formation rather than the particular requirement of signature.¹ In *Leoppky*, an Alberta court held that a name in an email message was sufficient (*Leoppky v Meston* 2008: [42]), and in *Golden Ocean Group* the English Court of Appeal held that a broker's name at the end of an email message satisfied the requirements of the Statute of Frauds in the case of a commercial guarantee (*Golden Ocean Group Ltd v Salgaocar Mining Industries Pvt Ltd* 2012).

Though there is historical support for the view that the original concern of the Statute of Frauds was evidential, rather than cautionary, in modern times the Statute has frequently been defended on the ground that it also performs a cautionary function, especially in relation to consumer guarantees.² If the ensuring of caution is recognised as a proper purpose of the statute it can be argued, with considerable force, that an email message should not be sufficient. It is notorious that email messages are often sent with little forethought, and signature to a paper document is clearly a more reliable (though not, of course, infallible) way of ensuring caution and deliberation on the part of the signer. This argument is even stronger where the purpose of legislation requiring signature is identifiable as consumer protection. If it is objected that this view would sometimes defeat reasonable expectations, the answer must be that this is always the price to be paid for legal formalities; if it is objected that it would be an impediment to commerce, an answer would be that a signed paper document may quite readily be scanned and transmitted electronically, or by fax. Where a contractual provision requires signature, it will, as with a requirement of writing, be a matter of interpretation whether signature on paper is required. In general, it may be concluded that the answer to the question whether or not a requirement of writing, or of signature, is satisfied by electronic communication must depend on the underlying purpose of the requirement.

6. Unreasonable Terms

This section turns to the relation of electronic technology to problems of unfairness, a topic that requires examination of the law relating to standard forms as it developed before the computer age, and then an assessment of the impact, if any, of computer technology. It is sometimes suggested that enforcement of electronic contracts presents no special problems, and that, when assent has been established, the terms are binding to their full extent. In one case the court said that ‘the agreement ... must be afforded the same sanctity that must be given to any agreement in writing’ (*Rudder v Microsoft Corp* 1999: [17]). This statement suggests two lines of thought: first, what defences are available, on grounds relating to unreasonableness, to any agreement, under general contract law; second, is it really true that electronic contracts should be treated in all respects in precisely the same way as contracts in writing? Perhaps a third might be whether ‘sanctity’ is an appropriate term at all, in this context, and in a secular age.

The leading case in Anglo-Canadian law on unsigned standard paper forms is *Parker v South Eastern Railway Co*. The issue was whether a customer depositing baggage at a railway station was bound by a term printed on the ticket limiting the railway’s liability to the sum of £10. It should be noted that this was by no means an unreasonable provision, since the sum would very greatly have exceeded the value of the baggage carried by most ordinary travellers. Frederick Pollock, counsel for the customer and himself the author of a leading treatise on contract law, argued presciently though unsuccessfully that, if the railway’s argument were to succeed, wholly unreasonable terms might be effectively inserted on printed tickets. One of the judges, Bramwell LJ, responded to Pollock’s argument by saying that ‘there is an implied understanding that there is no condition unreasonable to the knowledge of the party tendering the document and not insisting on its being read—no condition not relevant to the matter in hand’ (*Parker v South Eastern Railway Co* 1877: 428). This is a significant comment, especially as Bramwell went further than either of his judicial colleagues in favouring the railway.³ Even so, he did not contemplate the enforcement of wholly unreasonable terms.

In cases of standard form contracts (paper or electronic) there is usually a general assent to a transaction of a particular kind, and an assent to certain prominent terms (notably the price). But there is no real assent to every particular clause that may be included in the supplier’s form. Karl Llewellyn perhaps came closest to the reality in saying that the signer of a standard form gives ‘a blanket assent (not a specific assent) to any not *unreasonable or indecent* terms the seller may have on his form that do not alter or eviscerate the reasonable meaning of the dickered terms’ (Llewellyn 1960). Llewellyn was writing about paper forms, but his comment is even more apt in relation to electronic forms. In a modern English case, a term in an (p. 327) unsigned form was held to be impliedly incorporated in a contract for the hire of an earth moving machine.

There had only been two previous transactions between the parties, and Lord Denning MR based the result not on the course of past dealing, but on implied assent to the form on the current occasion:

I would not put it so much on the course of dealing, but rather on the common understanding which is to be derived from the conduct of the parties, namely, that the hiring was to be on the terms of the plaintiffs' usual conditions (

British Crane Hire Corp v Ipswich Plant Hire Ltd 1975: 311).

This approach implies that the hirer's assent is to reasonable terms only, and Sir Eric Sachs stressed that the terms in question were 'reasonable, and they are of a nature prevalent in the trade which normally contracts on the basis of such conditions' (*British Crane Hire Corp v Ipswich Plant Hire Ltd* 1975: 313).

The idea of controlling standard form terms for reasonableness was not widely taken up because it did not fit the prevailing thinking that made contractual obligation dependent on mutual agreement or on the will of the parties. But the concept of will was, even in the nineteenth century, subordinated to an objective approach, so that, in practice, as Pollock eventually came to think, and as Corbin later persuasively argued, the result was not necessarily to give effect to the actual intention of the promisor, but to protect the expectation that a reasonable person in the position of the promisee might hold of what the promisor intended. This approach was applied to a standard form contract in the modern Ontario case of *Tilden Rent-a-Car Co v Clendenning* (1978). A customer, renting a car at an airport, purchased collision damage waiver (insurance against damage to the car itself) and signed a form that, in the fine print, made the insurance void if the driver had consumed any amount of alcohol, however small the quantity. It was held by the Ontario Court of Appeal that this clause was invalid, because, applying the objective approach, the car rental company could not, in the circumstances of a hurried transaction at an airport, have reasonably supposed that Clendenning had actually agreed to it. This case, though it does not by any means invalidate all standard form terms, or even all unreasonable terms, offers an important means of avoiding *unexpected* standard form clauses, even where assent to them has been indicated by signature, as in the *Tilden* case, or by other means (such as a computer click). A potential limitation of this approach, from the consumer perspective, is that unreasonable terms may become so common in standard forms that they cease to be unexpected.

In about the middle of the twentieth century, a device developed in English law that enabled courts to invalidate clauses excluding liability where there had been a 'fundamental breach' of the contract. This device was unsatisfactory in several ways, and was eventually overruled in England (*Photo Production Ltd v Securicor Transport Ltd* 1980). It should be noted, however, that in overruling the doctrine (p. 328) the House of Lords said that it had served a useful purpose in protecting consumers from unreasonable clauses. Lord Wilberforce said that:

The doctrine of 'fundamental breach' in spite of its imperfections and doubtful parentage has served a useful purpose. There was a large number of problems, productive of injustice, in which it was worse than unsatisfactory to leave exemption clauses to operate (

Photo Production Ltd v Securicor Transport Ltd 1980: 843).

It is not a bad epitaph for a legal doctrine to say that it avoided injustice and that the alternative would have been worse than unsatisfactory. One of the reasons given by Lord Wilberforce for overruling the doctrine was that Parliament had by that time enacted a statute, the Unfair Contract Terms Act 1977, that expressly gave the court power to invalidate unreasonable terms in consumer standard form contracts. Subsequently, in 2013, a European Union Directive on Unfair Terms in Consumer Contracts (Council Directive 1993/13/EC) came into force throughout the European Union (Brownsword 2014). This also gives substantial protection to consumers against unreasonable standard form terms. The more general arguments discussed here will continue to be relevant in cases falling outside the scope of consumer protection legislation, as, for example, in the *British Crane Hire* case, and in other cases where both parties are acting in the course of a business.⁴

These statutory developments in English and European law, though they have no precise counterpart in Canada, are relevant in evaluating judicial developments in Canadian law. Canadian cases at first adopted the English doctrine of fundamental breach, but the Supreme Court of Canada eventually followed the English cases in rejecting the doctrine. New tests replacing the doctrine of fundamental breach were announced in *Tercon Contractors Ltd v British Columbia (Ministry of Transportation and Highways)* (2010). In considering the scope of these tests, it is important not to forget the valid purpose previously served by the doctrine of fundamental breach. It may reasonably be assumed that the court was aware that the new tests would need, to some degree, to perform the consumer protection function previously performed by the doctrine of fundamental breach, and now performed in English and European law (but not in Canadian law) by express statutory provisions. The *Tercon* case, like every text, must be read in its context, and the context is the history of the doctrine of fundamental breach, including the legitimate purposes that the doctrine, despite its defects, had achieved. Therefore, it is suggested, the new tests should be read, so far as possible, as designed to perform the legitimate work of consumer protection that had previously been done by the doctrine of fundamental breach.

The new test approved in *Tercon* involves three steps: first, the clause in question is to be interpreted; second, it is to be judged, as interpreted, for unconscionability; and third, it is to be tested for compatibility with public policy. These tests are capable of giving considerable power to reject unreasonable terms. Strict, or narrow, interpretation has often been a means of invalidating standard form clauses, and, in the *Tercon* case itself, (p. 329) though it was not a consumer case, the majority of the court in fact gave a very strict and (many would say) artificial interpretation to a clause apparently excluding liability.⁵ Second, the open recognition of unconscionability as a reason for invalidating individual clauses in a contract is potentially far-reaching. Third, the recognition of public policy as invalidating particular unreasonable clauses is also significant. Examples given of clauses that would be invalid for this reason were clauses excluding liability for dangerously defective products, but the concept need not be restricted to products. Binnie J, (dissenting on the interpretation point, but giving the opinion of the whole court on the fundamental breach question) added that ‘freedom of contract, like any freedom, may be abused’ (*Ter-*

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con Contractors Ltd v British Columbia (Ministry of Transportation and Highways) 2010: [118]). The use of the term 'abused' is significant, and may refer by implication to the power in Quebec law to set aside abusive clauses (Grammond 2010). The recognition that some contractual terms constitute an 'abuse' of freedom of contract must surely be taken to imply that the court has the power, and indeed the duty, to prevent such abuse. Unconscionability was also accepted by the Supreme Court of Canada as a general part of contract law in a family law case (*Rick v Brandsema* 2009) but it remains to be seen how widely the concept will be interpreted.

Unconscionability was originally an equitable concept, extensively used in the eighteenth century to set aside unfair contracts, in particular, forfeitures. Mortgages often contained standard language that was the eighteenth-century equivalent of standard form terms. The first published treatise on English contract law included a long chapter entitled 'Of the Equitable Jurisdiction in Relieving against Unreasonable Contracts or Agreements' (Powell 1790: vol 2, 143). Powell stated that the mere fact of a bargain being *unreasonable* was not a ground to set it aside in equity,

for contracts are not to be set aside, because not such as the wisest people would make; but there must be fraud to make void acts of this solemn and deliberate nature, if entered into for a consideration (Powell 1790: vol 2, 144).

But Powell went on to point out that 'fraud' in equity had an unusual and very wide meaning:

And agreements that are not properly fraudulent, in that sense of the term which imports deceit, will, nevertheless, be relieved against on the ground of inequality, and imposed burden or hardship on one of the parties to a contract; which is considered as a distinct head of equity, being looked upon as an offence against morality, and as unconscientious. Upon this principle, such courts will, in cases where contracts are unequal, as bearing hard upon one party ... set them aside (Powell 1790: vol 2, 145-146).

Powell gave as an example the very common provision in a mortgage—an eighteenth-century standard form clause—that unpaid interest should be treated as principal and should itself bear interest until paid. Powell wrote that 'this covenant will be relieved against as fraudulent, because unjust and oppressive in an extreme degree' (Powell 1790: 146). The concept of 'fraud' as used in equity can be misleading (p. 330) to a modern reader. 'Fraudulent' in equity meant 'unconscientious' or 'unconscionable'. No kind of wrongdoing was required on the part of the mortgagee. Powell's description of a standard clause of the sort mentioned as 'fraudulent', without any suggestion of actual dishonesty, illustrates that the courts in his time exercised a wide jurisdiction to control the use of unfair clauses. Every modern superior court is a court of equity, and, in every jurisdiction, where there is a conflict between law and equity, equity prevails (Judicature Act 1873: s 25(11)). The approval of unconscionability in the *Tercon* case should serve to remind modern courts of the wide powers they have inherited from the old court of equity.

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In *Kanitz v Rogers Cable Inc*, an unconscionability analysis was applied to a consumer electronic contract, and it was held that the test of inequality of bargaining power was met (*Kanitz v Rogers Cable Inc* 2002: [38]). Nevertheless the clause in question (an arbitration clause) was held to be valid, on the ground that evidence was lacking to show that it did not afford a potentially satisfactory remedy. In a future case, this latter conclusion might well be challenged. As Justice Sharpe has pointed out, the practical reality of an arbitration clause in a consumer contract is usually to deprive the consumer of any effective remedy:

Clauses that require arbitration and preclude the aggregation of claims have the effect of removing consumer claims from the reach of class actions. The seller's stated preference for arbitration is often nothing more than a guise to avoid liability for widespread low-value wrongs that cannot be litigated individually but when aggregated form the subject of a viable class proceeding.... When consumer disputes are in fact arbitrated through bodies such as NAF that sell their services to corporate suppliers, consumers are often disadvantaged by arbitrator bias in favour of the dominant and repeat-player corporate client (

Griffin v Dell Canada Inc 2010: [30]).

It might plausibly be argued that such a clause is usually unfair in the consumer context, and this is, no doubt, the reason why such clauses have been declared invalid by consumer protection legislation in some jurisdictions. It has been suggested that in some situations, where it has become burdensome for the consumer to withdraw, contracts might be set aside for economic duress (Kim 2014: 265).

The other potentially controlling concept approved in *Tercon* was public policy. Clauses ousting the jurisdiction of the courts were originally treated as contrary to public policy. Exceptions have been made, by statute and by judicial reasoning, for arbitration clauses and choice of forum clauses. Nevertheless, there may be scope for application of the concept of public policy in respect of unfair arbitration clauses and forum selection clauses. It would be open to a court to say that, although such clauses are acceptable if freely agreed by parties of equal bargaining power, there is reason for the court to scrutinise both the reality and the fairness of the agreement in the context of consumer transactions and standard forms, since these are clauses that, on their face, offend against one of the traditional heads of public policy. The comments of Justice Sharpe on the practical impact of arbitration clauses (p. 331) were quoted in the last paragraph. A forum selection clause confining litigation to a remote jurisdiction known to be inhospitable to consumer claims may be an equally effective deterrent. In some cases, where the terms of the contract effectively inhibit the user, as a practical matter, from terminating the contract and using an alternative supplier, the contract, or parts of it, might be void as in restraint of trade (*Your Response Ltd v Datateam Business Media Ltd* 2014).

Attention must also be paid to the provincial consumer protection statutes. Some contractual clauses have been prohibited. The Ontario (Consumer Protection Act 2002) and Quebec (Consumer Protection Act) statutes, for example, invalidate arbitration clauses in con-

sumer contracts, and the Alberta statute requires arbitration clauses to be approved in advance by the government (Fair Trading Act RSA 2000). There is also, in many of the statutes, some broader language, not always very lucidly worded. The Ontario statute states that 'it is an unfair practice to make an unconscionable representation, (representation being defined to include 'offer' and 'proposal') and adds that:

without limiting the generality of what may be taken into account in determining whether a representation is unconscionable, there may be taken into account that the person making the representation ... knows or ought to know...that the proposed transaction is excessively one-sided in favour of someone other than the consumer, or that the terms or conditions of the proposed transaction are so adverse to the consumer as to be inequitable (Consumer Protection Act SO 2002: ss 15(1), 15(2)(a), 15(2)(e)).

This language, though not so clear as it might be, would seem to be capable of giving wide powers to the court to invalidate unfair terms in standard form contracts. It does not seem, however, that these provisions have hitherto been given their full potential effect (*Wright v United Parcel Service* 2011: [145]). The same may be said of parallel provisions in other provinces.

The link between Canadian and English contract law has been weakened by the general acceptance in English and European law of the need for courts to control unreasonable standard form terms in consumer contracts; something not explicitly recognised in these terms in Canadian law. Canadian courts now quite frequently cite American cases on contract formation, and this is leading to a new kind of formalism, where there is the form, but not the reality, of consent. This may seem strange, since American formalism is commonly supposed to have been long ago vanquished by the realists. Yet, on second thought, the trend is, perhaps, not so surprising: the triumph of a simplistic form of realism over every other perspective on law tends to lead eventually to a disparagement of legal doctrine, and to a consequent neglect of, and impatience with, all subtleties that modify and complicate a simple account of legal rules. This leads in turn to a neglect of history, and to a failure to give due attention to the actual effects of legal rules in day-to-day practice, a perspective that was, in the past, central to common-law thought. The only thing left then is a kind of oversimplified (p. 332) formalism, paradoxically far more rigid than anything that the realists originally sought to displace.

Judges are not bound by some ineluctable force to impose obligations on parties merely because they have engaged in a superficial appearance of entering into contracts. Contractual obligation, when imposed by the common law, was always subject to the power of equity to intervene in cases of mistake or unconscionability. Modern courts have inherited the powers of the common law courts together with those of the courts of equity, and they possess the power, and consequently the duty, to refuse enforcement of contracts, or alleged contracts, that contravene basic principles of justice and equity. Practical considerations are important in this context: no form of reasoning should be acceptable that leads judges to turn a blind eye to the realities of commercial practice in the computer age,

where submission to standard form terms is a practical necessity. It remains true, as was said by a court of equity 250 years ago, that 'necessitous men are not, truly speaking, free men, but, to answer a present exigency, will submit to any terms that the crafty may impose upon them' (*Vernon v Bethell* 1762: 113 *per* Lord Northington).

In *Seidel v Telus Communications*, the Supreme Court of Canada held that an arbitration clause was ineffective to exclude a class action under the British Columbia Business Practices and Consumer Protection Act. The reasoning of the majority turned on the precise wording of the statute, and included the following:

The choice to restrict or not to restrict arbitration clauses in consumer transactions is a matter for the legislature. Absent legislative intervention, the courts will generally give effect to the terms of a commercial contract freely entered into, even a contract of adhesion, including an arbitration clause (*Seidel v Telus Communications Inc* 2011: [2]).

This comment, though *obiter*, and though qualified by the words 'generally' and 'freely entered into', is not very encouraging from the consumer protection perspective; it may perhaps be confined to arbitration clauses, where there is specific legislation favouring enforcement. Though consumer protection legislation certainly has an important and useful role to play, there will always be a need for residual judicial control of unfair terms that have not been identified by the legislature, or that occur in transactions that fall outside the legislative definitions. It is unrealistic to suppose that, because the legislature has expressly prohibited one kind of clause, it must have intended positively to demand strict enforcement of every other conceivable kind of contractual clause however unfair, or that, because legislation protecting consumers has been enacted in some jurisdictions and not in others, legislative silence is equivalent to a positive command that every conceivable contractual provision must be strictly enforced. The Ontario Consumer Protection Act, for example, invalidates arbitration clauses in consumer contracts, but not forum selection clauses that may equally have the effect of denying access to justice. It is not realistic to read this omission as amounting to a positive declaration by the Ontario legislature that (p. 333) forum selection clauses in consumer contracts, no matter how unreasonable, must always be strictly enforced; nor does it follow from the enactment of legislation in other jurisdictions expressly empowering courts to set aside unreasonable terms in standard form consumer contracts, that no analogous general power exists in the law of Ontario: a contract *prima facie* valid is nevertheless subject to general judicially developed concepts such as unconscionability and public policy, as the Supreme Court recognised in the *Tercon* case. The enactment of legislation in one jurisdiction cannot displace an inherent power of the court in another; on the contrary, it tends to suggest that some power (judicial, if not legislative) is needed to avoid injustice, especially if the history of the legislation shows that it was itself in part a codification of earlier judicial powers developed for this purpose. It would be unfortunate if inherent powers of the courts to avoid injustice were allowed to waste away.

Legislation, even where it does not apply directly to the case at hand, may suggest an analogy (Landis 1934). It would be an unduly rigid view of the common law to suppose that the courts cannot develop the law because the legislature has gone part way. Lord Diplock said in *Erven Warnink Besloten Vennootschap v J Townsend & Sons (Hull) Ltd*:

Where over a period of years there can be discerned a steady trend in legislation which reflects the view of successive parliaments as to what the public interest demands in a particular field of law, development of the common law in that part of the same field which has been left to it ought to proceed upon a parallel rather than a diverging course (*Erven Warnink Besloten Vennootschap v J Townsend & Sons (Hull) Ltd* 1979: 743).

Turning to the second question suggested by the assertion in *Rudder v Microsoft*, that electronic contracts must be afforded the same sanctity as all written contracts, it may be suggested that, from the perspective of unreasonableness, there *are* additional reasons for scrutiny of electronic contracts. In practice, it is impossible for a user to read the contract terms, and it is wholly unrealistic to suppose that a user requiring frequent access to a website would check the terms on every occasion to ensure that no alteration had been made since the previous use.⁶ Electronic documents are more difficult to evaluate and parse than paper documents because the size of the document is not immediately apparent, because all electronic documents look similar and so the appearance of the document does not alert the user to its significance, and because internal cross-referencing is difficult (Scassa and Deturbide 2012: 21). The user knows that there is no alternative to accepting the terms, because they would not be altered even if objection were made, and because access to computer databases or to electronic means of communication is often a practical necessity. Access to electronic websites has become a very frequent part of modern life, and may involve dozens, or even hundreds of clicks in a day on 'accept' boxes on many websites. The ease of adding standard form clauses means that there is a tendency towards the use of ever more burdensome provisions, which are then copied by competitors. These reasons are cumulative; each standing (p. 334) alone might be insufficient to differentiate electronic from paper contracts, but cumulatively they do indicate a practical distinction. Some of these reasons would apply to paper standard forms, but it cannot be doubted that electronic contracting makes it much easier, in practice, for business enterprises to include terms burdensome to users.

Fifty years ago, Lord Devlin described the judicial attitude to printed standard forms in a monopoly situation as a 'world of make-believe' (*McCutcheon v David MacBrayne Ltd* 1964: 133), and this comment is even more appropriate in relation to electronic contracts. Margaret Jane Radin (Radin 2013) and Nancy Kim have pointed out that electronic contracting, in practice, has shown itself particularly liable to attract oppressive and unreasonable contractual clauses. Kim writes that:

Companies intentionally minimize the disruptiveness of contract presentment in order to facilitate transactions and to create a smooth website experience for the consumer. All of this reduces the signaling effect of contract and deters con-

sumers from reading terms. Often, they fail to realize that by clicking 'accept' they are entering into a legal commitment. Companies take advantage of consumer failure to read and include ever more aggressive and oppressive terms. Meanwhile, courts apply doctrinal rules without considering the impact of the electronic form on the behavior of the parties (Kim 2014: 265–266).

Kim goes on to suggest that electronic contracts could be set aside for 'situational duress' in cases where the consumer has no real choice, for example, because data has previously been entrusted to a website and would be lost unless proposed new terms were accepted. She observes that

Electronic contracts differ from paper contracts ... Courts have emphasized the similarities between these electronic forms and their physical counterparts, but have often ignored their differences (Kim 2014: 286).

As Radin also has convincingly argued, these are not real agreements in any traditional sense of that word. There is insufficient reason for the courts to invoke such concepts as 'sanctity' in respect of such transactions. Contract law comprises a mixture of considerations of justice between the parties and considerations of social policy (Waddams 2011). Neither perspective can justify an unqualified sanctity, for there are many instances in which the supposed benefits of absolute enforcement of contractual obligations have been outweighed by considerations of justice between the parties or by considerations of public policy. In the context of electronic contracts, there is reason for the courts to remember the 'vigilance of the common law, which, while allowing freedom of contract, watches to see that it is not abused' (*John Lee & Son (Graham) Ltd v Railway Executive* 1949: 384 *per* Denning J). Against the merits of certainty and predictability must be weighed considerations of equity, fairness, avoidance of unjust enrichment, consumer protection, prevention of abuse of rights, good faith, and justice in the individual case.

(p. 335) 7. Conclusion

Computer technology demands a reappraisal of several aspects of contract law relating to contractual formation and enforceability. The nineteenth-century rules on postal acceptance may well be discarded as obsolete. Requirements of writing and of signature must be assessed in the light of the purposes underlying the initial requirements. The need for supervision of contracts for unfairness, especially but not exclusively in the consumer context, has become increasingly apparent in view of the tendency of electronic standard forms of contract to include ever more burdensome terms.

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Notes:

(1.) Even a paper signature would be insufficient on this reasoning if the intention of the parties was found to be that there should be no binding agreement until contemplated formal documents were executed.

(2.) See the comments of Lord Hoffmann in *Actionstrength Ltd (trading as Vital Resources) v International Glass Engineering (INGLEN) SPA* [2003] 2 AC 541, 549 (HL).

(3.) Bramwell LJ would have entered judgment for the railway; the majority ordered a new trial.

(4.) They might also be relevant in the case where neither party is acting in the course of business (rare in the context of electronic standard forms).

(5.) In *Robert v Versus Brokerage Services Inc* [2001] OJ No 1341 (Superior Ct) a broadly worded disclaimer clause was held, in the context of online securities trading, not to apply to loss caused by gross negligence (Wilkins J, [62]).

(6.) In *Kanitz v Rogers Cable Inc* [2001] 58 OR (3d) 299 (Superior Ct), it was held that a user was bound by a clause permitting subsequent changes posted on a website.

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Criminal Law and the Evolving Technological Understanding of Behaviour

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Abstract and Keywords

This chapter examines the claims made by science and technology that have impacted upon criminal law. It looks at issues of legitimacy in criminal law and in particular at claims based upon new scientific and technological explanations of human behaviour. It considers how the criminal law has responded to these challenges. It considers whether there are areas of the criminal law where a greater understanding of the relevant science would assist the criminal justice system. It also looks at the present legal approaches to those issues and considers how the Criminal Procedure Rules 2015 may provide a framework for the courts when dealing with science and technology.

Keywords: criminal law, technology, neurocognition, memory, procedure

1. Introduction

THIS Handbook is about the interface between law and technology. This part of the book examines the manner in which advances in technological understanding exert pressure on existing legal concepts and how this pressure may provoke change in both legal doctrine and within the law itself. This chapter examines the opportunities for new understandings of criminal behaviour realised by an increased scientific understanding of neurology and neurocognition. It considers how technology may assist in providing new answers to 'old questions' in criminal law. For example, how do new technological approaches help in identifying with accuracy what caused the death of a child in cases of alleged non-accidental head injury, or how using new understandings drawn from cognitive neuroscience may assist in redefining the debate surrounding the age of criminal responsibility?

(p. 339) The criminal law, when defining the more serious offences, tends to focus on the cognitive abilities of the defendant and what the defendant understood, or knew herself to be doing, at the time of the criminal act. The law is in some senses fairly impervious to direct scientific challenge because of its basis in normative structures that inform its

judgment of how humans think and act. The criminal law, in its offence requirements, still separates the criminal act from the mental processes which accompany the act when evaluating responsibility. In this sense, its approach to establishing guilt or innocence is profoundly unscientific. Few scientists who study the correlates of brain activity and behaviour would refer to mental states as something distinct from brain activity.

In court, because of the adversarial nature of the criminal justice system, the fragments of scientific or other evidence that have to be established to prove or disprove the prosecution case become the focus of the legal argument. Sometimes the evidence called to support the arguments made by defence or prosecution will be witness testimony, sometimes the basis of that evidence will be in the form of assertions of a professional opinion based on an understanding of science or technology. The witness testimony is likely to be based upon a memory of events that took place much earlier and is subject to cross questioning. Technological advances suggest that this is not the most efficacious manner to retrieve an accurate memory of events. Furthermore, the criminal courts expect that, where an assertion of technical knowledge is made, it is based upon verifiable science, and the person giving the explanation is qualified to give expert evidence.¹ Putting this together, what emerges is a system of criminal law, pre-trial and at the trial hearing, which draws on science for its understanding of various key issues. However, these issues are not necessarily linked into a cohesive scientific whole, but rather are held together by what the law demands and recognises as proof. One might therefore expect the impact of technology on this process to be focused on matters of particular of relevance in establishing the guilt or innocence of someone charged with committing a criminal offence.

2. Science, the Media, Public Policy and the Criminal Law

There is much debate, both academic and otherwise, about how to deal with those whose behaviour is deeply anti-social and violent, and about whether neurocognitive or biological understanding of the drivers of behaviour can assist the criminal justice system. Popular books have been written about the fact that the brain drives (p. 340) behaviour, particularly violent behaviour (see, for example, Raine 2014). The argument made is that some problematic criminal behaviour is best dealt with outside the present criminal justice system. This, in itself, raises interesting political and regulatory issues about who decides when something is to be treated extra-judicially, the manner in which this type of change should be introduced, who should be responsible for the introduction of these new scientific assessments, and how the decision making process should be regulated. Further questions need to be answered—such as how transparent the introduction of such tests and technologies will be, and where and how will they be trialled? Moreover, the results of the application of these technologies will usually demand that those using them, or reporting their results, exercise a degree of subjective judgment. Separating what may be viewed as factual evidence from evidence that might be viewed as subjective opinion has always posed an issue for the courts, as indeed it does for scientists. The courts face in-

interesting challenges in an age of growing technological understanding in deciding when the opinion of experts is necessary and when it is not. The criminal courts are particularly careful to prevent the use of expert evidence usurping the role of the jury.

It is naïve to propose that scientific explanations of new technological understandings of how we behave should supplant judicial understandings. It is also worth pointing out that science does not claim to have unique access to the truth. Scientific methods provide an interesting parallel to the process of judicial or legislative review of criminal law. The popular science writer Ben Goldacre describes the process:

Every fight ... over the meaning of some data, is the story of scientific progress itself: you present your idea, you present your evidence, and we all take turns to try and pull them apart. This process of close critical appraisal isn't something that we tolerate reluctantly, in science, with a grudge: far from it. Criticism and close examination of evidence is actively welcomed – it is the absolute core of the process – because the ideas only exist to be pulled apart, and this is how we spiral in on the truth (2014: xv).

There are some parallels here with the adversarial system of argument in the criminal courts where the prosecution case is put to proof, but while case law develops through such argument, much law does not. Public policy demands that in order for the law to be seen by the public as legitimate, or legitimately enforced, it must in some measure engage with societal views about right and wrong. In turn, this will affect the relationship between technology and the law. Society has strong views in relation to the development of the law. Public opinion is often formed around certain high-profile criminal cases as reported by the news media, and this popular opinion exerts a pressure on those who form policy. This is true both when law is made in the legislature and when the courts are interpreting and applying the law. For example, where a certain type of medical condition underlies the criminal behaviour, or at least provides a partial explanation for how a criminal event came about, then the legal issue for the courts is whether a mental condition defence is appropriate on the facts. Social perception of risk in relation to those who commit crimes when suffering from a mental disorder undoubtedly forms a part of the background to that discussion. The (p. 341) insanity defence provides an early example of this type of political discussion; indeed what is known as *M'Naghten's Case* is the response of judges of the Queen's Bench to criticism levelled at the case by the House of Lords. The House of Lords in 1843 was the senior of the two Houses of Parliament. The case had a high political profile as it concerned an attempt to assassinate the then Prime Minister and the killing of his Secretary, Edward Drummond. The courts have, on occasion, denied the insanity defence and narrowed the ambit of defences, such as insanity, explicitly for policy reasons. This is normally expressed in terms of the risk of harm to the general public if an excuse were to be granted to a particular defendant (*R v Sullivan* [1984]).

A problematic area for the law in terms of public policy and media attitudes to criminal behaviour is the age of criminal responsibility. Currently in England and Wales, that age is set at ten years old. Arguably, one of the reasons for a strict interpretation of the law by

the House of Lords in *R v JTB* [2009] is the effect of public opinion. The strength of public opinion with regard to children who commit sexual offences may be demonstrated by examining the media coverage in 2010 of the trial of two boys, aged ten and eleven tried at the Old Bailey for very serious sexual assaults on an eight-year-old girl. The BBC news coverage of the events surrounding the original trial raises a number of troubling issues, all of which would arguably have been made clearer by a better neurocognitive understanding of both memory and developmental maturity. Firstly, in this case, the girl's memory of the events was reported to be 'tenuous, inherently weak and inconsistent.' Secondly, in the analysis of the report, Paul Mendelle QC is reported as saying '[i]t's a matter for debate whether we should look again at the age of criminal responsibility and the extent to which juveniles are brought into criminal courts' (McFarlane 2010). The view of the Metropolitan Police Federation representative underlines how societal pressure affects the development of the law:

The Metropolitan Police Federation's Peter Smyth said on BBC Radio 4's Today Programme that the case wasn't just punitive: 'Justice is not just about punishment: it's a search for the truth. The families and victims need to know what the truth is. Can you imagine the hoo-ha if they hadn't been tried and two years later one or both of them assaulted another eight-year-old girl?' (Spencer 2010).

Protecting the public from those who commit dangerous acts is a key pressure in the development of the criminal law. Neuropsychologists have added greatly to the knowledge of how to structure interviews to retrieve memories of past events. Much work has been done on structuring interviews with children to enable them to recall events (Lamb 2008).

3. Proactively Protecting the Public?

Generally, in the criminal law, the circumstances that excuse blame are very narrowly defined. Those who wish to challenge the present legal approach to protecting (p. 342) the public make a number of arguments, based on a greater technological understanding of the causes of behaviour. Adrian Raine explores models of intervention that would treat violent individuals outside of the criminal justice system, before a crime is committed. Raine (2014) envisages a world in the future where the LOMBROSO² project will identify those who may go on to commit a serious violent offence. Raine suggests that an interdisciplinary team could be assembled to improve the power of existing models of screening of those released on probation (Raine 2014: 342). He argues that this putative model would utilise information gained from the brain, genetic inheritance, and the psychologically assessed risk factors attached to a potential violent offender. He claims that such a model could be effective at predicting which individuals were likely to commit serious violent crime. In this imagined world, neurocriminology would play a proactive, rather than reactive, role. Such a future, if achievable, would indeed raise many questions concerning the legitimacy of such a project, not least what is legitimate in terms of intrusions into the private world of citizens *before* they commit a crime.

Raine asks the reader to imagine that under LOMBROSO all adult males at the age of 18 and over would 'register at their local hospital for a quick brain scan, and DNA testing'. The brain scans would be of three types: structural, functional, and enhanced diffusion tensor imaging. There would also be a blood test (Raine 2014: 342). He suggests that 'an outraged society' which had suffered serious crime might accept preventative detention for those at risk of committing serious crimes. He does not suggest that the testing would be utterly accurate as a predictor of serious crime. Raine suggests that, at best, the tests would achieve an accuracy in the region of 80%, and this is only for specific offences, such as rape or paedophilic offences (Raine 2014: 343).

Raine's wishes to provoke thoughtful debate. His main argument with criminal justice systems is what he sees as their dependence on social models to understand behaviour. The thought that seemingly drives Raine's argument is that by identifying those whose biological make-up means that they are predisposed to anti-social behaviour, more effective management of that behaviour may be able to take place. Raine argues that this could make the world a safer place to inhabit, and he wishes us to consider whether such an outcome is appropriate in a liberal society. Claims of this sort are not new, at least in terms of the advantages of identifying anti-social behaviour. David Farrington has argued that early intervention in childhood can prove effective in preventing anti-social adult behaviour (Farrington and Coid 2003). Clearly Raine's suggestion for treatment goes beyond present practice, and would be expensive and fairly resource intensive. Raine also poses some profound questions about the nature of the society in which we wish to live.

To complicate the discussion of these matters further, the criminal law and criminal lawyers discuss the issues surrounding punishment and responsibility in a totally different manner. Raine, a neurocriminologist, argues that assessments (p. 343) of criminal behaviour are based 'almost exclusively on social and sociological models':

The dominant model for understanding criminal behavior has been, for most of the twentieth century, one built almost exclusively on social and sociological models. My main argument is that sole reliance on these social perspectives is fundamentally flawed. (2014: 8)

Raine makes the assumption that the law's central interest in determining guilt or innocence is framed in terms of choice or the extent of 'free will'. This assumption is contentious. The law does assume that a criminal act requires a voluntary act, but whether this entails 'free will' is highly debatable. Norrie argues that any recognition of free will by the criminal law is limited in its ambit. He also suggests that explanations of the social contexts that drive behaviour have a limited place in the criminal law in determining guilt or innocence. He writes:

The criminal law's currency of judgment is that of a set of lowest common denominators. All human beings perform conscious acts and do so intentionally. That much is true, and there is a logic in the law's denial of responsibility to those who, because of mental illness or other similar factor, lack voluntariness (narrowly conceived) or intentionality. But such an approach misses the social context that

makes individual life possible, and by which individual actions are, save in situations of actual cognitive or volitional breakdown, mediated and conditioned. There is no getting away from our existence in families, neighbourhoods, environments, social classes and politics. It is these contexts that deal us the cards which we play more or less effectively. Human beings, it is true, are not reducible to the contexts within which they operate, but nor are they or their actions intelligible without them. (2001: 171–172)

The underlying reason for the conflicting view is that Raine is suggesting that criminological reasoning is wrong in relying strongly on a social/sociological model of behaviour, and that a neurocognitive/biological approach could identify those who are truly dangerous. Raine is a criminologist whereas Norrie is a criminal law theorist. Norrie argues that the model of criminal responsibility employed by the criminal law, in the trial phase, largely ignores social or sociological explanations of behaviour. Norrie's critique of the law suggests that a better understanding of how social contexts influence crime will aid our understanding of when someone should be held criminally responsible, whereas Raine suggests that it will not aid our understanding of what predisposes anyone to criminal behaviour. These are two subtly different issues. Raine is interested in debating how best to prevent the risk of harm to the population at large by those whose environment and neurobiology potentiates the risk of serious criminal behaviour. Norrie is concerned that those accused of crime have the chance of a fair hearing before the criminal courts. The issue of punishment arises only once guilt has been established. This brings us to the real question of the legitimacy of the state to punish those who commit criminal acts.

(p. 344) 4. The Real Question of Legitimacy for the Criminal Courts

Arguably the strongest pressure exerted on the development of the criminal law is that identified in Jeremy Horder's argument, which concerns the source of the legitimacy of the state to enforce the law:

More broadly, one should not infer a commitment to the supposedly liberal values of formal equality, legal certainty and extensive freedom of the will from the excusatory narrowness of a criminal code. Instead, one may hypothesise that such narrowness stems from the (mistaken) assumption that a generous set of excusing conditions will seriously impede what has proved to be a dominating strategic concern in all developed societies, past and present, liberal and non-liberal alike. This is the concern to maintain the legal system's authority over the use or threat of force, by effecting a transfer of people's desires for revenge against (or, perhaps less luridly, for the compulsory incapacitation of) wrongdoers into a desire for the state *itself* to punish wrongdoing (or to incapacitate). (2004: 195–196)

Horder argues that by keeping the ambit of excusing conditions narrow, and recognising degrees of blameworthiness, in matters that mitigate or aggravate sentencing, the state maintains the legitimacy of its role. This avoids the populace resorting to acts of revenge because the state is seen as failing to hold people accountable for criminal acts. An interesting moot point is what would happen if the state were to perceive public opinion as having moved to support a more technological and interventionist stance in controlling potential criminals?

The question is not entirely without precedent, as the issue of how to deal with individuals at risk of committing serious crimes has previously been the focus of discussion in the UK. In 2010, Max Rutherford published a report looking at mental health issues and criminal justice policy. His report gives insights into how the type of system envisaged by Raine might work in practice. His report examined the operation of the policy introduced in 1999 by the then government to treat individuals with a Dangerous and Severe Personality Disorder (Rutherford 2010). Rutherford traces the initiative from its inception, and his assessment is damning:

The DSPD programme is a ten year government pilot project that has cost nearly half a billion pounds. Positive outcomes have been very limited, and a host of ethical concerns have been raised since its creation in 1999. (2010: 57)

The ethical concerns identified by Rutherford are from a variety of sources, but the most damning is from an editorial in the British Medical Journal:

The Government's proposals masquerade as extensions of mental health services. They are in fact proposals for preventive detention ... They are intended ... to circumvent the European Convention on Human Rights, which prohibits preventive detention except in those of unsound mind. With their promises of new money and research funding, they (p. 345) hope to bribe doctors into complicity in the indefinite detention of certain selected offenders. Discussion of the ethical dilemmas that these proposals present for health professionals is absent, presumably because they are ethically and professionally indefensible. (Mullen 1999: 1147; quoted in Rutherford 2010: 50)

The usefulness of the programme in achieving its ends is severely doubted by Rutherford. The Ministry of Justice Research Summary 4/11 examined part of the programme and looked at studies of effectiveness. The Research Summary reports a reduction in Violence Scale Risk scores. It also notes variance in therapeutic practice and a preference for the delivery of the programme in prison rather than psychiatric units. It states that good multi-disciplinary working was essential to success. Less positively, it states that 'pathways out of the units were not well defined' (Ministry of Justice 2011: 1).

Horder's view of the legitimacy of the State to punish, if he is correct, means that the public will want to know that they are safer from violent crime when money has been spent on treating Severe Personality Disordered Offenders. Indeed, this is likely to be the focus of the public interest in the outcomes of the criminal justice system. If the pathways

are not well defined to prevent recidivism, then concerns are likely to arise over the efficacy of the treatment of this category of offenders. Criminal trials raise different issues and there remains a tension between the public view of fairness and the criminal law's construction of offence and defence elements. Science and technology become relevant here to establish how events happened and whether the prosecution case is made out.

5. New Technologies Employed by the Criminal Law to Answer Old Questions

A further problem faced by courts is how to accurately establish the requisite mental elements of the crime. This is especially true where there are no witnesses to the crime. For example, when someone claims to have no memory of a traumatic crime and yet they seem to be the perpetrator, how is evidence of their mental state to be proved? Alternatively, if a defendant is suffering from a medical condition which suggests that they could not have formed the mens rea for the crime, what would count as evidence to support such a plea? Furthermore, apart from relying on the jury as a finder of fact, how is the law to establish when someone is telling the truth? Some technologies based on lie detection claim that they could assist the courts. How should such claims be assessed? (p. 346)

It is difficult for the criminal courts to determine what science is valid and should be accepted in evidence. The relationship between expert opinion evidence and miscarriages of justice has a long history. This is why one of the ways in which the law has responded to technology is by redefining the rules in relation to admissibility of evidence. However, advances in technological understanding greatly assist the courts in forensically addressing factual evidence. Problems may arise when the technology is unable to provide an explanation for the events that have occurred. The problem is exacerbated when the person accused of the crime is also unable to provide an explanation of the events which led to the criminal charge being made. The courts then must rely on the argument of experts as to the relevant scientific explanations of events. The judge can decide not to admit that evidence at all, when she deems it will not assist the jury or is not based on valid science.

The questions that underpin the establishment of guilt and innocence are fundamental and, in that sense, do not change over time. However, the science that helps to develop the jurisprudential reasoning in relation to the fundamental questions may change. The following sections explore some of the ways in which new technological and scientific understanding do or could assist the law in developing its jurisprudential understandings.

5.1 Is the Cause of Death Correctly Identified?

The importance of science in providing the best-informed explanation of events is underlined in a group of cases heard by the Criminal Court of Appeal in 2005 (*R v Harris, Rock, Cherry and Faulder* [2005]). These cases followed the concerns raised by the case of Angela Cannings. In *R v Cannings*, the expert opinion evidence, based on medical understandings of the cause of sudden infant death, was shown to be unable to establish, with any precision, the reason why two of Angela Cannings' children died suddenly, at a very

young age. An examination of the circumstances of the case, the large amount of technical detail heard by the jury, and the diversity of the expert evidence coupled with the absence of any explanation for the deaths gave the court cause for concern. The Appeal Court concluded that the presentation to the jury of a large amount of technical information regarding the likelihood of two deaths occurring in one family may have misled the jury. The Court of Appeal reasoned that where so many experts could not effectively explain why the two sudden infant deaths had occurred in the same family; then it would not be unreasonable for a jury to think this lack of explanation supported the prosecution case.

Throughout the process great care must be taken not to allow the rarity of these sad events, standing on their own, to be subsumed into an assumption or virtual assumption that the dead infants were deliberately killed, or consciously or unconsciously to regard the inability of the defendant to produce some convincing explanation for these deaths as providing (p. 347) a measure of support for the Prosecution's case. If on examination of all the evidence every possible known cause has been excluded, the cause remains unknown. (*R v Cannings* [2004]: 768)

The Court of Appeal in 2005 faced a considerable amount of expert evidence from which they had to attempt to understand the cause of children's deaths. The cases of *Harris* and *Cherry* were before the court because of the work of an interdepartmental group set up following the problems identified in *Cannings*. This group had reviewed the 'battered baby cases' and had written to the appellants suggesting that 'each might feel it appropriate for the safety of her or his conviction to be considered further by the Court of Appeal' (*R v Harris, Rock, Cherry and Faulder* [2005]: 4). The arguments before the Court of Appeal, in each case, concerned whether the deaths or serious injury had on the evidence and the most valid scientific reasoning been attributable to alleged non-accidental injury.

A large amount of technical information was heard by the Court of Appeal reviewing the cases. The expertise of those giving expert evidence ranged from pathology, brain surgery, histopathology, radiology, surgery, neuro-trauma, to biomechanical engineering. One of the central issues in the case was whether diagnosing non-accidental injury from a triad of injuries in the children had been appropriate. Unusually the law report contains two appendices: Appendix A is a glossary of medical terms and Appendix B contains diagrams of the head.

New evidence with regard to the possible identification of non-accidental head injury (NAHI) was heard from experts who applied new insights gained from biomechanical engineering to the understanding of how the brain injuries actually occurred. No expert who appeared before the court was an expert in this area but the court considered written reports by two experts in biomechanical engineering as to the effect of shaking on a human body. One expert witness produced evidence for all the appellants and one for the Crown in the case of *Cherry*. The expert opinions did not agree. The court stated that:

developments in scientific thinking and techniques should not be kept from the Court, simply because they remain at the stage of a hypothesis. Obviously, it is of the first importance that the true status of the expert's evidence is frankly indicated to the court. (*R v Harris, Rock, Cherry and Faulder* [2005]: 270)

Given that the cause of injury or death was not readily identifiable in all of the individual cases, the issue of determining the probability of NAHI facing the appeal court was extremely difficult. The court's view of the strength of the evidence varied for each of the appeal cases before them. What is interesting is the approach of the court to adjudicating in an area where technical and scientific knowledge was uncertain.³ In dealing with the new evidence before them, the court had to assess what impact that evidence had on the evidence already heard by the jury. The Court of Appeal concluded that where the new evidence raised lacked clarity as to the cause of death, there was a reasonable doubt as to the safety of the conviction.⁴

(p. 348) 5.2 Is this Person Mature Enough to be Viewed as Responsible?

A longstanding problem for the courts is identifying when someone is old enough to be held criminally responsible. In *Roper v Simmons* (2005), the Supreme Court of the United States of America decided that those who were convicted of homicide, but were 16 or 17 years old when they killed their victim, did not deserve the death penalty. Much behavioural and neuro-cognitive evidence was adduced to support the claim that their age was relevant to the degree of criminal responsibility which should attach to their crime. In England and Wales, the law in relation to the age of criminal responsibility was reviewed by the House of Lords in *R v JTB* [2009]. The Law Lords giving their opinions interpreted the law and confirmed the age of criminal responsibility was 10 years. The issue before them was whether the rebuttable presumption that a child was not criminally responsible until the age of 14 had been abolished by section 34 of the Crime and Disorder Act 1998. No reference is made in the opinions given in the House of Lords to any behavioural or scientific evidence. It is therefore possible that no such evidence was argued before them. The case appealed related to a conviction of a boy of twelve, for offences of causing or inciting children under 13 to engage in sexual activity. At his police interview the child had confirmed that he had committed the criminal activity but said that he did not know that it was wrong. This engaged the question on appeal of whether his responsibility for the offences was correctly made out or whether he could claim to be *doli incapax*; and thus incapable of incurring criminal responsibility. The House of Lords giving its opinion came to the conclusion that the political discussions during the passage of the bill that became the Crime and Disorder Act 1998 were clear in their aim to remove all claims that a child was *doli incapax*. It is disappointing that this decision was reached when there is much evidence that there is no particular age at which a human being passes from being a child, and therefore not responsible for their criminal actions, to being no longer a child and fully responsible for their actions.

In 2011, The Royal Society produced a policy document on Neuroscience and the Law (The Royal Society 2011). This document noted that: 'There is huge individuality in the timing and patterning of brain development' (The Royal Society 2011: 12). The policy document argued that therefore attributing responsibility required flexibility and determinations of individual criminal responsibility, based on the age of the perpetrator and that this needed to be done on a case by case basis. The reasoning given for this assertion was based on neuroscientific evidence:

Neuroscience is providing new insights into brain development, revealing that changes in important neural circuits underpinning behaviour continue until at least 20 years of age. The curves for brain development are associated with comparable changes in mental functioning (such as IQ, but also suggestibility, impulsivity, memory or decision-making), and are quite different in different regions of the brain. The prefrontal cortex (which is especially important (p. 349) in relation to judgement, decision-making and impulse control) is the slowest to mature. By contrast, the amygdala, an area of the brain responsible for reward and emotional processing, develops during early adolescence. It is thought that an *imbalance* between the late development of the prefrontal cortex responsible for guiding behaviour, compared to the early developments of the amygdala and associated structures may account for heightened emotional responses and the risky behaviour characteristic of adolescence. (The Royal Society 2011: 12)

Nita Farahany, writing after the decision of the US Supreme Court in *Atkins v Virginia* (2002), pointed out the difficulty of distinguishing between age, developmental immaturity, and brain damage, resulting in lack of capacity to appreciate the consequences of action (Farahany 2008–2009). Voicing a similar concern, William Wilson writes that where punishment is based on a rule-based system this must presuppose 'a basic ability to follow' the rules (Wilson 2002: 115). Without such an assumption, the imposition of punishment lacks legitimacy.

This problem is also highlighted in the Law Commission's discussion paper *Criminal Liability: Insanity and Automatism, A Discussion Paper* (Law Commission 2013). Chapter nine considers the possibility of a new defence of 'Not Criminally Responsible' by reason of developmental immaturity. However, the proposed defence would only exempt from criminal responsibility those who wholly lacked capacity by reason of developmental immaturity,

- (1) rationally to form a judgement in relation to what he or she is charged with having done;
- (2) to appreciate the wrongfulness of what he or she is charged with having done; or
- (3) to control his or her physical acts in relation to what he or she is charged with having done. (Law Commission 2013: para 9.4)

The Law Commission cite, in support of this proposal, comments made by the Royal College of Psychiatrists:

Biological factors such as the functioning of the frontal lobes of the brain play an important role in the development of self-control and of other abilities. The frontal lobes are involved in an individual's ability to manage the large amount of information entering consciousness from many sources, in changing behaviour, in using acquired information, in planning actions and in controlling impulsivity. Generally, the frontal lobes are felt to mature at approximately 14 years of age. (Law Commission 2013: para 9.11)

The Law Commission suggests as a matter for discussion that this proposed defence should not be limited to people aged under 18 (Law Commission 2013: para 9.17). Technological advances in understanding how the brain develops are therefore exerting pressure upon the law to be more humane in its application. The Law Commission has recognised this by opening for debate the issue of how the law should treat someone who, through developmental immaturity, lacks capacity to be criminally responsible. The suggestion from the Commission is that more research needs to be carried out in this area.

The reasoning of the judges' in the alleged NAHI cases, and of the Law Commission in relation to understanding developmental immaturity suggests that valid scientific (p. 350) evidence can support the court in making assessments of criminal responsibility is clearly correct. Both recognise that the scientific and technical knowledge will not always be conclusive. However, the suggestion in both cases is that greater understanding by the courts of new technologies and related science will greatly improve legal decision making.

5.3 Memory, Veracity, and the Law?

The veracity, or otherwise, of the alleged perpetrator, alleged victim, and those claiming to have witnessed a crime needs to be assessed by the criminal justice system. This happens throughout the process of investigation of a crime. The methodology of approaching the evidence at the investigatory stage of proceedings and at trial of any criminal offence will be key to accurately establishing the factual evidence on which a jury will make the determination of guilt or innocence. Achieving a high degree of accuracy is particularly difficult when the crime may have taken place a considerable time before evidence is collected. Particular problems arise when the only person able to give an explanation may be the perpetrator, who may claim not to have, or genuinely may not have, a memory of the crime. Distinguishing between the latter two states is deeply problematic.

The discrimination between veracity and falsehood remains problematic even where there are witnesses to an event because of the manner in which memory of events is laid down. Scientific understanding of memory and how it is laid down is advancing, but there is no fool-proof way of accurately measuring witness testimony to establish its veracity. People are more or less convincing and it is assumed by the courts that the jury will be

able to measure truth or falsehood by their understanding and experience of life. New understandings of how memory of action is laid down may question this presumption.

5.3.1 Understanding memory-based evidence

Martin Conway is a cognitive neuroscientist who has written a great deal about the relationship between memory and the law. He has experience of working as an expert witness in criminal trials. His work raises a number of pertinent issues for the law. He is concerned about the presentation of expert evidence relating to memory, particularly the question of who should comment on the validity of memory evidence. Conway argues that the courts ought to be careful in choosing from whom they accept evidence concerning the validity of a memory. In a chapter entitled *Ten Things the Law and Others Should Know about Human Memory*, Conway explains how he has reached his present opinion of how the law hears memory evidence. His opinion, at the time of writing the chapter, was based upon eight years of work as a professional expert witness. In the chapter, he makes a number of claims. Firstly, that the law is 'riddled with ill-informed opinion' (Conway 2013: 360) regarding (p. 351) how memory is laid down, and its reliability. He expresses concerns as to the scientific status claimed by expert witnesses. He recounts his shock at finding expert witnesses for the other side who were prepared to contest his 'rational, carefully thought out' opinion based on valid scientific understanding (Conway 2013: 360). He expresses the opinion that there is resistance from judges to receiving expert opinion regarding memory. He also suggests that in cases where memory evidence had to be assessed, too many of the experts making claims relevant to determinations of guilt and innocence had no real expertise of memory or of how memories of events are laid down.

Conway's insight into memory does indeed raise some interesting challenges for prosecutors and the criminal courts. According to Conway, memories are by nature fragmented and incomplete, and that certain types of memory are likely to be more accurate than other forms of memory. Memories relating to 'knowledge of a person's life' are more likely to be accurate than memories of a specific experience or a particular event (Conway 2013: 370). Indeed, Conway asserts that it has been scientifically demonstrated that memories of events are constructed by the mind and, because of the manner in which this happens, are prone to error.

Furthermore, the recall environment is exceptionally important to accurate memory retrieval. Conway gives examples of the ease with which a false memory of an event may be engineered. Examining the scientific view of what distinguishes an accurate memory from one which is likely to be less accurate, he asserts: 'Any account of a memory will feature forgotten details and gaps, and this must not be taken as any sort of indicator of accuracy. Accounts of memories that do not feature forgetting and gaps are highly unusual' (Conway 2013: 361). Conway points out that often in court inaccuracies of memory or confusion on recalling an event is viewed by both judges and juries as meaning that evidence is less reliable. Earlier in this chapter just such a comment was considered in relation to the evidence given by a child of eight who had been sexually assaulted. However, a scientific understanding of memory suggests that highly detailed accounts of

memory are likely to be less, not more, accurate. Conway counsels against regarding highly detailed accounts of events, 'such as precise recall of spoken conversations' as accurate. He suggests that the only way to 'establish the truth of a memory is with independent corroborating evidence.' He argues that some types of memories, including, among others, those of traumatic experiences, childhood events, and memories of older adults need particularly careful treatment (Conway 2013: 361).

The courts have been reluctant to accept this evidence in relation to children's evidence. The Court of Criminal Appeal has questioned its probative value. *R v E* [2009]. Information is provided by CPS to those giving evidence in criminal trials about dealing with cross examination from prosecution or defence when giving evidence. The CPS advice is to be well prepared and confident. The suggestion is that (p. 352) those giving evidence should remember that 'the person who remains reasonable and composed will gain more respect and credibility' (CPS 2014: 20). Witnesses are encouraged to consult notes taken at the time of the crime and prepare for the trial and to familiarize themselves with the statements that they previously made before giving evidence. Obviously making sure evidence is presented as well as possible is important and avoids wasting time and money. Nevertheless, it is also important that the evidence obtained at trial be as accurate as possible. This requires an understanding of how memories are laid down and how best they might be retrieved. Much work has been done on this, but there is room for more to be done, and lessons will be learned from greater neurocognitive understanding of how memories are laid down (see Royal Society 2011: 25).

5.3.2 Concealed Memories: Rooting out the Truth?

Developments in the US (Smith and Eulo 2015)⁵ and in India (Rödiger 2011) have posed questions about whether a new approach to the use of lie detection or memory detection machines could establish when people are, or are not, telling the truth. The claims are based on the science and related technologies of psychophysiology, more commonly known as lie detection (Rosenfeld, Ben-Shakhar and Ganis 2012). Obviously, if the State were able to accurately identify those who were lying, then much expense might be spared and the risk of harm to the general public could be reduced. Lie detection machines measure changes in a number of reactions. These can include galvanic skin reactions, heart rate, or the P300 signal measured by electroencephalogram (EEG). Some of the research into the use of questions to reveal concealed memories uses sophisticated paradigms to elicit responses from subjects for which a high degree of accuracy is claimed. Some technologists suggest that the application of tests for concealed memory in questioning those who were planning to carry out terrorist attacks would assist the authorities in correctly identifying those who had committed terrorist attacks; and could yield useful information about future attacks⁶ (Meixner and Rosenfeld 2011).

There is, quite rightly, much speculation and concern about such claims given that most of the research which has been published has been carried out in laboratory conditions. The methodology employed is open to the use of counter measures to conceal information. Also, laboratory testing is not subject to the difficulties which arise in real life. Prosecuting authorities would face difficulty in keeping relevant details about crime su-

pressed to prevent the information reaching the wider public. But knowledge of the details of a crime being widely known would compromise any memory tests which could be carried out. Additionally, issues regarding the laying down of memory and the general accuracy of memories make the detection of false or true memories even more complex. This is particularly so where the memories are not autobiographical and are of an event that took place a considerable time before the lie detection test.

(p. 353) However, proponents of the tests argue that it may be more accurate in revealing concealed memories than present techniques for questioning uncooperative suspects (Sartori et al 2008). The idea that a test can establish when information is being concealed obviously has great attraction to state authorities wishing to demonstrate that all efforts are being made to protect the public from those who are dangerous. For example, in England and Wales, basic lie detection technology is used to test the veracity of statements made by convicted paedophiles released on parole. A Ministry of Justice press release states that mandatory lie detection tests will be used for the 1000 most serious offenders, and that probation officers will be trained to administer the tests. The press release makes the following claims attributed to Professor Don Grubin:

Polygraph tests can be an important tool in the management of sex offenders and can enhance provisions already in place.

Previous studies have shown that polygraph testing both facilitates the disclosure of information and alerts offender managers to possible deception, allowing them to work with offenders in a more focused way. (Ministry of Justice and others 2014)

The nature of the training and the methods employed in the test will clearly affect the accuracy of the results. In August 2015, the *Daily Telegraph* reported that 63 sex offenders had been returned to prison with their licence withdrawn following polygraph tests (Ross 2015).

6. New Technologies and Difficult Questions for the Criminal Law

One area where technology has created difficulty for the law is in relation to end-of-life decisions. In June 2014, the UK Supreme Court gave its decision regarding a request for the review of the law relating to assisted suicide (*R on the application of Nicklinson and another v Ministry of Justice; R on the Application of AM(AP) v DPP* [2014]). New technologies in terms of medical advances mean that people are living longer, but possibly the circumstances of their continued existence are not as they would have wished. Some of these people will feel trapped by their situation and may wish to commit suicide but will be too severely disabled to do so without assistance. In England and Wales, it is a criminal offence to assist another to commit suicide. A recent Supreme Court decision reviewed the relevant law regarding those who would need assistance to bring their lives to

an end. One of the technological challenges that the court had to face was that one of the respondents, who (p. 354) died before the case reached the Supreme Court, had been able to communicate his thoughts to the world at large through social media using an eye blink computer. There was considerable public sympathy for his plight, possibly because of the very clear struggle he had to communicate his wishes. But perhaps the most interesting part of the Supreme Court's deliberations regarding technology are in relation to its ability to provide a machine that would deliver a fatal dose of the requisite drug to someone, in these circumstances, who wished to end their own life. The question of whether there was a violation of the right to life protected by Article 8 of the European Convention for the Protection of Human Rights and Fundamental Freedoms could not, according to Lord Neuberger, be considered in the absence of such technology:

Before we could uphold the contention that section 2 [of the Suicide Act 1961] infringed the article 8 rights of Applicants, we would in my view have to have been satisfied that there was a physically and administratively feasible and robust system whereby Applicants could be assisted to kill themselves (Nicklinson [2014]: para 120).

In Neuberger's opinion, the difficulty posed by the absence of the technology meant that an underlying moral issue could not be resolved: 'the moral difference between a doctor administering a lethal injection to an Applicant, and a doctor setting up a lethal injection system which an Applicant can activate himself'. This meant that to make the declaration of law requested by those bringing the case the effect would be to decriminalise an act

which would unquestionably be characterised as murder or (if there were appropriately mitigating circumstances) manslaughter. If, on the other hand, Dr Nitschke's machine, described in para 4 above, could be used, then a declaration of incompatibility would be a less radical proposition for a court to contemplate (Nicklinson [2014]: para 110).

The problem posed here was the absence of technological ability to design such a machine. Perhaps the more profound question is whether the creation of such a technology would merely change the nature of the discussion. Technology does not alter the issues concerning 'the right to die'; these are profoundly complex and not, one might think, in essence technological.

7. Legal Change through Pressure of Technological Advance

Perhaps the most important way in which the criminal law can respond to technological advances is to achieve appropriate measures to ensure that expert (p. 355) opinion evidence is properly admitted. If opinion evidence is pertinent and based on the best scientific knowledge and understanding, then the law should recognise its relevance in determining criminal responsibility. The rules regarding the admission of expert evidence in

criminal trials set out how expert evidence should be admitted in criminal courts (The Criminal Procedure Rules 2015: pt 19).

Part 19 of these rules makes clear the distinction between evidence that is accepted as fact and opinion evidence. The opinion of the expert must be objective and unbiased and the opinion given must be within the expert's area of expertise. It is made clear that the expert's duty to the court overrides any other obligation to the person who pays, or from whom the expert receives instruction. There is an obligation placed on any expert to make clear where any areas are outside her expertise when answering any question. Additionally, where the expert's opinion changes after the expert report is written and submitted to the court, that change must be made clear to the court. In relation to the process of introducing expert evidence, the rules clarify the requirements for the admissibility of evidence as a fact. The rules also strengthen the requirements with regard to evidence not admitted as a fact. Such evidence must detail the basis of the evidence; it must make clear whether there is evidence that substantially detracts from the credibility of the expert giving the opinion on which the submission is based. The party submitting the evidence must also provide, if requested:

- (i) a record of any examination, measurement, test or experiment on which the expert's findings and opinion are based, or that were carried out in the course of reaching those findings and opinion, and
- (ii) anything on which any such examination, measurement, test or experiment was carried out (19.3(d)).

Failure to comply with these requirements, unless the other parties agree to the submission of the evidence, or, the court directs that the evidence should be admitted will mean that the expert evidence will not be admitted. Furthermore, the admission of an expert report unless the expert gives evidence in person is subject to the same restrictions. Rule 19.4 sets out the framework for an expert's report and requires that the report give details of the expert's qualifications, experience, and accreditation. Very specific requirements are set out in the rules to allow for the validity of the expert evidence to be tested in court.⁷

The rules aim to avoid differences of expert opinion being aired in the courtroom as much as is possible, both in requiring the notification of parties involved in proceedings and requiring the identification of disputed matters (19.3). In cases where there are multiple defendants, the court may direct that a single expert gives evidence (19.7). The changes in the rules are an understandable response to the growth in technical understanding of many aspects of human behaviour. They reflect a desire on the part of those responsible for the criminal justice system that only the (p. 356) most valid scientific evidence is heard before a court. This, of course, creates challenges for valid science that is in its infancy and cannot pass some of the hurdles seemingly created by the new procedural rules.

8. Conclusion

There are scientific and technological issues that do pose difficult questions for the law where greater scientific and technological understanding will assist. For example, there are the two issues considered that still have to be fully addressed by the criminal law: the issues of developmental maturity and how this might affect criminal responsibility; and the issue surrounding our understanding of how memory is laid down. In particular, there are considerable problems faced by the courts in retrieving traumatic memories of sexual or other abuse. At present, sufficient developmental maturity for criminal responsibility is presumed from the age of ten. This is arguably extremely young, though the prosecution of young offenders occurs through the Youth Justice System and the courts related to that system. A greater understanding of the science surrounding these issues would assist the courts in the fair application of the law.

The introduction to the new rules of criminal procedure as a response to the growing scientific and technological knowledge base is to be welcomed. It seeks to avoid the problems that surfaced in the consideration of evidence in Angela Cannings' case. The aims of ensuring both parties to the case are notified of the precise basis on which the expert's opinion evidence is argued is an improvement. The pressure from advances in technological and scientific understanding will be more easily managed where there is clarity as to expertise and the basis of opinion. However, one of the greatest difficulties in *Cannings* was that, despite a vast quantity of medical and scientific evidence, it was not possible to identify with certainty the cause death. In that case, the Court of Appeal identified the failure to produce scientific evidence to establish what had caused the babies' deaths as a possible reason why the jury might have found the prosecution case more credible. Similarly, Professor Martin Conway argues, in relation to memory evidence, that often all the properly qualified expert will be able to say is that they are unable to identify whether the memory is accurate or not. Perhaps in this technological age judges will have to remind juries that there are still many issues that science cannot resolve. Juries may need to be reminded that the lack of scientific proof does not, however, prove the prosecution case, or for that matter the defence case either; it merely points to a gap in human knowledge.

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Notes:

(1.) See for example the application of the Criminal Practice Direction Part 33A in *R (on the application of Wright) v the CPS* [2015] EWHC 628 (Admin), (2016) 180 JP 273.

(2.) Cesare Lombroso was an early criminologist whose book *L'oumo delinquite* was first published in 1876. Drawing upon empirical research, he suggested that certain physical characteristics were shared by those who were criminal.

(3.) [135]: 'In our judgment, leaving aside Professor Morris' statistics, the general point being made by him is the obvious point that the science relating to infant deaths remains incomplete. As Mr Richards said when asked a question in the context of the amount of force necessary to cause injuries, he agreed that the assessment of injuries is open to a great deal of further experimentation and information. He assented to the proposition 'We don't know all we should'. Similarly, Professor Luthert in his evidence said:

'My reason for making that statement is simply that there are many cases where questions are raised as to how the child died and, because there is a big question mark over the circumstances, it is rather tempting to assume that ways of causing

death in this fashion that we do know about are the only reasonable explanations. But in fact I think we have had examples of this—I have heard already. There are areas of ignorance. It is very easy to try and fill those areas of ignorance with what we know, but I think it is very important to accept that we do not necessarily have a sufficient understanding to explain every case’.

As noted by the Court in *Cannings* and *Kai-Whitewind* these observations apply generally to infant deaths.’

(4.) The conviction of Cherry was upheld, Rock’s conviction for murder was quashed, and a conviction for murder substituted. The convictions of Harris and Faulder were quashed.

(5.) In the United States, while lie detection evidence is, at present, not admitted in criminal trials, law firms may still advise clients to take a test. This is because legal advisers argue that having a report from an expert regarding answers given relevant to the truth of statements made about the alleged crime can assist. The report can convince loved ones of innocence and may help in cases where the state prosecutor is uncertain whether to proceed or where a plea bargain may be made.

(6.) The two types of test are distinct. Lie detection records responses to questions which are designed to test whether the subject of the test is lying when responding to the questions asked. Memory detection may also test responses to questions, perhaps evaluating responses to information using fMRI scans to test if concealment is occurring, or may test responses to pictorial information, or to statements containing information only the suspect might know.

(7.) **19.4 Content of expert’s report**

Where rule 19.3(3) applies, an expert’s report must—

- ((a)) give details of the expert’s qualifications, relevant experience and accreditation;
- ((b)) give details of any literature or other information which the expert has relied on in making the report;
- ((c)) contain a statement setting out the substance of all facts given to the expert which are material to the opinions expressed in the report, or upon which those opinions are based;
- ((d)) make clear which of the facts stated in the report are within the expert’s own knowledge;
- ((e)) say who carried out any examination, measurement, test or experiment which the expert has used for the report and—
 - ((i)) give the qualifications, relevant experience and accreditation of that person,
 - ((ii)) say whether or not the examination, measurement, test or experiment was carried out under the expert’s supervision, and
 - ((iii)) summarise the findings on which the expert relies;
- ((f)) where there is a range of opinion on the matters dealt with in the report—
 - ((i)) summarise the range of opinion, and

- ((ii)) give reasons for the expert's own opinion;
- ((g)) if the expert is not able to give an opinion without qualification, state the qualification;
- ((h)) include such information as the court may need to decide whether the expert's opinion is sufficiently reliable to be admissible as evidence;
- ((i)) contain a summary of the conclusions reached;
- ((j)) contain a statement that the expert understands an expert's duty to the court, and has complied and will continue to comply with that duty; and
- ((k)) contain the same declaration of truth as a witness statement.

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Imagining Technology and Environmental Law

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Abstract and Keywords

Understandings of environmental law and technology are often co-produced as part of distinctive sociotechnical imaginaries. This essay explores this phenomenon by showing how Hardin's famous essay, the 'Tragedy of the Commons', is capable of being interpreted in two different ways, which provide divergent visions of the potential role of environmental law and technology in addressing environmental problems. The first, and more popular, interpretation characterizes law and technology as instruments for bringing about shifts in morality in light of limited resources. A different reading of Hardin's essay portrays law and technology in more constitutive terms. Identifying these different characterizations provides a starting point for a richer and more nuanced debate about the interaction between environmental law and technology. This is illustrated by an example from chemicals regulation.

Keywords: environmental law, technology, tragedy of the commons, socio-technical imaginaries, chemicals regulation

1. Introduction

ENVIRONMENTAL law is about the future, both normatively and substantively. Normatively, it is a subject concerned with the quality of life in communities, now and for future generations. Substantively, the vast bulk of environmental law is *ex ante* regulation. The prospective nature of environmental law means that the interaction between environmental law and technology is primarily an imaginative one. It is about how we as a polity envisage the roles that law and technology could play in ensuring environmental quality.

This chapter is about that process of imagination. It is about the narratives we tell about environmental law, environmental problems, and technology, and how those narratives can limit or broaden our legal imagination. Specifically, it focuses on one of the most pervasive 'origin myths' (Stirling 2009) in environmental law—Garrett Hardin's famous 1968 article, 'The Tragedy of the Commons'. 'The Tragedy of the Commons' (TC) is one of the key concepts in environmental law and much has been said about it (Ostrom 1990; Com-

mittee on the Human Dimensions of Climate Change 2002). At its simplest, the TC is a parable about collective action problems (p. 361) and how to solve them and, as Bogojevic has noted, Hardin's scholarship is 'at the heart of any regulatory debate concerning the control of the commons' (2013: 28). The TC also has much explicitly and implicitly to say about how technology can contribute to addressing environmental problems.

This chapter explores how the narrative of the TC can be understood in two distinctive ways, each way imagining different roles for law and technology. These two different understandings map onto two distinct tendencies in environmental law literature. The first is to see the TC as a device that understands law and technology as instrumental solutions to problems. The second is to understand 'commons problems' as narratives about the mutually constitutive relationships between understandings of law, technology, and environmental problems.

Overall, I show that different characterizations of the TC co-produce different understandings of law and technology, and thus different understandings of their potential (Jasanoff 2003). In this regard, the TC can be understood as giving rise to quite distinctive 'socio-technical imaginaries'. Jasanoff and Kim define socio-technical imaginaries as:

collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects. Imaginaries, in this sense, at once describe attainable futures and prescribe futures that states believe ought to be attained (2009: 120).

Focusing on how the TC can be understood as promoting different socio-technical imaginaries highlights the ways in which the entangled roles of environmental law and technology are malleable, culturally embedded, and framed by collective understandings. This chapter has three parts. First, it gives a brief overview of the TC and how it has influenced the development of environmental law. Second, it shows that the TC gives rise to two very different socio-technical imaginaries that promote different understandings of law and technology. This highlights the choices that can be made about how law and technology are imagined. Lastly, this chapter provides an extended example in relation to chemicals regulation.

Three important points should be made before starting. First, this chapter does not attempt to be a comprehensive analysis of the TC. Rather, it uses a study of the TC to show that 'origin myths' such as the TC directly influence how we understand environmental law and technology. Second, technology, as with law, is difficult to define (Li-Hua 2013). I define 'technology' broadly to include any form of 'applied science' (Collins and Pinch 2014: ch 1). A fundamental feature of such 'applied science' is that it is operating out in the physical and social world. Third, my primary focus in the initial sections is on United States (US) environmental law where the TC has had the most obvious impact. But, as shall be seen in the last section, the idea of socio-technical imaginaries is not limited to that legal culture.

(p. 362) **2. Hardin's Tragedy of the Commons**

Garrett Hardin, a scientist, published the 'Tragedy of the Commons' in 1968. The piece had started out as a 'retiring president's address to the Pacific division of the American Association for the Advancement of Science' and was Hardin's first 'interdisciplinary analysis', albeit an accidental one (Hardin 1998: 682). Hardin's essay was essentially a morality tale about liberal ideas of freedom. It was also a parable about how to think about environmental problems. The subtitle to the article was 'The population problem has no technical solution; it requires a fundamental extension in morality'. Hardin defined a technical solution as a solution 'that requires a change only in the techniques of the natural sciences, demanding little or nothing in the way of change in human values or ideas of morality' (1968: 1243).

The starting point for his article was a piece by two authors about nuclear proliferation, in which they concluded that:

It is our considered professional judgment that this dilemma has no technical solution. If the great powers continue to look for solutions in the area of science and technology only, the result will be to worsen the situation' (Hardin 1968: 1243).

As Hardin noted, 'technical solutions are always welcome' but the purpose of his article was to identify a class of problems he described as 'no technical solution problems' (1968: 1243). His particular focus was over-population and, like many morality tales, the overall piece has not aged well and is dated in feel. But what has remained durable from this 1968 article are a few paragraphs in which Hardin outlined what he saw as the TC.

'Picture a pasture open to all', Hardin tells us (1968: 1244), making clear his essay was an exercise in imagining. On this pasture, herdsman place cattle. Overuse of the pasture may be prevented by 'tribal wars, poaching and disease', but once 'social stability becomes a reality', it leads to each herdsman putting as many cattle as possible on it, leading to over-use of the pasture. 'Freedom in a commons brings ruin to all', Hardin tells us (1968: 1244). In the essay, Hardin also identifies the TC appearing in a 'reverse way' in relation to pollution, leading to what he described as the 'commons as cesspool' (1968: 1245). In dealing with the TC, he identified a number of possible responses—privatizing the commons, regulating access, taxing—but ultimately he highlighted the importance of 'mutual coercion mutually agreed upon' (1968: 1287).

Whatever one thinks about Hardin's essay, there is no doubt that '[p]rior to the publication of Hardin's article on the tragedy of the commons (1968), titles containing the words "the commons", "common pool resources", or "common property" were very rare in the academic literature' (van Laerhoven and Ostrom 2007: 5). After it, the study of the TC became part of many disciplines to the point that it (p. 363) has arguably given rise to a distinct disciplinary area with its own methodological challenges (Poteete, Janssen, and Ostrom 2010). My focus is on environmental law.

The TC has been a major justification for the rise of environmental law and for the form it has taken. In particular, the TC has promoted the idea that some form of legislative or legal intervention is needed to prevent environmental degradation. This idea can manifest itself in a variety of ways, varying from a simple need for legal coercion to an understanding of environmental law as a response to either problems of market failure caused by uncosted externalities, or the problems of collective action. As Sinden notes:

the ‘Tragedy of the Commons’ has become the central and defining parable of environmental law and the starting point for virtually every conversation about environmental degradation. And indeed, it is a compelling and powerful thought experiment. It lucidly illustrates the incentive structures that operate to make groups of people squander commonly held resources, even when doing so is against their collective self interest. And it explains the concept of externalities and how they lead to market failure (2005: 1408–1409).

The TC has been a catalyst for many developments in environmental law. It has promoted environmental federalism (Percival 2007: 30) and the rise of international environmental law (Anderson 1990). In that regards, Ostrom notes:

The conventional theory of collective action predicts, however, that no one will voluntarily change behavior to reduce energy use and GHG [greenhouse gas] emissions; an external authority is required to impose enforceable rules that change the incentives for those involved ... Analysts call for new global-level institutions to change incentives related to the use of energy and the release of GHGs (Ostrom 2010: 551).

An international treaty is thus ‘solving’ the collective action problem.¹ The impact of the TC can also be seen in the way it is one influence (albeit not the only influence) on the ‘polluter pays’ principle, in the way that principle is forcing the internalization of costs (Lin 2006: 909). Thus, the TC has had an influence on environmental enforcement and has been a justification for the idea that penalties would:

at a minimum ... recoup the ‘economic benefit’ externality derived by a polluter in failing to conform to a pollution standard when other companies had internalized the cost of pollution by spending the necessary funds to abate discharges into the air and water (Blomquist 1990: 25).

Moreover, the TC has resulted in two main legal responses to environmental problems. The first is command-and-control legislation that, as Rose notes, is often based on a ‘RIGHTWAY’ logic, in that it regulates ‘the way in which [a] resource is used or taken, effectively prescribing the methods by which users may take the resource’ (1991: 9). She notes ‘modern command-and-control environmental measures’ allow air emissions by regulatory actors ‘but only through the use of specific control equipment (the “best available technology”) such as scrubbers to contain the emissions from coal burning exhaust stacks

or catalytic converters on automobiles’ (p. 364) (Rose 1991: 10). In other words, an environmental law is often dictating particular technological choices based on the TC.

The second set of legal responses that resonate with the TC involve the use of regulatory strategies that internalize the costs of environmental impacts. These are described as economic instruments and include tradeable permits and taxation. Emission trading schemes are one of the most obvious examples of such economic instruments (Bogojevic 2013). A central aspect of such schemes is that they incentivize technological innovation by internalizing economic costs (Wiener 1999: 677). As Stallworthy notes:

the success of emissions markets depends on assuring that carbon prices remain sufficiently high to reflect the value of threatened environments and to incentivise technological innovation and lowest cost solutions (2009: 430).

In other words, the TC directly leads to the creation of particular relationships between environmental law and technology. The question is, what type of relationships?

At this point, things start to get a little sticky. Over the years, I have read Hardin’s essay many times and what has struck me is how ambiguous it is—an ambiguity often ignored in its retelling as part of the environmental law canon, but one not surprising, given its origins. Hardin was not a social scientist and it is unfair to expect him to be putting forward a sophisticated understanding of law and society. The significance of his essay lies far more in its expression of an origin myth about development and its environmental consequences. As Nye notes:

People tell stories in order to make sense of their world, and some of the most frequently repeated narratives contain a society’s basic assumptions about its relationship to the environment (2003: 8).

Hardin’s essay is such a narrative. However, as an origin myth, it can be understood in different ways. In particular, Hardin’s essay can be understood to give rise to two very different types of ‘socio-technical imaginary’—one that sees law and technology as instrumental, and another that sees them as far more substantive. Let me consider each in turn.

3. Environmental Law and Technology as Instruments

The first way that the TC can be understood as a sociotechnical imaginary is as a narrative in which technology, law, and morality are understood as separate from (p. 365) each other. On this telling, the TC is an essay in which Hardin wants his readers to focus on morality and how ideas of liberalism need to be adapted in light of limited resources. The focus on that value shift explains why the TC is a ‘no technical solution problem’.

That focus can also have implications for how technology and law are understood. In particular, on this approach, technology is framed as 'technical' and thus as instrumental. In this regard, Hardin is using a sense of 'technical' similar to that which Porter has identified as emerging in the 20th century: 'if we define the technical not just as what is difficult, but as what is inaccessible and, by general consent, dispensable for those with no practical need of it' (2009: 298). Classifying problems as 'technical problems' 'shunt[s] these issues off for consideration by specialists' (Porter 2009: 293) to be solved discretely. Technical expertise is instrumental and not open to public reason. This is not to say technology is not useful, but rather, for Hardin, it is a tool for morality.

Likewise, Hardin can also be understood as characterizing law as instrumental. It is part of a 'system' that needs to be updated in relation to contemporary issues (Hardin 1968: 1245–1246). Legal concepts and frameworks such as the commons, private property, statutory law, and administrative law needed to be adapted in light of morality. Indeed, Hardin can be seen to be arguing against the legal concept of the commons. He stated:

Perhaps the simplest summary of this analysis of man's population problems is this: the commons, if justifiable at all, is justifiable only under conditions of low-population density. As the human population has increased, the commons has had to be abandoned in one aspect after another (1968: 1248).

In other words, law needed 'elaborate stitching and fitting to adapt it' to the problems of overuse (Hardin 1968: 1245). Law can also be thought of as 'technical' in Porter's sense, in that its detail is seen as neither capable of being open to public debate nor relevant to such debate. Indeed, Porter uses legal knowledge as a prime example of technical knowledge (2009: 293).

Finally, it is also worth noting that law and technology are not only understood as instrumental and technical in relation to this 'instrumental sociotechnical imaginary', but also in regard to the way they shift values. As Holder and Flessas note:

Hardin, in 'The Tragedy of the Commons', acknowledges that the problems underpinning common usage are in fact problems of values. Regulation of access, and its concomitant framing of ownership, become necessary because in his hypothetical examples Hardin assumes values that are hostile to communality and commonality in regard to limited resources (2008: 309).

Law is thus adapted to respond to the need to shift values in light of the problem of limited resources. It is a tool for value change and nothing more.

This socio-technical vision of commons, technology and law has had a significant impact on contemporary environmental law. Thus, as already noted above, the (p. 366) TC was used from the early days as a justification for centralized command-and-control regulation that often would dictate technological choices either implicitly or explicitly: the Clean Air Act and the Clean Water Act in the US being cases in point (Ackerman and Stewart 1987: 172–173). In these foundational environmental statutes, both law and technology

were used as tools for environmental protection. Once those tools were found wanting in delivering environmental results, there was thus a shift to economic instruments that were seen as an alternative response to the TC. The legal framework was perceived as not delivering the required technological outcomes. Thus Ackerman and Stewart noted:

BAT [Best Available Technology] controls can ensure the diffusion of established control technologies. But they do not provide strong incentives for the development of new environmentally superior strategies and may actually discourage their development (1987: 174).

In contrast, Ackerman and Stewart argued that economic instruments, in particular the use of tradeable permits, would do the opposite. They argued:

A system of tradeable rights will tend to bring about a least-cost allocation of control burdens, saving billions of dollars annually. It will eliminate the disproportionate burdens that BAT imposes on new industries and more productive industries by treating all sources of the same pollutant on the same basis. It will provide positive economic rewards for the development by those regulated of environmentally superior products and processes (1987: 179).

The rise of emissions trading schemes and other forms of economic instruments can be seen as stemming from this logic. These different strategies are seen as a better response to the TC problem by encouraging technological innovation.

By the 1990s, this type of thinking gave rise to a 'toolbox' vision of environmental law (Fisher 2006), in which both technology and law were viewed as devices for addressing environmental degradation. This vision did not necessarily abandon command-and-control regulation (Gunningham 2009), but was based on the assumption that there was a need to adapt legal and technological responses in light of a specific environmental problem. Thus Gunningham, who has written much about 'smart regulation', notes:

Direct regulation has worked well in dealing with large point sources, particularly where 'one size fits all' technologies can be mandated. Economic instruments such as tradeable permits work best when dealing with pollutants that can be readily measured, monitored and verified and where there are good trading prospects (2009: 210).

The most important thing to note about this development is that both law and technology are viewed as instruments closed off from public reason.

The most obvious example of this instrumental mind set is the way emissions trading schemes have been promoted in different jurisdictions. Bogojevic has explored the instrumental characterization of law in sparkling and sophisticated detail in this area (Bogojevic 2009; Bogojevic 2013). She shows how scholars and policy makers have understood such schemes as 'straightforward regulatory measures' that require little in the way of discussion, because they involve a 'generic step-by-step design (p. 367) model' and a minimal role for the state (Bogojevic 2013: 11). Such schemes (and the technological innova-

tion they foster) are thus seen as instrumental to delivering international climate change obligations targets and as requiring no mainstream public debate. Another recent example is the OECD's promotion of the idea of 'green growth' (2011), which focuses on ensuring environmental and economic policy 'are mutually reinforcing' (2011: 10). 'Innovation will play a key role' in this relationship, the OECD states, as '[b]y pushing the frontier outward, innovation can help to decouple growth from natural capital depletion' (2011: 10).

Much criticism has been levelled at this instrumental approach to thinking about law and technology. Some of it comes from an ethical and normative perspective (Gupta and Sanchez 2012; Sinden 2005) and some from a legal scholarship perspective (Bogojevic 2013). The most significant critique has been from Elinor Ostrom, who has shown how Hardin's analysis of both the TC problem, and the solution to it, was a gross over-simplification that ignored the variety of social arrangements, particularly in other cultures, that have developed to manage the commons (1990). Nearly all these scholars are critiquing the instrumental understanding of both law and technology. Thus Ostrom, Janssen, and Anderies argue that the TC has given rise to an approach in which law is used as a 'panacea' to solve problems:

Advocates of panaceas make two false assumptions: (i) all problems, whether they are different challenges within a single resource system or across a diverse set of resources, are similar enough to be represented by a small class of formal models; and (ii) the set of preferences, the possible roles of information, and individual perceptions and reactions are assumed to be the same as those found in developed Western market economies (2007: 15176).

Ostrom, Janssen, and Anderies are thus also highlighting the way in which an instrumental understanding of the TC is used as a way of promoting a homogeneous understanding of environmental problems—one in which culture plays no role. Indeed, Ostrom's work has been about exploring the variety of institutional arrangements that do, and can, exist to manage common pool resources. This analysis is far less instrumental—it understands law, institutions and environmental problems as existing in a 'co-evolutionary' relationship (Dietz, Ostrom and Stern 2003: 1907). This is a very different type of narrative about environmental problems, law, and technology.

4. Environmental Law and Technology as Mutually Constitutive

My concern is not directly with Ostrom's work but with the type of socio-technical imaginary that Hardin's work did, and could, promote in environmental law. (p. 368) Returning to Hardin's essay, there is a certain paradox in the type of socio-technical imaginary it has promoted. As seen above, Hardin was arguing against technical solutions to commons problems and yet the TC has been the justification for treating law and technology as instruments to bring about shifts in morality and behaviour. In other words, the TC has be-

come a narrative promoting technical solutions. It is useful to ponder Hardin's argument a little further to show that other interpretations are possible.

I argue that there easily are alternative understandings of the TC. It is important to remember that Hardin's subheading was 'The population problem has no technical solution; it requires a fundamental extension in morality'. The thrust of his argument was against solutions that were about changes in 'technique'. His focus was on scientific technique, but it can be read as a more general argument against 'technical solutions' in Porter's sense (Porter 2009). Hardin's idea of 'tragedy' came not from ideas of unhappiness, but rather from the philosopher Whitehead's notion that tragedy 'resides in the solemnity of the remorseless working of things' (Hardin 1968: 1244). Hardin's essay was about how environmental problems were the product of social arrangements and in particular how we understand human behaviour, markets, and states. Drawing on the work of a nineteenth-century 'mathematical amateur', Hardin proposed the TC as a rebuttal of Adam Smith's concept of the 'invisible hand'. His discussion of the role of the state (and ideas of coercion), and the possible role of private property were ways to understand that dealing with problems such as overpopulation and pollution required thinking about society and 'not quick technological fixes' (Hardin 1968: 1244).

In particular, Hardin's analysis was responding to a specific American notion of freedom (Foner 1998). To put the matter another way, his 'origin myth' was confronting other 'origin myths' that existed in the US at that time. These myths often had their roots in narratives about US westward expansion and promoted distinctive ideas of liberalism (O'Neill 2004). Indeed, it is striking to think Hardin was writing at a time just after the peak of the great Hollywood Westerns, which present important imaginaries 'about the founding of modern bourgeois law abiding, property owning, market economy, technologically advanced societies' (Pippin 2010). Hardin is really confronting that imaginary. 'Coercion is a dirty word to most liberals now', Hardin notes (1968: 1247), and the essay is an attempt to show why that should not be the case. Hardin was explicitly arguing against the status quo (1968: 1247–1248). The essay is peppered with examples from the American frontier and American life: Christmas shopping parking and controlling access to US national parks. In other words, while the TC can be read as a simple device that provides answers to problems of environmental degradation, it can also be read as a narrative about the importance of how environmental problems are socially framed. In other words, there is a reading of the TC that provides a more substantive role for law and technology. This role recognizes that technology has a significant institutional aspect, which is closely interrelated with socio-political orders (p. 369) and legal orders. This is not only a 'thicker' description of technology than the one given previously in this chapter, but also a 'thicker' understanding of law (Fisher 2007: 36). As Collins and Pinch note, technology is not 'mysterious' but 'as familiar as the inside of a kitchen or a garden shed' (2014: ch 1). Technology thus interrelates with day-to-day life. Technology is shaped by the physical and social world, and vice versa.

This reading chimes with elements of Ostrom's work, and also interrelates with a large swathe of environmental law scholarship, which shows that law is not just an instrument, but that it frames our understanding of technology (Jasanoff 2005); property concepts (Rodgers 2009; Barritt 2014); and the role of public administration (Fisher 2007). Law has a substantive and constitutive role to play in shaping our understanding of what technology is and what it can be. Moreover, in other disciplines, particularly Science and Technology Studies, there is recognition that 'institutional practices in science and technology are tacitly shaped and framed by deeper social values and interests' (Expert Group on Science and Governance 2007: 9). This does not only mean that technological choices are normative choices (which they clearly are), but also that the ways in which technology is conceptualized are dynamic and shaped by the social order. Understandings of the social and physical world are co-produced in legal forums (Jasanoff 2010) and law and administrative practice are delimiting and demarking technology (Lezaun 2006). Law, technology, and our understandings of the world are malleable.

The question then becomes what the most productive and constructive ways of thinking about environmental law and technology actually are (Latour 2010). Hardin's point was to avoid partitioning off problems into the unreachable world of the technical, i.e. beyond public reason. As such, the TC could be seen as promoting a very different socio-technical imaginary from that which it has mainly promoted—an imaginary in which technical solutions need to be avoided. An important part of this thicker vision of the TC is Hardin's idea of 'mutual coercion mutually agreed upon'. Hardin is highlighting that responses to TCs cannot be derived from deferring to experts; rather, those responses must be developed in mainstream governance forums. As Collins and Pinch note:

Authoritarian reflexes come with the tendency to see science and technology as mysterious – the preserve of a priest-like caste with special access to knowledge well beyond the grasp of ordinary human reasoning (2014: ch 1).

Hardin is arguing the opposite. For something to be 'mutually agreed upon', it must be within the realm of 'ordinary human reasoning'.

I should stress I am not engaging in some act of revisionism. My point is that the TC has been responsible for one type of narrative in environmental law, but that narrative is not inevitable. Law and technology need not just be understood as instruments, but should also have more substantive and mutually constitutive roles. Another socio-technical imaginary about environmental (p. 370) law and technology is possible, but it is an imaginary in which both play a more constitutive role.

That mutually constitutive relationship can be seen if one looks at the economic sociologist Michel Callon's work on 'hot' and 'cold' situations; it highlights how there are choices to be made in how the social and physical world are co-produced (Fisher 2014). In an essay exploring the idea of economic externalities and markets (and thus exploring similar ground to Hardin), Callon has noted:

For calculative agents to be able to calculate the decisions they take, they must at the very least be able to a) draw up a list of possible world states; b) hierarchize and rank these world states; c) identify and describe the actions required to produce each of the possible world states. Once these actions have become calculable, transactions and negotiations can take place between different agents (1998: 260).

This can be thought as a 'business as usual model' where actors and actions operate within a settled and solid framework. Law is clearly playing a role in creating those frameworks. Any legal frame will be imperfect and will create what Callon calls 'overflows'—no frame controls and contains everything (1998: 248–250). An externality, whether positive or negative, is an example of an overflow, but the assumption is that it can be recognized and managed either by the parties or by some form of regulation. This is what Callon describes as a 'cold situation' (1998: 255), which is a situation where actors can calculate the costs and benefits of various actions and negotiate and/or act on that basis (Callon 1998: 260). We might also think about such situations as allowing for 'technical solutions' because negotiation and calculation does not seemingly need any form of moral or socio-political debate and discussion. In this regard, this is the type of understanding of commons problems that Hardin was arguing against. This is even though his TC parable, by identifying world states, relevant parties, and possible actions, also took on a 'cold situation' feel.

For Callon, 'cold situations' are very different from 'hot situations'. The latter are those situations in which:

everything becomes controversial: the identification of intermediaries and overflows, the distribution of source and target agents, the way effects are measured. These controversies which indicate the absence of a stabilised knowledge base, usually involve a wide variety of actors. The actual list of actors, as well as their identities will fluctuate in the course of a controversy itself and they put forward mutually incompatible descriptions of future world states (1998: 260).

Many environmental problems can easily be thought of as 'hot', particularly commons problems. There is difficulty in identifying source and target agents and there is a wide group of actors. There is a lack of a stabilized knowledge base. There are mutually incompatible understandings of the world. The 'hot' nature of environmental problems is reinforced by the fact that most environmental law is operating *ex ante*.

(p. 371) In 'hot situations', law has an important role in reframing our understanding of the world and responsibilities in relation to it (Leventhal 1974; Fisher 2013). Those frames often cut across existing legal frameworks and understandings of responsibilities. Environmental law can thus be understood as a process in which environmental problems and technology are reframed in the search for a 'better' approach (Howarth 2006; Winter 2013). Lange and Shephard (2014) have argued the need to take an eco-social-legal approach to thinking about water rights in which the mutually constitutive and malleable relationships between law, environmental degradation and technological practices are

charted. Neither law nor technology are just tools, but rather they are substantive and malleable. They are also not separate from morality. Another socio-technical imaginary is possible.

5. Reimagining Environmental Law and Technology: Chemicals Regulation as a Case in Point

Let me provide one simple example of this mutually constitutive narrative of law, technology, and environmental problems: chemicals regulation (Fisher 2014). The way in which law frames many technologies has been beautifully charted by other scholars (Jasanoff 2005; Lange 2008). At first glance, chemicals do not seem to fit into such an analysis in that chemicals are not seen as technologies but instead as discrete physical objects that are immutable. But the use of chemicals is ‘applied science’. The focus of chemicals regulation is not so much chemistry but how chemicals are utilized in different industrial and manufacturing processes. Moreover, if one looks at different regulation regimes concerned with chemical safety in different legal cultures, they are framing the technology of chemical use in different ways.

There are many different stories we can tell about chemicals (Brickman, Jasanoff, and Iglén 1985), and many of these narratives overlap with a TC narrative. Thus, it is commonly understood that problems with chemicals safety arise because there was no historical incentive for manufacturers to test their chemicals for safety (Lyndon 1989). This was because there were no laws stopping unsafe chemicals being placed on the market. This created a ‘commons problem’, in that it was not in the manufacturer’s self-interest, while it was in the common good, to provide such information (Wagner 2004). Not only was such information expensive to produce, but there was also no market advantage in producing it. Indeed, quite the opposite. Just as with the classic TC, command-and-control legislation was seen as needed (p. 372) to address this problem. Because many chemicals were already sold on the market, this legislation primarily applied to new chemicals. But just as with other such legislation, chemicals regulation was seen as problematic because it was seen as hindering technological innovation by making the production of new chemicals expensive (Sunstein 1990).

This narrative can easily be fit into a techno-social imaginary of law and technology as instrumental. Accordingly, it can be argued that the US Toxic Substances Control Act 1976 adopted a command-and-control approach, while the EU, in its REACH regulation, adopted a market-based approach to dealing with the commons (Fisher 2008). The problem with this narrative is that it ignores the way in which these different regimes frame chemicals differently. To put the matter another way, chemicals are imagined as very different ‘regulatory objects’ (Fisher 2014).

Thus, under the original Toxic Substances Control Act 1976 (TSCA) in the US, chemicals are understood as objects that are regulated only when a certain level of 'risk' is identified. The power of the Environment Protection Agency (EPA) Administrator is not a general power to regulate all chemical substances. Thus, while the Administrator must keep an inventory of chemical substances manufactured over a certain quantitative threshold (15 USC § 2607(b)(1)) and must be notified of their production (15 USC § 2604), the power of the Administrator is only in cases where a 'risk' exists. Testing requirements can only be imposed where a chemical substance 'may present an unreasonable risk of injury to health or the environment' (15 USC § 2603(a)(1)(A)(i)). The actual regulation of a chemical substance can only be where there is a 'reasonable basis to conclude that the manufacture, processing, distribution in commerce, use, or disposal of a chemical substance or mixture, or that any combination of such activities, presents or will present an unreasonable risk of injury to health or the environment'. If such a basis exists, the Act lists a number of different regulatory requirements that the Administrator can impose 'to the extent necessary to protect adequately against such risk using the least burdensome requirements' (15 USC § 2605). Under the TSCA, chemicals are conceptualized as a 'risky' technology, and are regulated as such.

In contrast, under the EU REACH regime, chemicals are treated as market objects. The White Paper on a *Strategy for a Future Chemicals Policy*, which launched debate about REACH, noted the real problem in chemical safety was 'the lack of knowledge about the impact of many chemicals on human health and the environment' (Commission 2001: 4). That generation of information is through the market and thus the REACH regulation was passed under the internal market competence (now Art 114 TFEU), not the environmental protection competence (now Art 192(1) TFEU), and DG Enterprise and Industry is responsible for it in the European Commission. The primary, and most controversial, regulatory obligation of the REACH regime has been Article 5 (Fisher 2008). It is explicitly entitled 'No data, No market'. It states:

(p. 373)

Subject to Articles 6, 7, 21 and 23, substances on their own, in preparations or in articles shall not be manufactured in the Community or placed on the market unless they have been registered in accordance with the relevant provisions of this Title where this is required.

Article 5 is creating a regulatory identity for the substances as soon as they are 'manufactured' or 'placed on the market'. Under REACH, chemicals are market 'technologies'. Their identity as objects to be regulated comes from the fact that they are economic commodities.

In other words, the distinction between US law and EU law is not just a distinction between a command-and-control approach and a market-based approach. Each legal regime is imagining the problem differently and thus imagining chemicals differently. In the US, the problem is understood in terms of human health risks and thus chemicals are regulated to reduce risk. In the EU, the regulatory logic of REACH is based on the problems that

lack of information about chemical safety create for market competitiveness. Chemicals are thus regulated to ensure that competitiveness. Nor is our legal and technological imagination simply limited to a binary choice between state-based law and market-based law.

Take, for example, the Californian Green Chemistry Initiative (CGCI) that characterizes chemicals as ‘scientific objects’, although in doing so does not turn chemicals into something that can only be governed in the realm of Porter’s ‘technical’. The CGCI has developed as a specific legal manifestation of a broader international discourse about green chemistry and its variations that has been ongoing since the early 1990s (Anastas and Kirchhoff 2002). This discourse began within the sphere of regulatory science, not regulatory law, and the focus of discussion has been upon the scientific design of chemical products so as to reduce, or eliminate, hazard. Design is thus understood as ‘an essential element in requiring the conscious and deliberative use of a set of criteria’ (Anastas and Kirchhoff 2002: 686). As Linthorst notes about green chemistry:

it is a combination of several chemical concepts, a conceptual framework that can be used in the design of chemical processes achieving environmental and economic goals by way of preventing pollution ... Two concepts form the heart of this green chemistry philosophy. The first concept is Atom Economy, which is ‘at the foundation of the principles of green chemistry’, and, the other one is catalysis, which is a ‘fundamental area of investigation’ (2010).

Thus green chemistry is largely about factoring environmental and health protection into molecular design (Iles 2013: 465). The primary actors governing chemicals in green chemistry are thus the scientists in the laboratory developing chemicals (Iles 2013: 467). With that said, green chemistry is outward looking. It cannot operate without attention being paid to the uses to which chemicals are being put. The focus is not only on design but also the development of safer chemical products. Green chemistry is thus about law reframing understanding of chemicals and thus technology.

(p. 374) This reframing can be seen in how California has taken Green Chemistry forward. In 2008, California produced a report that outlined six recommendations: ‘expanding pollution prevention; developing a green chemistry capacity; creating an online product ingredient network; creating an online toxics clearinghouse; accelerating the quest for safer products; and moving from a “cradle-to cradle” economy’ (Californian Environmental Protection Agency and Department of Toxic Substances Control 2008: 3). This report has been followed by two laws. Senate Bill 509 introduced a new title into the Health and Safety Code entitled ‘Green Chemistry’ and created a requirement for a Toxics Information Clearinghouse. Assembly Bill 1879 empowered the Californian Department of Toxic Substances Control (DTSC) to identify and prioritize chemicals in relation to both their use and their potential effects and then to ‘prepare a multimedia life cycle evaluation’ in relation to them. The law required the Department to develop regulations that aim to reduce hazards from chemicals of concern and encourage the use of safer alternatives. The

law also created a Green Ribbon Science Panel that may, among other things, ‘assist the department in developing green chemistry’.

These two regulations referred to above came into force in October 2013. The Safer Consumer Products Regulation provides a definition of chemicals more akin to that under TSCA (§ 69501.1(a)(20)(A)(1)–(2)). The Regulation places significant emphasis on information gathering and disclosure. It also identifies a ‘candidate chemicals’ list that is primarily generated by chemicals being classified and regulated under other regulatory and policy regimes in the US, EU, and Canada. Chemicals thus become ‘candidate chemicals’ under the Californian regime because they have been identified under other regimes. The ‘candidate chemical’ list is operating as a tool for identifying which chemicals may require further scientific analysis.

The Regulation then requires the development of a priority list of products through identifying ‘product/candidate chemical combinations’. The criteria for being placed on the list are exposure and the potential for adverse impact, where adverse impact is defined in considerable detail. Alternative analyses must be carried out for priority products and this involves a number of stages. The first stage involves an identification of product requirements and the functions of the chemicals of concern (those in the priority list), and then an identification of alternatives. The second stage involves carrying out a multimedia life cycles analysis of alternatives. This process is largely a scientific and analytical one—the point of the regulations is that they require going ‘back to the drawing board’ in thinking about chemical use and product design. Thus, while the regulations do allow for regulatory responses on the part of the Department, the primary focus of the regulations is requiring manufacturers to carry out particular types of scientific and research inquiry.

I have provided this extended example of the CGCI because it provides a good example of how law, environmental problems, and technology can be imagined in very different ways. Chemicals and their nature are being opened up to public (p. 375) scrutiny and public reason. It is a very different socio-technical imaginary than one in which law and technology are simply instruments to achieve a particular moral shift. It chimes with Hardin’s arguments about being wary of technical solutions and makes clear that the status quo can come in many different forms. Hardin demanded that his readers imagine the environment and its capacity in a different way—a way that did not sit easily with existing political narratives, but which had implications for law.

What can be seen in this example relating to chemicals regulation is that the process of imagination can take different forms, and will be embedded in different legal cultures. Thus TSCA can be seen as a product of a vision of the US administrative state in which its role is to assess risk (Markell 2010; Boyd 2012). In contrast, REACH grows out of very distinctive ideas of regulatory capitalism that have been a by-product of European integration (Levi-Faur 2006; Fisher 2008). In particular, the EU experience is one in which markets are malleable frameworks that can be constructed in many different ways (Fligstein 2001). In contrast again, green chemistry has grown out of the distinctive experi-

ences of regulatory science (Jasanoff 1990). Law and technology in all these cases are not just instruments but are mutually constitutive.

6. Conclusion: Taking Imagination Seriously in Thinking about Environmental Law and Technology

This chapter has been about how environmental law scholars imagine environmental law and technology. In particular, it has shown how Hardin's account of the TC has led to a socio-technical imaginary that promotes an instrumental understanding of law and technology. There is a certain irony in this because the main thrust of Hardin's essay was to argue against 'technical solutions' and his short article can be understood as the basis of a different socio-technical imaginary in which law and technology play more substantive and constitutive roles. This imaginary is not particularly radical and, as previously discussed, can explain the very different framings of chemicals in different legal cultures.

Latour has suggested societies often 'lack a narrative resource' about technology (1990). While those narratives are not always explicit, it is not that they don't exist, but rather they are embedded in wider 'origin myths' about the nature of society. We cannot imagine technology without imagining law and society. As Jasanoff and Kim (2013: 190) note, 'sociotechnical imaginaries are powerful cultural resources (p. 376) that help shape social responses to innovation'. By recognizing such imaginaries and their impact upon the development of environmental law and technology, it becomes apparent that choices can be made about the direction and nature of both environmental law and technology. Those choices are not simply choices about regulatory strategy and technological innovation, but choices about how we choose to imagine the world and how we choose to live in it. To put the matter another way, there are different ways to think about Hardin's 'pasture open to all'.

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Notes:

(1.) As we shall see, Ostrom is critical of this assumption.

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From Improvement Towards Enhancement: A Regenesi of EU Environmental Law at the Dawn of the Anthropocene

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Abstract and Keywords

This chapter discusses a host of what mostly are still isolated ad hoc technology-driven initiatives, usually in support of human (rights) imperatives, which effectively endeavour to engineer and re-engineer living and non-living environments in ways that have no natural, legal, or historical precedent. The umbrella term I propose to capture such initiatives is ‘environmental enhancement’. Potential examples that fit this definition include genetic modification of disease-transmitting mosquitoes to protect human health, solar radiation-management initiatives and other forms of climate engineering to sustain human life on earth, the creation of new life forms to secure food supplies and absorb population growth, and de-extinction efforts that help restore the integrity of ecosystems. The question this paper asks, in the words of Brownsword, is whether conventional environmental law ‘connects’ with environmental enhancement, focusing on EU environmental law, and whether states may be duty-bound to enhance environments in pursuit of human rights imperatives.

Keywords: Anthropocene, environmental law, EU environmental law, human rights, enhancement, technologies, regulation

1. Introduction

IN *The Natural Contract*, Michel Serres discusses the implications of what now is widely referred to as the Anthropocene (2008: 4). The term denotes a new geological epoch succeeding the Holocene in which, some insist with catastrophic global consequences for human welfare, technology-driven anthropogenic impacts on the Earth’s biosphere have merged and surpassed the great geological forces of nature. The Anthropocene calls into question deeply entrenched psychological, political, and philosophical divides; between humans and nature, between the local and the global, between the individual and the collective, and between the present and the future. Rather than a scientific construct, the Anthropocene thereby above all is (p. 380) normative, representing a watershed moment

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for philosophy, policy, and law (Clark 2015). More than any other legal discipline, it is environmental law that is forced to face uncomfortable questions that are little short of existential.

Apocalyptic expert opinions about the implications of the Anthropocene are all too plausible, and particularly in the lead up to the COP21 Paris Climate Summit, alarmingly widespread (Luntz 2014). Serres entertains hopes that the paradigm-shift the Anthropocene should usher in may help humankind to muster the vision and resolution to embrace a Natural Contract. There is indeed every reason to add to a Social Contract that has served to promote peace amongst peoples, but which has proved unfit to prevent the destructive wars humankind has waged against nature and thereby against itself:

If we judge our actions innocent and we win, we win nothing, history goes on as before, but if we lose, we lose everything, being unprepared for some possible catastrophe. Suppose that, inversely, we choose to consider ourselves responsible: if we lose, we lose nothing, but if we win, we win everything, by remaining the actors of history. Nothing or loss on one side, win or nothing on the other: no doubt as to which is the better choice. (Serres 2008: 5)

The Anthropocene highlights that technological impacts on earth systems have become geological forces in their own right, and a range of existing and emerging technologies now allow regulators to entertain realistic hopes of directing those forces to re-engineer planet Earth for the good of humankind. In short: circumstances combine to give rise to an increasingly plausible vision of Earth 2.0.

It is against that background that this chapter intends to discuss a host of what mostly are still isolated ad hoc technology-driven initiatives, usually in support of human (rights) imperatives, which effectively endeavour to engineer and re-engineer living and non-living environments in ways that have no natural, legal or historical precedent. The umbrella term I propose to capture such initiatives is ‘environmental enhancement’.¹ A proposed preliminary definition of environmental enhancement is as follows:

Intentional interventions to alter natural systems, resulting in unprecedented characteristics and capabilities deemed desirable or necessary for the satisfaction of human and ecological imperatives or desires.

The definition serves as a starting point for discussion, and certainly does not claim any finality. Examples that fit this definition include genetic modification of disease-transmitting mosquitoes to protect human health,² solar radiation-management initiatives, and other forms of climate engineering to reduce climate change impacts, the creation of new life forms to secure food supplies and absorb population growth, and de-extinction efforts that help restore the integrity of ecosystems. Whereas these examples may suggest that environmental enhancement is a new phenomenon, the Haber-Bosch process has been used (p. 381) for over a century. Through this process, atmospheric nitrogen is purposefully converted into ammonia, allowing for the mass production of artificial fertilizer in support of ever-increasing food demand (or, we might equally well argue, in pursuit of ‘the

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right to food'). The process has changed the planet's nitrogen cycle more profoundly than any natural event has ever done before (Erisman and others 2008).

Inviting comparison with the difficulties in distinguishing conventional 'medical therapy' from 'human enhancement' (Cohen 2014), the dividing line between orthodox 'environmental improvement' and controversial manifestations of environmental enhancement is equally hard to pin down. That conceptual difficulty may remain of mere academic interest if the regulatory architecture underpinning what we may term 'conventional environmental law' is fit to engage environmental enhancement policies, but it is by no means clear that is the case. Accordingly, the question this chapter addresses, in the words of Brownsword, is whether conventional environmental law 'connects' with environmental enhancement (Brownsword and Somsen 2009). It does this by focusing on EU law as a regulatory domain. The EU provides a fitting context for this discussion for at least two reasons. First, its role in setting environmental policy and law across the Member States of the European Union is both well-established and paramount. Second, the EU possesses the powers and instruments directly to impose obligations on Member States and EU nationals, and it is committed to wielding these powers to ensure respect for (environmental) human rights.

Although the context of existing EU environmental law should help focus the discussion of our central question, the task remains a daunting one. This is so not only because it requires a first conceptualization of environmental enhancement, but also because there is no single yardstick by which to pronounce on questions of regulatory disconnection. In the abstract, we may say that disconnection manifests itself when the continued application of a regulatory regime to novel (uses of) technologies undermines the realization of agreed regulatory goals (effectiveness), or when this compromises agreed principles, procedures, or institutions pertaining to the legitimacy of either regulatory goals themselves, or the way in which these are realized. The agreed goals, principles, procedures, and institutions that make up EU environmental law are numerous and diverse and found throughout the treaties and international conventions to which the EU is a party. Our conclusions about the fit between EU environmental enhancement and environmental law therefore must be articulated at a fairly high level of abstraction.

To answer our central question about regulatory connection, the case must be made that environmental enhancement is a discrete phenomenon with autonomous meaning and significance over and above the concept of 'environmental improvement' employed in Article 191(1) TFEU. In order to examine the (p. 382) regulatory connection between environmental law and environmental enhancement, we must first articulate a workable caricature of current EU environmental law. The odds that a fit between environmental law and environmental enhancement will emerge from our analysis may appear poor from the start, because the latter in essence is a reluctant response to structural flaws in the central tenets of the former. Thus, environmental enhancement involves often highly risky technological interventions in poorly understood and complex ecological and social systems, which are seriously considered only because of irrefutable evidence of catastrophic

threats to human welfare that half a century of environmental regulation has allowed to materialize.

Legal scholars, philosophers, and political scientists ought to turn their attention to environmental enhancement as a matter of urgency, because it could soon prove a rational policy response to impending ecological catastrophe, risk and regulatory disconnection notwithstanding.³ The complex scientific discourse of critical planetary thresholds, captured in the Planetary Boundaries Hypothesis (Rockström and others 2009; Nordhaus, Shellenberger and Blomqvist 2012), imparts particular urgency in the discussion this chapter seeks to set in motion, as it is not implausible that regulators may take it as implying *duties* to pursue enhancement policies aimed at proactively steering clear of those critical apocalyptic thresholds (Pal and Eltahir 2015⁴). It has been observed that climate change, for example, is a:

threat that, identifiable only by specialist scientists, demands of non-experts a special scrupulous exactness about the limits of our own knowledge. We have to confess our own reliance on debates in which we cannot intervene, yet not allow our uncertainty to become vacillation or passivity. [...] *We are called upon to act with unprecedented collective decisiveness on the basis of a probability we cannot assess for ourselves, is not yet tangible, yet is catastrophic in its implications.*

(Perez Ramos 2012: emphasis added)

It will be further suggested that a striking degree of congruence between conventional EU environmental law instructing the EU to ‘preserve, protect and improve’ the environment and the United Nation’s ‘respect, protect and fulfil’ framework applying to (environmental) human rights could serve to endow that claim with legal pedigree.

Focusing on the EU as environmental regulator, the remainder of this chapter accordingly is in three parts. Part 2 seeks to capture the central tenet of current EU environmental law and confronts environmental enhancement policies with this conventional paradigm. Part 3 tentatively explores the plausibility of constructing duties to engage in enhancement policies, and for that purpose attempts a re-interpretation of conventional environmental law in accordance with the United Nation’s Respect, Protect, Fulfil framework. Conclusions are brought together in part 4.

(p. 383) 2. EU Environmental Law and Environmental Enhancement

2.1 The Central Tenet of EU Environmental Law

If we imagine ourselves moral and omniscient regulators anticipating the onset of anthropogenic climate change in the mid-1850s,⁵ doubtlessly we would have immediately and decisively acted to *preserve* the integrity of the climate. This we would have done by, first, adopting prevailing temperatures as a legally binding baseline, and abstaining from state

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initiatives that cause temperatures to rise above that baseline. Second, we would have realized that, in addition, proactive policies are needed to *protect* the climate against private assaults, channelling the behaviour of private actors so as to keep CO₂ emissions under control. Third and finally, we would have closely and continuously monitored the effectiveness of the totality of climate measures adopted. Where we found that emissions had risen, risking anthropogenic impacts, we would have swiftly responded by introducing additional measures to *improve* the trend until original baseline levels were restored. In the contemporary language of Article 191(1) TFEU: we would have acted with a view to ‘preserving, protecting and improving’ the quality of the environment.⁶ We would have measured the effectiveness of our three-tiered policy to preserve, protect, and improve the climate against our self-imposed baseline, which at the same time would have been constitutive of the primary obligation to preserve, protect, and improve the climate, and decisive for the scope of those obligations.

This latter point is of crucial importance, as it not only goes a long way towards explaining current environmental crises but, as will be explored further, also foretells what regulators may aspire in terms of engineering Earth 2.0 with enhancement policies at their command. We may loosely conceive of this absence of an autonomous generic ecological baseline as environmental law lacking an equivalent of ‘human dignity’ with which every human life is deemed to be intrinsically endowed, irrespective of time and place, and which serves as a shield (or, depending on one’s take on human dignity, a sword) to fend off destructive interferences with the essence of the human condition.⁷ The closest equivalent in contemporary environmental law is perhaps the ‘non-degradation principle’, found in US Wilderness Law⁸ and occasionally also in secondary EU environmental law (Glicksman 2012). However, in both cases, the principle remains conditional, triggered only after discretionary exercises of power by Congress to designate an area as ‘Wilderness’, or by equally contingent exercises of legislative powers by the EU legislator. EU environmental law therefore is devoid of an unconditional baseline of general application, (p. 384) leaving much of the environment *ipso facto* unprotected against even the most destructive or frivolous of human assaults.⁹

If Serres’ vision of a Natural Contract is ever to become reality, a first-order principle of ecological integrity of general application should be at the heart of its design. It is true that the precautionary principle, elevated in Article 191(2) TFEU to a general principle of EU environmental law, provides the EU legislator with powers to act even in the absence of solid scientific evidence of environmental risk. But, unlike human dignity, which shields humans against even benign unsolicited external interferences, the precautionary principle is triggered only in the face of reasonable grounds for concern that serious and/or irreversible harm to the environment may occur. Moreover, although lowering the evidential threshold for regulatory action, it is doubtful if in isolation the precautionary principle can give rise to justiciable EU *duties* to act to engage novel matters of environmental concern.¹⁰ At best, such precautionary duties could possibly arise in pre-existing statutory contexts, engaging the specific environmental imperatives explicitly recognised and articulated in such regimes. By way of illustration, Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora represents a comprehensive regime, specif-

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ically protecting some 220 habitats and 1000 species listed in its Annexes (OJ L106/1). Precautionary duties might arise to add specific habitats or species to the list of protected species in line with the objectives and operational principles entrenched in this pre-existing regime,¹¹ even though as yet the author is not aware of precedents that back up this assertion.

This being as it may, what matters for now is that, by virtue of Article 191(1) TFEU, the core of EU environmental policy consists of a three-tiered programme of preserving, protecting, and improving the environment. Second, such action is set in motion by, and is substantively delimited through, discretionary powers exercised at the whim of EU institutions that can decide to assign protective baselines to environments that, until that time, remain unprotected. Put crudely, until the Scottish grouse is explicitly assigned protected status, it can be served for dinner.¹²

In the environmental practice of the EU, baselines protecting the quality of the environment have taken different forms, reflecting the underlying rationales for any given measure. Within Article 191(1) TFEU, eco-centric and anthropocentric rationales coexist: 'preserving, protecting and improving the environment' and 'the protection of human health'.¹³ The picture is complemented by baselines inspired by Article 114 TFEU, which authorizes adoption of environmental measures aimed at the establishment or functioning of the internal market.¹⁴ For example, in matters of the aquatic environment, baselines have been expressed anthropocentrically by designating waters that must be able to support certain uses (such as bathing (Directive 2006/7/EC), drinking (Directive 98/83/EC), fishing (Directive 2006/113/EC), and so on). Eco-centric baselines have been articulated through ecological (p. 385) quality objectives (such as 'good ecological status'), at times combined with emission standards for ultra-hazardous substances for which 'zero-emission' is the ultimate aim.

Regardless of whether baselines reflect environmental or health goals, it is always the exercise of legislative powers that triggers the Union's commitment to preserving, protecting, and improving the quality of the environment. One important question we should ask, without at this stage attempting an answer, is whether the exercise of such powers is equally discretionary when human health is at stake, as opposed to when purely ecological imperatives are at risk. If the answer to this is that action to satisfy core human health interests is less discretionary than action to fulfil ecological needs, to the extent the Anthropocene instructs that the human/nature divide is untenable, such a difference is, quite arguably, equally unsustainable.

Even to say that the EU institutions' discretionary powers to assign protected status to unprotected environments are unfettered would be to underestimate the significance of the guidelines articulated in Article 191(3) TFEU, which comprise additional obstacles that need to be negotiated, the precautionary principle notwithstanding.¹⁵ These include, in particular, economic considerations such as 'the potential benefits and costs of action or lack of action', and 'the economic and social development of the Union as a whole and the balanced development of its regions'. The phrase 'shall contribute to' is further proof

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that Article 191(1) TFEU does not impose unconditional obligations. The regulatory tilt latent in Article 191 TFEU is undeniably towards permitting human exploitation of environments, and ecologically inspired regulatory interventions represent exceptions to this general rule.

Once EU environmental directives or regulations have been adopted, baselines are thereby established, and dormant duties to preserve, protect, and improve the environment acquire legal meaning and significance. If the baseline comes in the form of a Special Area of Conservation (SAC), for example, preserving the SAC implies a duty to abstain from activities that could threaten the ecological integrity of that SAC. Protecting the SAC calls for proactive policies to defend it against external assaults that may come in the form of hunting, economic development, and so on. Improving the SAC requires remedial action to return environments to the ecological *status quo ante* that existed at the time of designation of the SAC, that is the quality level responding to the baseline.

The sheer number of EU regulatory instruments adopted over the past forty years may give rise to the impression that the whole of the EU environment is in fact properly regulated, and that the permissive nature of Article 191(1) TFEU is therefore no real cause for concern. In reality, however, for every species protected, hundreds remain legally unprotected, and aesthetic values and the non-living environment (the colour of the ocean and the skies, cloud formations, and so on) as a rule enjoy little or no legal protection. For the purpose of this chapter, this last (p. 386) observation highlights that unprotected environments can easily become subject of environmental enhancement initiatives.

2.2 Environmental Enhancement: The Final Frontier?

Faced with life-threatening runaway climate change, living in the mid-nineteenth century, our imaginary omniscient regulator is left with no other option than to resign himself to massive regulatory failure, and the humbling prospect of migrating livestock and fellow citizens to colder climates for what later could still turn out to be a temporary stay of execution. In contemporary climate law parlance, such a chicken-run is euphemistically termed ‘climate adaptation policy’. Failing that option, the inevitable conclusion would be, in the uncensored words of acclaimed Danish climatologist Professor Jason Box, that ‘we’re fucked’ (Luntz 2014). Unlike his nineteenth-century predecessor, however, Box has a final trick up his sleeve:

we need an aggressive atmospheric decarbonisation program. We have been too long on a trajectory pointed at an unmanageable climate calamity; runaway climate heating. If we don’t get atmospheric carbon down and cool the Arctic, the climate physics and recent observations tell me we will probably trigger the release of these vast carbon stores, dooming our kids’ to a hothouse Earth. That’s a tough statement to read when your worry budget is already full as most of ours is.¹⁶

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Box's 'aggressive atmospheric decarbonisation program' foresees pulling CO₂ directly out of the atmosphere, a proposal inspired by concerns about human health. Are we dealing with a conventional environmental law programme to 'improve' the climate, or is what is proposed in fact an environmental enhancement initiative? Discussing the programme in the abstract, this section sketches a first degree of conceptual grip on the improvement/enhancement dichotomy.

First, whatever its ultimate form, the programme will be technology-driven. Although an inescapable consequence of the fact that it is through its use of technologies that *homo faber* has come to constitute such a destructive global force, the growing prominence of technologies in the environmental regulatory toolbox is highly significant in its own right.¹⁷ It means that future environmental law will increasingly develop into a set of principles managing the use of technologies, both in their capacity as targets and instruments of regulation, probably with less focus on channeling the behaviour of regulatees. Section 3 will briefly consider these future uses of technologies.

Yet, it is not only the central role of technologies that sets a decarbonization programme apart from conventional EU environmental regulation. It is above all the fact that those technologies are deployed *directly* to alter the chemistry of the atmosphere, completely bypassing target groups of regulatees. It marks a stage in environmental politics in which human ingenuity and technological prowess are (p. 387) recognized for the forces of Nature they are. It also reflects a resignation to the fact that, as Mahomet could not be persuaded to move to the hill, the hill must be made to move towards Mahomet. The equivalent in a criminal law context would perhaps be to surrender preventive and corrective anti-crime policies targeting potential criminals in favour of the population-wide administration of moral enhancement drugs (Persson and Savulescu 2008). Some might even argue that Box's decarbonization programme falls foul of common understandings of 'regulation', as it does not target the behaviour of regulatees, but aspires to re-engineer the atmosphere to suit the needs of present and future generations of humans.¹⁸

Realization of such a programme would of course require a legal basis which, by virtue of Article 192(2) TFEU, the European Parliament and the Council could establish. However, the character of any such EU instrument is likely to be very different from what we have come to associate with conventional EU environmental law. Just like a moral enhancement crime prevention programme would (partly) imply replacing criminal codes by pharmaceutical laws, climate engineering programmes or other direct technological interventions to re-engineer the environment would require environmental regulation to evolve towards a set of engineering principles engaging risk.¹⁹ Such a shift from regulating behaviour towards regulating design has obvious and profound implications for the general public. Above all, participation in standard-setting, a defining feature of EU environmental governance, is likely to become both more troublesome and marginal.

All this still does not answer the question of whether we are facing a conventional if controversial technology-driven proposal to improve the environment, squarely within the spirit of Article 191(1) TFEU, or whether we have strayed into the uncharted world of en-

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vironmental enhancement. The answer to that question, it is suggested, hinges formally on the existence and nature of protective baselines. In that respect, Article 191(1) TFEU distinguishes two broad classes of baselines: those targeting ‘health’ and those aiming at ‘the environment’. To the extent that health and environmental imperatives call for different or even opposing regulatory interventions, what constitutes ‘improvement’ or ‘enhancement’ from a health perspective may be deleterious for the environment, and vice versa. The subsequent analysis will clarify the significance of the health/environment dichotomy.

2.2.1 Environmental enhancement in pursuit of human health

For the same reason that logically we cannot talk of preserving, protecting, or improving the environment without some pre-agreed benchmark or baseline, we also cannot sensibly speak of enhancing it. Earlier it was observed that without a prior discretionary act of fixing a baseline, EU environmental law contains no autonomous point of reference for determining which aspects of the environment need preserving, protecting, or improving, and in effect leaves such environments unprotected. (p. 388) It is in that sense that EU environmental law is permissive; in the absence of protective baselines, alterations of the environment can take place unimpeded. This also implies that, in such circumstances, beneficial climatological changes brought about by a decarbonization programme will meet no legal obstacles, provided of course that the programme itself does not pose a danger to human health or protected environments.

It is for this reason that recent open field trials with genetically modified male *Aedes Aegypti* mosquitoes could get the go-ahead: (a) there are no baseline laws protecting the insect, and (b) the modifications are deemed safe for humans and the environment.²⁰ In view of the human welfare imperatives served by the eradication of dengue fever, addressing the spread of the *Aedes Aegypti* is likely to be judged as a beneficial alteration of the environment. But should we think of it as improving, or enhancing, the environment? If we put ourselves in the position of the insect, unquestionably, the intervention is distinctly harmful and thus cannot possibly be seen as an act of environmental improvement. Understood from the ecological paradigm that underpins part of environmental law, the eradication of *Aedes Aegypti* is an act of environmental destruction, albeit in the absence of protective rules a lawful one.

Crucially, however, Article 191(1) TFEU cites ‘protecting human health’ as one of the rationales for EU environmental policy, and from a human health perspective, the genetic modification of the insect is judged distinctly different. In the absence of an ecocentric baseline, we must judge the genetic modification of *Aedes Aegypti* in the context of concerns about human health. We are not preserving, protecting, or improving the environment, because we are not endeavouring to protect the ecological *status quo* (which calls for measures to preserve and protect) or *status quo ante* (for which we resort to improvement policies). For all intents and purposes, against the benchmark of human health, we are *enhancing* the insect, giving it unprecedented characteristics to serve humans. Although the word ‘unprecedented’ is to be preferred over ‘unnatural’—which in the Anthropocene has lost much of its meaning—what precisely qualifies as unprecedented re-

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mains a difficult question to answer. In discussing de-extinction efforts in Section 2.2.2, it will be argued that what is unprecedented may relate to both the physical (something physically new) and the legal (something legally novel).

What applies to the *Aedes Aegypti* also regards organisms that have never occurred in nature but which are engineered from scratch and deliberately released into the environment, such as bacteria engineered to clean up organic and inorganic pollutants. Again, we are dealing with environmental enhancement. As current EU biotechnology law shows, there are few if any a priori restrictions on the kind of organisms that can be released into the environment, provided these do not constitute a danger to human health or the environment.²¹ Yet, a recent House of Lords Select Committee report on genetically modified insects still bemoans the fact that the regulatory tilt in Directive 2001/18/EC on the Deliberate Release into (p. 389) the Environment of Genetically Modified Organisms is too restrictive (OJ L106/1 2001), saying that:

it is inappropriate that new GMO technologies are considered in relation to an unrealistic, risk-free alternative. We recommend that the regulatory process should acknowledge control methods currently in use, such as insecticides, which a new technology may replace.²²

It is true that Directive 98/44/EC on the Legal Protection of Biotechnological Inventions, by virtue of Article 6, excludes certain particularly abhorrent enhancements from patentability. However, as Article 6(1) implies *a contrario*, the fact that an invention is not patentable does not regard its legality. In sum, the release into the environment of novel organisms in pursuit of human health imperatives, in the absence of protective baselines, constitutes a lawful act of environmental enhancement.

More complex is how to understand health-inspired environmental measures in situations in which protective environmental baselines have in fact been articulated. Is it possible to identify a point at which 'improvement' (that is, action aimed at re-establishing the ecological *status quo ante* articulated in a baseline) becomes 'enhancement'? Intuitively, we may feel that this turning point occurs when direct technological interventions in environments propel states 'beyond compliance'.²³ For instance, the recently adopted Paris Agreement on climate change contains, in Article 2, a target of limiting temperature rises to two degrees Celsius relative to pre-industrial times through a programme specified in subsequent provisions (Paris Agreement 2015). If Box's direct intervention in the atmosphere actually *reduces* overall atmospheric CO₂ concentrations, and thereby cools down the planet to pre-industrial levels, we would find ourselves in the realm of environmental enhancement.

It is not unproblematic, even under such circumstances, to qualify the decarbonization programme as environmental enhancement. The process of removing CO₂ from the atmosphere may take the form of a technological novelty, but as long as it does not result in 'unprecedented' climate characteristics, it does not appear to satisfy our preliminary definition of environmental enhancement. Indeed, it could be maintained that the programme merely aspires a return to a climatological *status quo ante*, that is, 'improving' the cli-

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mate by bringing it as far as possible back to, in the words of the Paris Agreement, pre-industrial times. As for reductions in CO₂ concentrations that lead to slowing down of global warming beyond legally binding requirements, even if it means cooling down the planet, we might say that these are merely 'more stringent protective measures' sanctioned by Article 193 TFEU as well as by Article 4(3) of the Paris Agreement.²⁴ Decarbonization programmes as such are also compatible with the Paris Agreement, Article 4(1) of which provides:

In order to achieve the long term temperature goal set out in Article 2, Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognising that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter (p. 390) in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources *and removals by sinks of greenhouse gases* in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty (emphasis added).

The fact remains that Article 2 of the Paris Agreement frames state duties in terms of capping *increases* in the global average temperature, while an aggressive decarbonization programme (theoretically) could perhaps result in temperature *decreases*. Legally, as the 'more protective measures' to which Article 193 TFEU refers must be in terms of capping temperature increases, measures aimed at realizing temperature decreases cannot be justified on that basis.

Nor is there necessarily a need to do so. As observed, in the absence of a baseline (taking the form of minimum global temperatures, prohibition of extra-territorial impacts, and so on) there is little to stop states pursuing such a course or action.²⁵ In summary, then, a decarbonization programme that contributes to keeping global average temperature increases under control amounts to environmental improvement. When the programme yields results that transcend existing legal baselines, it is appropriate to conceive of the programme as environmental enhancement.

Other climate engineering initiatives, such as solar radiation management, are more obviously to be regarded as environmental enhancement. For example, if reflective particles are released into the atmosphere to reflect sunlight and cool down the planet, this results in an unprecedented composition of the atmosphere and amounts to a clear case of environmental enhancement.²⁶

2.2.2 Environmental enhancement in pursuit of ecological imperatives

The Pyrenean ibex is a species of mountain goat that, despite featuring in the Habitats Directive as protected, became extinct in 2000. Thus far unsuccessfully, scientists have used reproductive cloning techniques in attempts to bring back the Pyrenean ibex. What do we make of such de-extinction efforts?²⁷ The story of the Pyrenean ibex is spectacular and highly significant. It ushers in a phase in nature conservation policy in which failures to preserve species no longer need to result in irreversible loss of biodiversity. Yet, it is

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posited that the return of the Pyrenean ibex is not an example of environmental enhancement. The technology involved is spectacular, but on account of its previously protected status, the cloning efforts should be conceived as an example of 'improving' the environment, restoring it to the baseline level agreed in the Habitats Directive.²⁸ Should de-extinction techniques become more reliable, there appears no reason why Member States should not be duty-bound to use them in cases such as the Pyrenean ibex.

At the same time, it is proper to point out that the Habitats Directive leaves ample room for the pursuit of enhancement initiatives, provided the overall coherence of Natura 2000 is not compromised, or such interventions are mandated by human health or public safety, have beneficial consequences of primary importance for the (p. 391) environment, or answer imperative reasons of overriding public interest. Article 22(b) of the Directive, in similar vein, allows the deliberate introduction into the wild of any species not native as long as this does not prejudice natural habitats within their natural range or the wild native fauna and flora. Genetically enhanced species therefore may be introduced, provided these comply with relevant secondary EU law, such as Directive 2001/18/EC on the Deliberate Release of Genetically Modified Organisms (OJ L106/1 2001), and do not prejudice natural habitats within their natural range or the wild native fauna and flora.²⁹

Obviously, no protective baselines exist for plants and animals that have long gone extinct, such as the woolly mammoth. Programmes currently under way to bring back the mammoth from extinction therefore must be regarded as enhancement, simply because at no time has the mammoth enjoyed *legal* protection so that it is formally incorrect to say that a cloning programme would improve the environment by reinstating the *status quo ante* (Shapiro 2015). It is in that formal legal sense that the return of the mammoth is unprecedented.

3. Reflections on an Anthropocentric Regeneration of EU Environmental Law

3.1 Human Rights Duties to Preserve, Protect, and Improve the Environment

It has been seen that, in the absence of an all-encompassing general ecological standstill principle, environmental enhancement will encounter few legal hurdles.³⁰ The default position of EU environmental law is and remains that humans are free to alter environments in any way they see fit, unless these have been purposefully and specifically protected. Alterations clearly can come to include enhancements, relative to human needs, of unprotected environments and unregulated spheres of protected environments. By way of innocent example, in the absence of rules regulating the use of sunlight, the inhabitants of the small Norwegian village Rjukan were free to install three giant solar-powered, computer-controlled mirrors on the top of mount Gausta to reflect sunlight on their little town, overcoming the problem of depressing gloom that surrounded them for six months every year. Likewise, large-scale open field trials could be conducted with genetically modified male

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Aedes Aegypti mosquitoes, offering prospects to control dengue fever in pursuit of the right to health, because the mosquito in question has remained legally unprotected.

(p. 392) A monumental insight that could propel environmental enhancement policies to the fore is captured by the 'Planetary Boundaries Hypothesis' (PBH). It posits that there are nine critical, global biophysical thresholds to human development (Steffen 2015) and, crucially, that crossing these boundaries will have catastrophic consequences for human welfare.³¹ Although couched in the language of science, the PBH has acquired key political and legal importance because of alarming evidence that some thresholds are close to being transgressed, or indeed have been overstepped. The amount of CO₂ in the air, for example, is higher than in the past 2.5 million years and responsible for prospects of imminent dramatic climate change.³² Popular preoccupation with human impacts on the climate is understandable, but obscures similarly deleterious anthropogenic alterations of biogeochemical cycles, including: nitrogen, phosphorus and sulphur; terrestrial ecosystems through agriculture; freshwater cycles through changes in river flow; and levels of CO₂ and nitrogen in the oceans.³³

The immediate legal importance of the language of apocalyptic boundaries in which the PBH is couched is that it could trigger the search for an environmental law paradigm revolving around duties to act in pursuit of the imperatives spelled out in provisions such as Article 37 of the Charter of Human Rights, Article 191 TFEU, and Article 4 TEU. As a matter of common sense, the EU and its Member States should be duty-bound to take effective action to avert imminent catastrophic ecological threats to human survival. Increasingly robust scientific evidence that environmental decline now forms an immediate threat to basic preconditions for human life implies that environmental law becomes a specialization of human rights law.³⁴ Such a transformation fundamentally upsets the constitutive paradigm and operational logic informing environmental law. Essentially, rather than merely to halt, slow down, or remedy anthropogenic impacts on the environmental *status quo* in pursuit of sustainability, the rationale of environmental law (also) becomes anthropocentrically to manage a process of intentional technologically induced environmental change in pursuit of human survival and welfare. As the example of the Haber Bosch process shows, that practice of environmental enhancement began well over a century ago, and is taking place on a scale realized by few.

As for the question *when* the EU institutions should take up the task of re-engineering the environment, it is crucial to acknowledge that systemic ecological and social complexities result in non-linear patterns of change, making it exceedingly hard to accurately predict when catastrophic tipping points will occur. In such circumstances of pervasive scientific uncertainty, the precautionary principle instructs the EU to take action sooner rather than later, at least in those cases when risks of inaction exceed risks of action.³⁵ Such a reading of the precautionary principle, which as a rule is associated with protection of the ecological *status quo* and certainly not with the engineering of Earth 2.0, is bound to be controversial but not altogether implausible (Reynolds and Fleurke 2013). (p. 393)

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If EU environmental law becomes human rights driven, this also has the effect of calling into question the conditional nature of Article 191(1) TFEU. The United Nations' 'Respect, Protect, Fulfil' (RPF) framework may serve to conceptualise and legitimize such a transformation. The framework arose from debates regarding the substance of the 'right to food' (Eide 1989), but its usefulness extends to social and economic rights more generally, including the right to a clean environment (Anton and Shelton 2011). The synergies and etymological similarities between the RPF trilogy and the preserve/protect/improve (PPI) trilogy of Article 191(1) TFEU are so striking that it is remarkable that they have escaped the interest of legal commentators. Indeed, the similarities between the two frameworks appear to point at a viable anthropocentric reinterpretation of EU environmental law (Table 16.1).

Like the PPI framework, the RPF is a framework revolving around a tripartite typology, but of *duties* 'to avoid depriving' (to respect), 'to protect from deprivation' (to protect), and to 'aid the deprived' (to fulfil). The *duty to respect* regards violations committed by states rather than by private persons. In EU environmental law literature, as discussed, the duty to preserve the environment implies that the EU and its Member States must not interfere with environments that satisfy a designated status. One important implication of an interpretation of the duty to preserve consistent with the duty to respect is that this calls into question the conditional character of duties to preserve environments that perform functions critical for human welfare.

The *duty to protect*, significantly, doubles verbatim in the RPF and PPI frameworks. Within the RPF framework, the duty to protect implies a state duty to act when activities of private individuals threaten the enjoyment of (environmental) rights.³⁶ The obligation to protect is understood as a state obligation to 'take all reasonable measures that might have prevented an event from occurring.'³⁷ EU environmental law, in Article 191(2) TFEU, similarly couches the duty to protect in the language of preventing harm, and stipulates that the level of protection afforded by EU regulatory action must be 'high'.

Most interesting for our purposes is a reinterpretation of 'environmental improvement' in line with the *duty to fulfil* (improve). The duty to fulfil is 'what is owed to victims—to people whose rights already have been violated. The duty of aid is ... (p. 394) largely a duty of recovery—recovery from failures in the performance of duties to respect and protect' (Shue 1985). The obvious and hugely controversial question is whether the duty to fulfil might give rise to state duties to enhance. In respect of the right to food, it has been observed that:

Table 16.1 Synergies between the RPF and PPI frameworks

Social & Economic Human Rights (RPF)	EU Environmental Law (PPI, Art. 191 TFEU)
Duty to Respect →	← ← Duty to Preserve
Duty to Protect →	← ← Duty to Protect
Duty to Fulfil →	← ← Duty to Improve

[t]he obligation to fulfil (facilitate) means the State must *proactively* engage in activities intended to strengthen people’s access to and utilisation of resources and means to ensure their livelihood, including food security. Finally, whenever an individual or group is unable, for reasons beyond their control, to enjoy the right to adequate food by the means at their disposal, *States have the obligation to fulfil (provide) that right directly*. This obligation also applies for persons who are victims of natural or other disasters (added emphasis).³⁸

It is common wisdom that resource scarcity of states takes the sharp edges off duties to fulfil, more than is the case in respect of duties to respect or protect. The arrival of environmental enhancement technologies such as genetic manipulation, synthetic biology, and climate engineering unsettles that premise, however, as they will often represent cheap alternatives compared to current mitigation policies.³⁹

In fact, more generally, technologies will be central to any transformation of environmental law from a set of discretionary ambitions to preserve, protect, and improve the environment towards duties to respect, protect, and fulfil environmental rights. It is appropriate to attempt briefly to conceptualize the roles technologies may play in this respect.

3.2 Conceptualizing Environmental Technologies

Intimately related to the PBH, and as much of political as of scientific importance, is a proposal by the Anthropocene Working Group to formalize the Anthropocene as the geological epoch in which humankind currently exists.⁴⁰ The notion was first introduced by Nobel Prize winning atmospheric chemist Paul Crutzen to denote the period in Earth’s history during which humans exert decisive influence on the state, dynamics, and future of the planet (Crutzen and Stoemer 2000; Steffen, Crutzen and McNeil 2007). The proposal to formalize the Anthropocene was considered by the International Commission on Stratigraphy at the 2016 International Geological Conference in Cape Town. As yet, the Anthropocene is not a formally defined geological unit within the geological time scale in the same manner as the Pleistocene and Holocene are, and formalization will hinge on scientific criteria as well as its usefulness for the scientific community. However, as is pointed out on the Working Group’s website, the political, psychological, and scientific

currency the concept enjoys is substantial (Subcommission Quarternary Stratigraphy 2015).

Whereas the legal significance of the PBH concerns the purposes of environmental law, the arrival of the Anthropocene has important implications for the means by which these goals are to be pursued. Essential is the realization that technologies (p. 395) play such decisive roles in the unremitting quest of *homo faber* to master the universe that they now have come to rival the forces of nature in shaping the future of planet Earth.⁴¹ This implies that, in terms of means, environmental law must mobilize and direct the full potential of technologies towards preserving, protecting, improving, and quite possibly enhancing the environment for the sake of present and future generations. The lesson to be learned from the Anthropocene is that, unless technologies become the principal target *and* instrument of environmental policy-making, environmental law will become an irrelevance. The scandal engulfing Volkswagen after its malicious use of smart software to feign compliance with emission standards in millions of diesel-powered cars, almost certainly contributing to loss of life, provides a shocking illustration of the forces regulators are up against.⁴²

In this respect, regulators can take heart from the existence and continuous development of a range of technology-driven instruments for environmental policy that harbour the potential to set in motion a renaissance of environmental law along the lines sketched here. Conceptually, it is proposed to distinguish four broad categories of technologies that regulators can, and at times must, deploy in fulfilment of their environmental obligations;

- (i) surveillance technologies;
- (ii) technologies that operationalize conventional statutory standards;
- (iii) normative technologies ('code'); and
- (iv) enhancement technologies.

The roles of these four classes of technologies in operationalizing duties to preserve, protect, and improve the environment are broadly and very briefly as follows.

Surveillance, above all, is an essential prerequisite for the early detection of changes in elements of complex socio-ecological earth systems that can unexpectedly reverberate across the entire system with potential catastrophic impacts.⁴³ By necessity, the implication of this function of surveillance technologies is that its ambition must be Panoptical. Surveillance is also direly needed dramatically to improve on the low-detection rates of infringements and environmental crimes that often cause irreversible environmental harm.

Technologies of course will continue to play their crucial roles in operationalizing statutory standards (such as ambient and aquatic emission standards and quality objectives) designed to preserve, protect, or improve environments. Such technologies may pertain both to products and processes.

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In addition, *normative* technologies must be developed and deployed that remove non-compliance from the equation altogether in all those cases where further transgressions would result in catastrophic impacts.⁴⁴ Whereas we may be concerned about the inevitable encroachments on human autonomy to which deployment of such technologies gives rise, it is hard to resist the use of normative technologies to (p. 396) avoid catastrophe when they are already routinely used, for example, by car dealerships to immobilize cars from owners that have defaulted on their monthly credit payment (Corkery and Silver-Greenberg 2014).

Table 16.2 A Classification of Environmental Technologies	
Role in the Regulatory Process	Target
Ancillary to EU statutory standards	Regulatees (humans)
Securing perfect surveillance	Regulatees (humans)
Securing perfect compliance	Regulatees (humans)
Environmental enhancement	Environment (living/non-living)

Enhancement technologies, finally, must be used to engineer environments beyond any existing legal standard, or at variance with the known states of the environment, when this is imperative for human survival and the realization of human rights. Examples of this final category of technology-driven environmental policy include the genetic manipulation, synthetic biology, nanotechnology, climate engineering, and de-extinction efforts (Table 16.2).⁴⁵

4. Conclusions

The reality, hammered home by the Anthropocene, is that humankind must take control of the technological powers it yields if human catastrophe is to be avoided. Clearly, that conclusion cannot leave environmental law unaffected. This chapter has discussed a number of likely implications for EU environmental law, in particular the prospect of systematic and possibly large-scale intentional interventions in earth systems in order to avert such catastrophes. Those interventions are termed ‘environmental enhancement’. Although at times it has proved difficult to distinguish enhancement from improvement, the chapter has shown that such a distinction is both viable and desirable. The desirability resides not least in the plausible prospect of environmental enhancement becoming a standard policy option, and it is even arguable that duties may arise in circumstances where human life is directly at risk.

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Therefore, the question that needs to be addressed is whether the paradigm informing conventional environmental law, and the corpus of texts that describe and frame it, is fit to engage with this new reality. Such a fit seems to be lacking, and (p. 397) therefore we may talk of regulatory disconnection between the reality of environmental enhancement and existing environmental law.

First, disconnection appears to manifest itself in terms of legitimacy, because to conflate 'environmental enhancement' and 'environmental improvement' is to bestow on the EU powers it was never intended to yield. Whereas current EU powers 'to preserve, protect and improve' the environment are substantively curtailed by the environmental *status quo* (disciplining powers to preserve and to protect) or *status quo ante* (curtailing powers to improve),⁴⁶ ambitions to enhance the environment exist independently of present or past states of the environment, and hence are substantively boundless. Moreover, enhancement powers are legally disciplined essentially only by two 'soft' constraints: pre-existing environmental regulation affording environments protected status, and 'risk'. The softness of those constraints flows from the discretionary nature of the exercise of Article 191 TFEU powers to 'preserve, protect and improve' the environment, from the fact that human rights trump legally protected ecological values, and from the common-sense truism that risks should thwart enhancement initiatives only if these exceed risks posed by alternative action or inaction. Essentially, on the basis of current EU environmental law, the EU's powers to enhance the European environment thus appear limitless.

Second, regulatory disconnection is likely to manifest itself in terms of effectiveness because conventional principles of environmental law are designed to guide the EU legislature in its pursuit of retrospective ecological conservation and improvement imperatives. It is most doubtful whether these principles are similarly suitable to optimize technology-driven environmental enhancement policies that, in contrast, are prospective in nature and defend environmental human rights imperatives that will often clash with ecological values. Although not discussed in any detail, conventional interpretations of the precautionary principle, for example, sit uneasily with the increasing need for environmental enhancement initiatives in pursuit of human rights. Provocatively, we may suggest that the precautionary principle must be accompanied by a 'proactionary principle' where such human rights duties are at stake (More 2013: 258-267).

The continued appropriateness of other principles in Article 191(2) TFEU, such as the principle that environmental damage should be rectified at source and the polluter should pay, to the extent they prioritize targeting the behaviour of regulatees, also appear questionable. This is because, as the example of decarbonization programmes shows, the essence of environmental enhancement resides in bypassing regulatees. Rather than regulating the source of increases in atmospheric CO₂ (say car use, or car design), environmental enhancement targets the manifestation of the source: temperature rise.

In sum, there appears every reason to start thinking seriously about redesigning environmental law in ways that do justice to the realities of the Anthropocene.

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Notes:

(1.) See Han Somsen, 'Towards a Law of the Mammoth? Climate Engineering in Contemporary EU Environmental Law' (2016) 7 *European Journal of Risk Regulation* (forthcoming March 2016). Clearly, this choice of terms is not without significance. 'Enhancement' has positive connotations, 'engineering' is neutral, and 'manipulation' clearly has a negative ring. The preference for 'enhancement' in this article is conscious, reflecting ambitions to ameliorate the environment relative to human needs.

(2.) According to a recent World Bank report, climate change increases the risk of water-borne diseases and the transmission of malaria, with a warming of 2 to 3°C likely to put an extra 150 million people at risk for malaria. See The World Bank, *Shockwaves, Managing the Impact of Climate Change on Poverty* (Washington 2015). Scientists have now genetically modified malaria mosquitoes in response. See VM Ganz et al., 'Highly efficient

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Cas9-mediated gene drive for population modification of the malaria vector mosquito *Anopheles stephensi*' (2015) 112 *Proceedings of the National Academy of Sciences* E6376–43. See also, in particular, the *Science and Technology Select Committee, Genetically Modified Insects* (HL 2015-16, 68-I).

(3.) Han Somsen, 'When regulators mean business: Regulation in the Shadow of Environmental Armageddon' (2011) 40 *Rechtsfilosofie & Rechtstheorie* 47. Public acceptance of large-scale technological interventions in complex earth systems to remedy environmental degradation may also be on the increase. See 'NextNature' <<https://www.nextnature.net/nl/>> accessed 9 January 2016; 'Ecomodernist Manifesto' (*Ecomodernism*) <<http://www.ecomodernism.org/manifesto-english/>> accessed 23 Dec. 2015.

(4.) Jeremy Pal and Elfatih Eltahir, 'Future temperature in southwest Asia projected to exceed a threshold for human adaptability' (Nature Climate Change, 26 October 2015).

(5.) A real-life candidate that fits that profile is Alexander von Humboldt (1769–1859). In a speech he gave in 1829, he called for 'a vast international collaboration in which scientists around the world would collect data related to the effects of deforestation, the first global study of man's impact on the climate, and a model for the Intergovernmental Panel on Climate Change, assembled 160 years later'. See Nathaniel Rich, 'The Very Great Alexander von Humboldt' (2015) 62(16) *The New York Review of Books* 37.

(6.) Treaty on the Functioning of the European Union [2012] OJ 1 326/47 ('TFEU'), Art 191(1) provides:

'1. Union policy on the environment shall contribute to pursuit of the following objectives:

- (•) preserving, protecting and improving the quality of the environment,
- (•) protecting human health,
- (•) prudent and rational utilisation of natural resources,
- (•) promoting measures at international level to deal with regional or world-wide environmental problems, and in particular combating climate change.'

(7.) This, of course, is not the only or perhaps not even the prevailing understanding of human dignity. See Derrick Beyleveld and Roger Brownsword, *Human Dignity in Bioethics and Biolaw* (Oxford University Press 2001).

(8.) See the Wilderness Act of 1964 Pub L 88-577 (16 USC 1131-1136) s 4(b): 'Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character.'

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(9.) A great deal more can be said about baselines. Baselines come in many different forms and there have been significant developments in environmental law in that respect. The REACH Regulation, for example, marks a stage in which for chemicals producers must show safety before they can be marketed (reversal of the burden of proof). For habitats and species featuring in Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora of 1992 ('Habitats Directive'), member states must endeavour a 'favourable conservation status'. This wealth of different baselines notwithstanding, until purposefully protected environments remain targets for unfettered human interference.

(10.) See Elizabeth Fisher, 'Is the Precautionary Principle Justiciable?' (2001) 13 *Journal of Environmental Law* 315. Cf Arie Trouwborst, *Precautionary Rights and Duties* (Brill 2006). Trouwborst concludes that, as a matter of customary international law, such duties arise 'wherever, on the basis of the best information available, there are reasonable grounds for concern that serious and/or irreversible harm to the environment may occur' (159).

(11.) Floor Fleurke, *Unpacking Precaution* (PhD thesis, University of Amsterdam, 2012).

(12.) These were the circumstances that gave rise to Case C-169/89, *Gourmetterie van den Burgh* [1990] ECR I-02143.

(13.) 'The prudent and rational utilisation of natural resources' and 'promoting measures at international level to deal with regional or worldwide environmental problems, and in particular combating climate change' appear specifications of ecological and health imperatives.

(14.) Article 191(1) foresees protecting *the quality* of the environment. We therefore ignore internal market regulation, often expressed in emission standards that control releases of (ultra-hazardous) substances in the environment, and standards regulating environmental impacts of products. While these standards may directly contribute to the quality of the environment, guaranteeing a minimum environmental quality is not what they are designed to do.

(15.) Article 191(3) TFEU provides:

'3 In preparing its policy on the environment, the Union shall take account of:

- (•) available scientific and technical data,
- (•) environmental conditions in the various regions of the Union,
- (•) the potential benefits and costs of action or lack of action,
- (•) the economic and social development of the Union as a whole and the balanced development of its regions.'

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(16.) S. Luntz, 'Climatologist Says Arctic Carbon Release Could Mean "We're Fucked"' (IFL Science, 4 August 2014) <www.iflscience.com/environment/climatologist-arctic->.

(17.) See Bruno Latour, 'Love your Monsters—Why We Must Care for our Technologies as we do for Our Children' in Michael Shellenberger and Ted Nordhous (eds), *Love your Monsters* (Breakthrough Institute 2011: 55); 'To succeed, an ecological politics must manage to be at least as powerful as the modernising story of emancipation without imagining that we are emancipating ourselves from Nature. What the emancipation narrative points to as proof of increasing mastery *over* and freedom *from* Nature—agriculture, fossil energy, technology—can be redesigned as the increasing *attachments* between things and people at an ever-expanding scale. If the older narratives imagined humans either fell from nature or freed themselves from it, the compositionist narrative describes our ever-increasing degree of *intimacy* with the new natures we are constantly creating. Only "out of Nature" may ecological politics start again and anew.'

(18.) A workable traditional definition is: 'a binding legal norm created by a state organ that intends to shape the conduct of individuals and firms'. Barak Orbach, 'What is Regulation?' (2012) 30 *Yale Journal on Regulation Online* 6. However, this thought experiment relies on a wider definition than 'binding legal norms', including also forms of self-regulation, market instruments and technologies.

(19.) In this regard, EU biotechnology regulation provides an instructive example. Council Directive 2001/18/EC on the deliberate release into the environment of genetically modified organisms OJ [2001] L106/1 regulates the design of GMOs with a view to containing risks. The past decade has seen a gradual extension of the concept risk to include 'other concerns' of an ethical and socio-economic nature.

(20.) See the deliberate release in the Cayman Islands, Malaysia, and Brazil of genetically modified mosquitos in attempts to put an end to dengue fever without recourse to hazardous pesticides, with promising results. Renée Alexander, 'Engineering Mosquitoes to Spread Health' (*The Atlantic*, 13 Sept. 2014) <<http://www.theatlantic.com/health/archive/2014/09/engineering-mosquitoes-to-stop-disease/379247/>> accessed 4 January 2016.

(21.) Ibid.

(22.) The World Bank (n 2).

(23.) Neil Gunningham, Robert A Kagan, and Dorothy Thornton, 'Social License and Environmental Protection: Why Businesses Go Beyond Compliance' (2004) 29 *Law & Social Inquiry* 307 <<http://scholarship.law.berkeley.edu/facpubs/675>> accessed 4 January 2016.

(24.) UNFCCC Conference of the Parties, 'Adoption of the Paris Agreement' FCCC/CP/2015/L.9.Rev.1 (12 December 2015), art 2. Available at <<http://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf>> accessed 4 January 2016, art 4(3): 'Each Party's successive nationally determined contribution will represent a progression beyond the Party's then current nationally determined contribution and reflect its highest possible ambition, reflect-

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ing its common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.'

(25.) This is presuming that such changes do not result in extra-territorial impacts engaging international responsibility.

(26.) Hence, it has been asserted that '[s]everal schemes depend on the effect of additional dust (or possibly soot) in the stratosphere or very low stratosphere screening out sunlight. Such dust might be delivered to the stratosphere by various means, including being fired with large rifles or rockets or being lifted by hydrogen or hot-air balloons. These possibilities appear feasible, economical, and capable of mitigating the effect of as much CO₂ equivalent per year as we care to pay for': Panel on Policy Implications of Greenhouse Warming et al., *Policy Implications of Greenhouse Warming: Mitigation, Adaptation, and the Science Base* (National Academy Press 1992) 918.

(27.) For information on de-extinction see 'The Long Now Foundation' <<http://longnow.org/revive/>> accessed 4 Jan. 2016.

(28.) See Steve Connor, 'Cloned goat dies after attempt to bring species back from extinction' *The Independent* (London, 2 February 2009) <<http://www.independent.co.uk/news/science/cloned-goat-dies-after-attempt-to-bring-species-back-from-extinction-1522974.html>> accessed 4 Jan. 2016. Attempts to bring back the Pyrenean ibex from extinction are ongoing.

(29.) For a more detailed analysis of the scope for environmental enhancement in the context of the Habitats Directive, see Somsen (n 1).

(30.) An example of an ecological baseline is found in Article 2(14) of Dir. 2004/35/EC of 21 April 2004 on Environmental Liability with regard to the Prevention and Remedying of Environmental Damage [2004] OJ L143/56: '“baseline condition” means the condition at the time of the damage of the natural resources and services that would have existed had the environmental damage not occurred, estimated on the basis of the best information available.'

(31.) These are land-use change, biodiversity loss, nitrogen and phosphorous levels, freshwater use, ocean acidification, climate change, ozone depletion, aerosol loading, and chemical pollution.

(32.) Up-to-date information is available on the Internet at Earth System Research Laboratory, 'Trends in Atmospheric Carbon Dioxide' <<http://www.esrl.noaa.gov/gmd/ccgg/trends>> accessed 8 Jan. 2016. In April 2014 the level stood at 401.30.

(33.) In similar vein, Karen N Scott, 'International Law in the Anthropocene: Responding to the Geoengineering Challenge' (2013) 34 *Michigan Journal of International Law* 309.

(34.) See *Urgenda v The Netherlands* HA ZA 13-1396, which contains the seeds of such thinking in para 4.74: 'Based on its statutory duty—Article 21 of the Constitution—the

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State has an extensive discretionary power to flesh out the climate policy. However, this discretionary power is not unlimited. If, and this is the case here, there is a high risk of dangerous climate change with severe and life-threatening consequences for man and the environment, the State has the obligation to protect its citizens from it by taking appropriate and effective measures. For this approach, it can also rely on the aforementioned jurisprudence of the ECtHR. Naturally, the question remains what is fitting and effective in the given circumstances. The starting point must be that in its decision-making process the State carefully considers the various interests.’ Available at <<http://www.urgenda.nl/documents/VerdictDistrictCourt-UrgendavStaat-24.06.2015.pdf>> accessed 7 Jan. 2016.

(35.) Ibid.

(36.) This situation should not be confused with situations in which the acts of private individuals are attributed to the state. On that issue, see for example articles on ‘Responsibility of States for Internationally Wrongful Acts’ in International Law Commission, ‘Report of the International Law Commission on the Work of its 53rd session’ (23 April–1 June and 2 July–10 August 2001) UN Doc A/56/10.

(37.) *Osman v United Kingdom* ECHR 1998-VIII 3124, paras 115–22.

(38.) Committee on Economic, Social and Cultural Rights, ‘The Right to Adequate Food (Art 11)’ (1999) UN Doc E/C.12/1999/5, General Comment 12, para 15. Comment 14 further provides that a state party which ‘is unwilling to use the maximum of its available resources for the realisation of the right to health is in violation of its obligations under Article 12.’

(39.) See for example Johann Grolle, ‘Cheap But Imperfect: Can Geoengineering Slow Climate Change?’ (*Spiegel Online*, 20 November 2013) <<http://www.spiegel.de/international/world/scientist-david-keith-on-slowing-global-warming-with-geoengineering-a-934359.html>> accessed 8 Jan. 2016.

(40.) Colin Waters et al., ‘The Anthropocene is functionally and stratigraphically distinct from the Holocene’ 351 (2016) *Science*, 137.

(41.) Committee on Economic, Social and Cultural Rights (n 38), 614: ‘The term [...] suggests that the Earth has now left its natural geological epoch, the present interglacial state called the Holocene. Human activities have become so pervasive and profound that they rival the great forces of Nature and are pushing the Earth into a terra incognita.’

(42.) See ‘VW Emissions Cheat Estimated to Cause 59 Premature US Deaths’, *The Guardian* 29 Oct. 2015 published on the Internet at: <<http://www.theguardian.com/environment/2015/oct/29/vw-emissions-estimated-to-cause-59-premature-us-deaths>>.

(43.) The realization that environmental governance must change to engage so-called ‘Complex Adaptive Systems’ has been growing as part of Anthropocene-thinking. That challenge must be faced regardless whether environmental policy aims at mitigating environmental degradation or at enhancing environments. See Duit A and Galaz V, ‘Gover-

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nance and Complexity—Emerging Issues for Governance Theory' (2008) 21 Governance: An International Journal of Policy, Administration, and Institutions 311.

(44.) For a more detailed analysis of the implications of the use of normative technologies in environmental policy, see Somsen (n 3).

(45.) The Long Now Foundation (n 48==27).

(46.) See TFEU, Arts 191–194.

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Parental Responsibility, Hyper-parenting, and the Role of Technology

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Abstract and Keywords

This chapter explores the impact of technology on parenthood. It draws out some of the themes raised by the genetic enhancement debate, arguing that they reflect some of the current themes in contemporary parenthood. Particularly pertinent is the phenomenon of hyper-parenting, which itself often relies on technology to enable surveillance of children. It is argued that this practice reflects the political and popular rhetoric around conceptions of parental responsibility, which has been picked up and reinforced in the law. The chapter concludes by arguing against an overemphasis on the power that parents have over children to train them to be good citizens and argues for a relational vision of parenthood, recognizing also the power that children have over adults and the way that children can shape parents.

Keywords: Parental responsibility, surveillance, technology, hyper-parenting, intensive parenting

1. Introduction

THE genetic enhancement of children holds both a fascination and a terror in contemporary culture and academic debates. There is considerable soul-searching about a future when parents who decide to have a child head not to the bedroom, but to the laboratory. There they would pore over glossy brochures and select the child's appearance, sporting prowess, sexuality, and musical inclinations. The days when you had to take the luck of the draw and nature determined what child would be yours would seem terribly old fashioned. Why leave it to chance when you can use science to determine what your child will be like: athletic, attractive, and ambitious.

There has been considerable academic debate over whether or not parents should be permitted, or even be required, to manipulate the genes of embryos to produce an idealized version of the child. A vast amount of literature has been written on this topic (Murray, 1996; Agar, 2004; Glover, 2006; Green, 2007; Sandel, 2007). I do not  want to add to that literature directly. However, it is astonishing how much attention has been paid to

the issue, given that, to a significant extent, it is the stuff of science fiction. The technology necessary for being able to control the characteristics and abilities of children is decades away, if it will ever be possible. So, why, apart from the fact it raises some interesting academic issues, has it generated so much discussion?

This chapter suggests that the genetic engineering debate, and the substantial media, academic, and professional discussions it has engendered, reflects conflicting emotions about contemporary parenting. The vision of the parent being able to create a child in their likeness who will be a productive good citizen, chimes with and reflects current fears and desires within parenting. In particular, it reflects a wider debate around concepts of the responsibility of parents for their children and a group of parenting practices often known as 'hyper-parenting' or helicopter parenting. This hyper-parenting itself uses technology to enable surveillance by parents of children in various ways. The chapter thus considers the role of technology in parenting by deconstructing understandings of parenting. In a one-way, controlling, hyper-parenting model of parenting, technology is facilitative and useful. However, the chapter concludes by arguing that this model of parenting, and thus the hopes for technology in relation to it, is deeply flawed, because it fails to take into account the full richness of the contingent and mutually nourishing relationships between parents and their children.

Therefore, this chapter looks at what debates and concerns about future forms of reproductive technology tell us about the nature of being a parent, particularly about concepts of parental responsibility in both a legal and a cultural sense. To start the discussion, the chapter focuses on a strand of the argument from the genetic enhancement debate that presents a strong moral case against such intervention, namely that children should be seen as a gift. The chapter then moves to consider the legal concept of parental responsibility before exploring the legal, political, and social discourse that analyses the ways in which parents are taken to be responsible for their children. These discourses of responsibility are strongly linked to parents becoming insecure and engaging in the practice of hyper-parenting. To this end, technologies not only enable parents in their attempts to control their children, but also to enable their children to surpass other children in a range of activities. The chapter concludes by decrying these developments. Children should not be seen as playdough to be shaped by parents into perfect citizens. Rather, parents and children are in deep relationships—they care for and impact on each other in profound ways.

2. Children as a Gift

One of the strongest objections to the idea of genetic enhancement has been put forward by Michael Sandel (2004: 57):

(p. 406)

The deepest moral objection to enhancement lies less in the perfection it seeks than the human disposition it expresses and promotes. The problem is not that parents usurp the autonomy of a child they design. The problem is in the hubris of the designing parents, in their drive to master the mystery of birth ... it would disfigure the relation between parent and child, and deprive the parent of the humility and enlarged human sympathies that an openness to the unbidden can cultivate.

And he thinks (2004: 62):

... the promise of mastery is flawed. It threatens to banish our appreciation of life as a gift, and to leave us with nothing to affirm or behold outside our own will.

This kind of argument, which in the genetic enhancement debates has proved influential (although controversial), is very relevant to the current debates about intensive parenting and the concept of parental responsibility. Hyper-parenting is often driven by a desire to make the child the best they can be and to protect them from all dangers; the very motivations that might be behind those who seek to promote genetic enhancement. For those who find Sandel's claims attractive, there is a tension between a parent accepting a child as they are—as a gift—and being responsible for the shaping of the child. Sandel (2004: 62) directly draws this link: 'the hyperparenting familiar in our time represents an anxious excess of mastery and dominion that misses the sense of life as gift. This draws it disturbingly close to eugenics.' He expands on his fear in this passage:

the drive to banish contingency and to master the mystery of birth diminishes the designing parent and corrupts parenting as a social practice governed by norms of unconditional love ... [It is] objectionable because it expresses and entrenches a certain stance toward the world—a stance of mastery and dominion that fails to appreciate the gifted character of human powers and achievements, and misses the part of freedom that consists in a persisting negotiation with the given (Sandel, 2007: 82–83).

Rather, we should accept children 'as they come', 'not as objects of our design' or 'instruments of our ambition'. Quoting theologian William F May, he calls for an 'openness to the unbidden' (Sandel, 2007: 64).

There is an obvious difficulty for these kinds of arguments: at face value, they may argue against a parent agreeing to any kind of medical treatment or improving intervention, rather than letting the child be (Kamm, 2005). Sandel (2004: 57) is clear that this is not what he arguing for. He claims that 'medical intervention to cure or prevent illness ... does not desecrate nature but honors it. Healing sickness or injury does not override a child's natural capacities but permits them to flourish'. To enliven his point, he distinguishes between good running shoes, which help bring out an athlete's natural talents and are appropriate, and taking drugs to enhance athletic ability, which is not. Much weight is therefore carried by the distinction between interfering in a child's natural capabilities and designing them, and removing barriers which might inhibit a child's natural

flourishing. The difficulties are demonstrated by Frances Kamm's (2005) observation that cancer cells (p. 407) and tornadoes are parts of nature, but we should not honour them. The line between enhancing natural ability and creating abilities that are not there in nature is not readily apparent. But, difficult though it is to draw, it is certainly a line that has proved popular in the literature. It is a line that is relevant to the debates around the legal conception of parental responsibility.

3. Parental Responsibility

At the heart of the legal effect of parenthood is the concept of 'parental responsibility'. This is defined in section 3(1), Children Act 1989 (UK): '“parental responsibility” means all the rights, duties, powers, responsibilities and authority which by law a parent of a child has in relation to the child and his property’.

It is not a particularly helpful definition. However, it is reasonably clear what the drafters of the legislation had in mind. They wanted to move away from language referring to the rights of parents to language that instead emphasizes their responsibilities. The Law Commission (1982: para 4.18), whose work was so influential in the development of the Children Act 1989, observed that 'it can be cogently argued that to talk of “parental rights” is not only inaccurate as a matter of juristic analysis but also a misleading use of ordinary language'. The Commission (1982: para 4.19) went on to say that 'it might well be more appropriate to talk of parental powers, parental authority, or even parental responsibilities, rather than of rights'. This view was undoubtedly seen as progressive. Children were not objects over which parents had rights, but people they had responsibilities towards. Any rights the parents did have were to be used responsibly to promote the welfare of the child. As Lord Fraser put it in *Gillick v West Norfolk and Wisbech AHA*: 'parents' rights to control a child do not exist for the benefit of the parent. They exist for the benefit of the child and they are justified only in so far as they enable the parent to perform his duties towards the child, and towards other children in the family'.¹ That said, it would be wrong to suggest that there is no scope for parental discretion as to how their responsibilities are carried out. As Baroness Hale has observed, '“the child is not the child of the state” and it is important in a free society that parents should be allowed a large measure of autonomy in the way in which they discharge their parental responsibilities'.²

In many ways, the emphasis on parental responsibility was a positive move and no family lawyer would want to regress to when a father was seen as having a paternal right to dominate or abuse their child. Yet, since its origins as the modern version of parental rights, the talk of parental responsibilities now has taken on a sinister (p. 408) overtone, as discussed in the following sections, particularly in reaction to social problems that 'poorly parented' children are seen to cause.

4. 'The Crisis of Parenting'

In her book *The Parent Trap*, Maureen Freely refers to fact that 'as a nation we have become obsessed with fears about damaged children and endangered childhood' (2000: 13). Parents, she argues, are now terrified that they are failing in their responsibilities to their children:

Never have the odds against good-enough parenting been greater. The standards of performance are rising, just as more mothers are being pushed into work. The definitions of neglect and abuse are growing, and now extend to include cohabitation and marriage breakdown. In the present climate, to speak in public as a good-enough parent is to invite someone else to point out how abysmally we've failed. ... This makes us an insecure and biddable constituency, quick to apologise for our faults and slow to point out where our masters could do better, and the government has taken advantage of our weaknesses to consolidate its power (2000: 201).

These concerns are reflected and reinforced in political and media portrayals of parenthood. Poor parenting has been blamed for a wide range of social ills, leading to what Frank Furedi (2011) has described as the 'pathologizing of parenting'. Newspaper headlines paint a bleak picture of modern day parenting: 'Parents Blamed Over Gang Culture' (BBC News, 2008); 'Gordon Brown Says Parents to Blame for Teenage Knife Crime' (Kirkup, 2008); 'Parents Blamed for Rise in Bad Behaviour' (Riddell, 2007); 'Parents of Obese Children are "Normalising Obesity" say NHS boss' (*Western Daily Press*, 2015); 'Pupils are More Badly Behaved than Ever and it's their Parents Fault, say Teachers' (*Daily Mail*, 2013). In the light of such views, unsurprisingly, parenting has been described as a major 'public health issue' (Dermott and Pomati, 2015: 1).

This bleak picture of parenthood is reinforced by talk of a 'crisis of childhood' (BBC, 2006), although in truth humankind has probably been worrying about childhood since time began (Myers, 2012). In 2007, a United Nations Children's Fund (UNICEF) report ranked children's well-being in the UK as being the worst of 21 developed nations on measures such as health, poverty, and the quality of family and peer relationships. In 2011, a report issued by the charity Save the Children placed the UK 23rd out of 43 developed countries in terms of children's well-being (Ramesh, 2011).

(p. 409) Politicians have been responsible for much of the parent-blaming headlines. There has been an interesting shift in the political rhetoric from emphasis on family form (and particularly marriage), which was emphasized in the Conservative Government of the late 1980s, to the modern emphasis on parental practices (Collins, Cox and Leonard, 2014). Parents are seen as responsible for ensuring children become active citizens of the future (Janssen, 2015). When he was Deputy Prime Minister, Nick Clegg said, '[p]arents hold the fortunes of the children they bring into this world in their hands' (*The Telegraph*, 2010).

The 'riots' in the summer of 2011 were particularly strong example of parent-blaming (De Benedictis, 2012; Bristow, 2013). Kirkup, Whitehead, and Gilligan (2011) reported the response of David Cameron, the Prime Minister at the time:

The Prime Minister said that the collapse of families was the main factor which had led to last week's turmoil and said that politicians had to be braver in addressing decades of erosion of traditional social values ... The question people asked over and over again last week was 'where are the parents? Why aren't they keeping the rioting kids indoors?' he said. Tragically that's been followed in some cases by judges rightly lamenting: 'why don't the parents even turn up when their children are in court?' Well, join the dots and you have a clear idea about why some of these young people were behaving so terribly. Either there was no one at home, they didn't much care or they'd lost control.

Social commentators warmed to the theme. Alice Thomson (2011) wrote:

It's not a class issue. There is divorce, dysfunction and dadlessness in Croydon and Chelsea. Parents work too hard or not enough. Few of us know how to discipline our children properly; they've become our friends and we are nervous even to suggest that they make their own beds ...

And it was certainly not just politicians on the right who identified the problem as being 'sub-standard parenting' (Bennett, 2008). Without much political opposition, the government proceeded with a series of initiatives designed to help parents fulfil their role. 2011 saw the launch of the 'Troubled Families' programme targeting 120,000 families in Britain who live 'troubled and chaotic lives' (Department for Communities and Local Government, 2013). This promoted directed interventions through social work. The kind of thinking behind these interventions was explained by the Home Office (2008):

Parenting is a challenging job which requires parents to discipline, guide and nurture their child effectively. Parents have a responsibility to the child and the community to supervise and take care of their children and prevent problems in their behaviour and development which, if allowed to go unchecked, could present major difficulties for the individual, the family and the community.

Parenting contracts and orders are a supportive measure designed to help parent(s) or carer(s) improve their parenting skills so that they can prevent problems in their child's behaviour and steer them away from becoming involved in anti-social and offending behaviour.

(p. 410) This emphasis on the responsibility for parents for the bad behaviour of children has been reflected in the law (Hollingsworth, 2007). Increasingly, authoritarian measures have been used against parents who were seen to be causing anti-social and criminal behavior by not supplying sufficient levels of parenthood (Gillies, 2012). Parenting Orders (Magistrates' Courts (Parenting Orders) Rules 2004: Statutory Instrument 2004 No 247) allowed magistrates to require parents to sign parenting contracts, parenting programmes, or even to attend a residential parenting course. As Le Sage and De Ruyter (2007) put it: '[t]his parental duty can be interpreted in terms of control, i.e. that parents have the duty to supervise, control or guard children, inhibit their antisocial impulses and attempt to create an environment free of antisocial temptations.' In sum, this picture of

politics and recent social change shows how the responsibilities of parents are now highlighted as a social narrative, but in a strongly negative sense. Parents are failing the state by failing in their responsibilities to their children.

5. Hyper-parenting

It is not surprising that the emphasis on the responsibilities in parenthood has led to what has been described as a 'paranoid parenting' (Furedi, 2014). By 1996, Sharon Hays (1996: 8) was writing about intensive expectations on mothers. We expect, she claimed, 'emotionally absorbing, labor-intensive, and financially expensive' mothering. The media presentation of this issue is fascinating. As in other areas, mothers cannot win. Either they are 'Tiger moms' and overly pushy for their children (Chua, 2011), or neglectful mothers for failing to give their children the best start in life: 'mothers who can't teach basic life skills are failing not just their own children, but everyone else's too' (Roberts, 2012).

In popular media, the insecurities and guilt of parents has been reflected in a huge growth in literature designed to equip and train parents. This can be found in the extensive literature of popular books aimed at parents seeking to improve their skills. The fears and pressures are reflected in the titles: *How to be a Better Parent: No Matter how Badly your Children Behave or How Busy You Are* (Jardine, 2003), *Calm Parents, Happy Kids: The Secrets of Stress-Free Parenting* (Markham, 2014), *Calmer, Easier, Happier Parenting: The Revolutionary Programme That Transforms Family Life* (Janis-Norton, 2012). Some readers may be sceptical of the realism presented by these books and show a greater affinity with the author of *Go The F**k To Sleep* (Mansbach, 2011).

(p. 411) As the importance of parents in the life of children is emphasized in the media and by the law, it is not surprising that this has produced some modern phenomena of parenting seen as excessive (Honoré, 2009). Janssen (2015) separates out several styles of excessive parenting:

- (1) 'helicopter parents' who try to solve all of their children's problems and protect them from all dangers ...
- (2) 'little emperor' parents who strive to give their children all the material goods they crave ...
- (3) 'tiger moms' who push for and accept nothing less than exceptional achievement from their children ... and
- (4) parents who practice 'concerted cultivation' by scheduling their children into several extracurricular activities to provide them with an advantage ...

These forms of hyper-parenting are seen as parents (always, of course, other people!) who are excessive in their parental role. Driven by the belief propagated by politicians and the media that parenting has the power to impact hugely on the well-being of children and that parents need the skills to excel in parenting, they sacrifice everything to ensure their children thrive. They are constantly engaging their children in improving ac-

tivities to ensure that they 'succeed', by which is meant they perform better than other children. Carolyn Daitch (2007) has written of it as 'a style of parents who are over focused on their children ... They typically take too much responsibility for their children's experiences and, specifically, their successes or failures'. Ann Dunnewold (2012) refers to the practice of over-parenting: '[i]t means being involved in a child's life in a way that is over-controlling, overprotecting, and over perfecting, in a way that is in excess of responsible parenting.'

The explanations for this behaviour has been summarized by Alvin Rosenfeld and Nicole Wise (2001):

This is happening because many contemporary parents see a parent's fundamental job as designing a perfect upbringing for their offspring, from conception to college. A child's success – quantified by 'achievements' like speaking early, qualifying for the gifted and talented program, or earning admission to an elite university – has become the measure of parental accomplishment. That is why the most competitive adult sport is no longer golf. It is parenting.

It may be that hyper-parenting is linked to the great inequalities in our society. The consequences of succeeding or not succeeding are seen as so significant in financial terms that considerable parental investment is justified (Doepke and Zilibotti, 2014).

Marano (2008) suggests that overparenting can arise where a woman leaves her job in favour of full time mothering. Especially where highly educated and driven, her ambition is put into the child. Indeed, perhaps in an attempt to justify her decision to leave her career, she provides intensive levels of parenting. More convincingly, Bayless (2013) locates fear as the root of hyper-parenting, suggesting 'a fear (p. 412) of dire consequences; feelings of anxiety; over-compensation, especially parents feeling unloved or neglected as a child and deficiency in own parents; peer pressure from other parents.' The last factor has led some commentators to prefer the notion of competitive parenting (Blackwell, 2014). This reflects the anxiety that one is not doing as much as other parents and therefore one is failing in one's responsibilities (Faircloth, 2014). O for the technology that could ensure our child is ready packaged, pre-destined to good citizenship and we need not worry that we are not doing enough to ensure that the child is receiving the best possible start in life (*The Economist*, 2014). And we are back with the debates over genetic enhancement.

As we have seen, 'parent blaming' has become a powerful feature of contemporary culture (Bristow, 2013). Parents are expected to have a particular set of skills and to exercise those with competence and care. A failure to do so is a failure to be a good parent and, as a result, society is negatively affected. The remainder of this chapter will take a critical look at the messages sent about parenting and the impact these developments have on parenting. It is argued that the expectations placed on parents set them up to fail; that the burdens placed on parents are excessive; that the burdens are highly gender- and class-based; that the identity of the child is subsumed into that the parent in the

current discourse on parenting; and that parenting has become privatized. The chapter concludes with an alternative vision of the parent-child relationship.

6. Parents Destined to Fail

The requirements or expectations on parents are excessive. Frank Furedi (2014) focuses on the role of experts and the 'scientification of child rearing' in relation to parents and their ability to take personal responsibility regarding their children:

Contemporary parenting culture exhorts parents to bring up their children according to 'best practice.' In virtually every area of social life today, experts advocate the importance of seeking help. Getting advice – and, more importantly, following the script that has been authored by experts – is seen as proof of 'responsible parenting.'

Parenthood has become a matter for experts, or at least 'supernanny'. Parents need special skills and training to do the job. This, however, can set up parents to fail.

Reece (2013) is concerned by the government advice (Department of Health, 2009) in *Birth to Five*, where positive parenting is promoted as a response to discipline issues. She quotes this passage:

(p. 413)

Be positive about the good things ... Make a habit of often letting your child know when he or she is making you happy. You can do that just by giving attention, a smile, or a hug. There doesn't have to be a 'good' reason. Let your child know that you love him or her just for being themselves... . Every time he or she does something that pleases you, make sure you say so (Reece, 2013: 61).

For Reece, although this image of positive parenting might not sound particularly arduous, 'positive reinforcement is far-reaching and nebulous: extending infinitely, it is impossible to define or fulfil. This is parenting without limit.' Parents will inevitably fail to be as positive as they could. She also refers to the advice of one parents guide on listening to a child:

It's not as easy as it sounds. To listen, first of all you have to think about your body language. Sit her in one chair, and you sit in another chair, facing her. Make good eye contact; have a relaxed facial expression; give feedback to show you're listening; nod in the right places (Reece, 2013: 63).

As Reece (2013: 63) points out, despite sounding like common sense, the requirements are in fact arduous and impossible to fulfil: '[t]he fine detail of such advice reinforces the impossibility of success: you may have given praise, in a positive tone of voice, but did you nod in the right places.' Can a parent ever be 'listening' or 'positive' enough? The parent is required to be the 'reflective parent' and Reece argues that this is, in fact, coer-

cive. It denies parents the opportunity to be natural and spontaneous. It is not surprising we have seen growth in the 'how to be a good parent' market, and the increased 'outsourcing' of child-rearing responsibilities to experts.

7. The Excessive Burden on Parents

The second aspect of social messaging about modern parenting is that there is no appreciation of the impact on the parent of the advice being given. Take for example these comments in *Birth to Five*: 'eat your dinner nicely so that your toddler will eat his dinner nicely; put away your clothes neatly so that your toddler will put away his clothes neatly' (Home Office 2008). While, again, appearing to be good advice, the expectations thereby placed on parents are considerable. Dare to be slightly untidy; eat without immaculate manners; consume an unhealthy snack; or utter words that should not be spoken and your child is destined to life of debauchery. Of course, that is not what the Government advice is trying to say, but given the general atmosphere around parenting, that is how it could be understood.

(p. 414) The technologies available to track and monitor children have added to the burden on parents. During her time as a government minister, Maria Miller stated that it is the responsibility of parents to ensure that children do not view pornography or inappropriate material on the Internet (Lawrence, 2012). That can be expensive and complex role, which in commercial settings is undertaken by trained IT departments.

A whole range of technologies are available to parents take on the responsibilities of protecting children from danger and ensuring they become good citizens. From baby monitors to GPS trackers, parents can use technology keep tabs on their children; yet these require extensive time and financial commitments. Marx and Steeves (2010) comment on the range of devices available:

Technologies examined include pre-natal testing, baby monitors and nanny cams, RFID-enabled clothing, GPS tracking devices, cell phones, home drug and semen tests, and surveillance toys, and span the years from pre-conception through to the late teens. Parents are encouraged to buy surveillance technologies to keep the child 'safe'. Although there is a secondary emphasis on parental convenience and freedom, surveillance is predominately offered as a necessary tool of responsible and loving parenting. Entrepreneurs also claim that parents cannot trust their children to behave in pro-social ways, and must resort to spying to overcome children's tendency to lie and hide their bad behaviour.

And if any parent feels that these are invading the privacy of children, Nelson (2010: 166) reminds them that parents 'praise baby monitors and cell phones for helping them to establish this desired closeness and responsiveness and for enabling them to use the knowledge thus obtained to better control their children.' The availability of this tracking tech-

nology may mean that those parents who do not exercise these options are perceived to be failing to take seriously their role.

8. The Exaggerated Claims of Parenthood

An overarching message sent by contemporary understandings of parents is that they are all-powerful (Faircloth and Murray, 2015). Even if they cannot currently genetically engineer their children, they can still do an enormous amount to influence them. One parenting course advertisement states:

We are the main influence on our teenagers' future. ... Meeting our teenagers' deepest needs, setting healthy boundaries, helping to develop their emotional health and teaching them how (p. 415) to make good choices takes skill and dedication. Taking time to reflect on our end goal can help us to build our relationship with our teenagers now (National Parenting Initiative, 2013).

The assumptions here, and in the law more generally, over the amount of control that parents exercise over children appears to excessive. A good example is the recent decision of the Court of Appeal in *Re B-H*. The case involved two teenage girls who, following the separation of their parents, lived with their mother and strongly objected to seeing their father. Vos LJ said: '[i]t is part of the mother's parental responsibility to do all in her power to persuade her children to develop good relationships with their father, because that is in their best interests.'³ While acknowledging that 'headstrong' teenagers can be 'particularly taxing' and 'exceptionally demanding', nevertheless the mother should change her daughters' attitudes. The President of the Family division wrote:

... what one can reasonably demand—not merely as a matter of law but also and much more fundamentally as a matter of natural parental obligation—is that the parent, by argument, persuasion, cajolement, blandishments, inducements, sanctions (for example, 'grounding' or the confiscation of mobile phones, computers or other electronic equipment) or threats falling short of brute force, or by a combination of them, does their level best to ensure compliance.⁴

Much more could be said about this case (Herring, 2015), but for now three points are worth noting. The first is that the court seems to imagine parents have far more power over their children than might be imagined. How is a mother expected to force teenagers to have a good relationship with someone else? Getting a teenager to do their homework is hard enough; getting them to visit and think positively about someone else is another. This is particularly so given that, in this case, the father had treated the children badly in the past. It appears the court is more interested in placing the blame for the breakdown on the mother than anything else. Second, the case ignores the emotional impact on the mother. The breakdown in this case was bitter. The mother had some good reasons to think ill of the father and oppose contact. While accepting that, following the court's decision, it was best for the children to spend time with their father, it might be reasonable to expect the mother not to impede the contact. To expect her to enable the contact to which

she was so strongly opposed requires an enormous amount of her. Third, the case loses sight of the children's own autonomy. They, too, had reasons for not wanting to see their father. To assume that the children's views were the responsibility of the mother presents an image of children being completely under the influence of the parents. It denies children's agency and is highly paternalistic. This final point is a general concern about the attitudes towards parenting. The emphasis on parental responsibility for the actions of children, and the significance attached to the need for good parenting, overlooks the agency of children themselves.

(p. 416) 9. The Gendered Aspect of Responsibility

The impact of parent blaming is highly gendered. While the advice and media presentations normally talk about parenting generally, the burden of the advice typically falls on mother. A good example is the NHS Choices (2010) discussion of research showing:

A significant positive relationship was found between offspring BMI and their mothers' BMI, i.e. there was a higher chance of the child being overweight/obese if their mother was. The association between child and maternal BMI had become more significant across generations. There was also a positive trend between increased BMI in the offspring cohort if their mother was in full-time employment; a relationship that was not seen in the 1958 cohort.

The link, then, is drawn between the weight of the mother and the work status of the mother and obesity. While, quite properly, the website emphasises the research does not prove correlation, one suspects many readers will receive the take home message as: '[i]f a mother wants a thin child she should be thin herself and not work.' And the flipside 'If your child is obese it is either the fact your working or your own obesity which has caused this.' Certainly the current attention paid to child obesity and the need for parents to tackle it is, the evidence suggests, treated by parents and professionals as primarily aimed at mothers (Wright, Maher, and Tanner 2015).

10. The Class-based Assumptions Behind Parenthood

It is easily overlooked that the popular presentation of the 'good parent' is heavily class-based (Ramaekers and Suissa, 2011). This chapter has already noted how the good parent will be using technology to enable them to exercise surveillance of children's internet use and track their movements. These are only available to those with significant economic resources. The use of 'supernannies', 'trained child minders', parental guides, and courses, not to mention qualified music teachers, tennis coaches, and the like to ensure the child is fit and well-rounded are, it hardly needs to be said, expensive. Nelson (2010: 177) writes of how the hyper-parenting requires the use of economic and social resources:

In short, the attentive hovering of the professional middle-class parents both requires and builds on a vast array of material resources, even though it does not necessarily rely on all available technology; simultaneously, the attentive hovering has roots and dynamics that emerge from, and are sustained by, cultural and social practices.

Another example is schooling. Selection of schools is now an important aspect of parental choice. Yet in reality it is heavily linked to socio-economic resources (Dermott and Pomati, 2015). Responsible parents will exercise their choice with care, but there is only a meaningful choice for those who have the economic and social resources to manipulate the system.

11. Merging of the Parent and Child

In much of the literature on modern parenting, the identities of the parent and child are merged. This is highly apparent in the genetic enhancement debate, where the child is created at the command and request of the parent. The child is a reflection of the parents' values and character. But this presented also as true in the current atmosphere surrounding parenthood, i.e. the competitive parent wants their child to be the best because that reveals that they are the best parent. As we saw earlier, the untidiness of the child reveals the untidiness of the parent. This idea of the child being a reflection of the parent is described by Stadlen (2005: 105), where the mother creates 'her own unique moral system within her own home', allowing her to 'learn not just what "works", but also what her deepest values are, and how she can express them in creating her family' (248). Her family is the very embodiment of her values, 'both her private affair and also her political base' (253). These kinds of attitudes are reinforced by the enormous emphasis placed on the responsibility of parents to raise their children well. The concern is not just that that creates a dangerous merging of the self of the parent and the child. As Reece put it: '[t]his gives a whole new meaning to the term "mini-me"' (2013).

12. The Privatizing of Parenthood

The emphasis on the parent as being responsible for the child ignores the significance of broader social, environmental, and community impacts of children (Gillies, 2011). (p. 418) The importance of a good environment, good quality education, a supportive community, and high-quality children's television is all lost when the debate is framed in terms of parental failure (Dermott and Pomati, 2015). As Levitas (2012) points out, 'troubled families' were defined in terms of multiple disadvantages, such as having no parents in work. However, perhaps inevitably, the line between troubled families and families who caused troubles soon became blurred. The solution proposed by the government was to help

these parents be better parents, not to tackle the root causes of disadvantage that rendered them ‘troubled’ in the first place.

13. Towards a Relational Model of Parenthood: The Limits of Technologizing Parenthood

This section brings together the themes of this chapter relating to hyper-parenting—the fetishization of the ability to genetically engineer children, the desire to control and mould children, and the emphasis of the parents’ responsibility for children. These themes are all open to technology playing a useful role in ‘good parenting’, but they are all subject to a single major flaw: they imagine parenthood as a one-way street. Parenthood is something that parents do to children and is designed with the aim of producing good, well-rounded children. The skill of parents is to mould their children to be good citizens, and to be responsible if their children turn out to be otherwise. Parenting has become a verb, rather than a noun (Lee and others 2014: 9–10). As Furedi (2011: 5) puts it: ‘[t]raditionally, good parenting has been associated with nurturing, stimulating and socializing children. Today it is associated with monitoring their activities.’ Parenting has become a skill set to be learned, rather than a relationship to be lived.

The modern model of parenting described in this chapter involves children as passive recipients of parenthood. The parent-child relationship is not like that. The modern model overlooks the ways that children ‘parent’ the adults in their life. Children care, mould, control, discipline, and cajole their parents, just as parents do their children. The misdeed of a parent seeking to genetically engineer or hyper-parent their child is not just that the parent is seeking to impose a particular view of what is a good life on their child, although that is wrong. It is the error of failing to be open to change as an adult; failing to learn from children, failing to see that the things you thought were important are, in fact, not. It is failing to find the wonder, fear, loneliness, anxiety, spontaneity, and joy of children, and to refind them for oneself (Honoré, 2009).

(p. 419) Parenthood is not about the doing of tasks for which one has been trained, with technological tools. It is not a job to perform with responsibility; it is a relationship. Should we not look for parents who are warm, kind, loving, and understanding, rather than well-trained, equipped with technology, and hyper-vigilant (Stadlen, 2005)? This is not least because being a parent is not accomplished by possessing a skills set in the abstract. It is a specific relation to a particular child. It involves the parent and child working together to define what will make a successful relationship (Smedts, 2008). Sandel (2004: 55) says that ‘parental love is not contingent on talents and attributes a child happens to have.’ This, perhaps, is what is wrong with hyper-parenting. The child is not a project for parents to design and control. The language of children as a gift is preferable. That is typically seen as a religious claim, but it can be seen as a metaphor (Leach Scully, Shakespeare, and Banks 2006).

These points are all the more apparent to those of us whose children do not fall into the conventional sense of 'normal'. The notion of parental control and responsibility for what a child is or does seems absurd in this context. The rule books are long since discarded and it is a matter of finding day by day what works or, more often, what does not work. Parents of disabled children come to know that the greatest success for the child will be a failure by the objective standards of any government league table or examination board. But such social standards fail to capture a key aspect of parenting—that children can cause parents to be open to something more wonderful, particularly when they are more markedly different from a supposed social norm. Hannah Arendt (1958) has spoken of the power of 'natality': being open to unpredictable, unconditioned new life that birth brings. And perhaps it is that which seems an anathema to much current political and public talk of parenthood. As Julia Lupton writes, 'totalitarianism knows neither birth nor death because it cannot control the openings of action—the chance to do, make, or think something new—that natality initiates' (2006).

Returning to the issue of genetic enhancement, Frances Kamm (2005: 14) writes:

A deeper issue, I think, is our lack of imagination as designers. That is, most people's conception of the varieties of goods is very limited, and if they designed people their improvements would likely conform to limited, predictable types. But we should know that we are constantly surprised at the great range of good traits in people, and even more the incredible range of combinations of traits that turn out to produce 'flavors' in people that are, to our surprise, good.

And this captures a major argument against the technologizing of parenting, of seeking to use what powers we have to shape our children. Our vision of what is best for our children is too depressingly restrained: a good job, a happy relationship, pleasant health, and to be free from disease. Yet the best of lives is not necessarily marked by these things. Ellis (1989) writes that parents of disabled children suffer 'the grief of the loss of the perfect child'. This is a sad framing of such parenthood because disability can at least throw off the shackles of what is expected. It takes (p. 420) parents out of the battle of competitive parenting, where the future is not a predictable life course and is all the more exciting for that.

14. Conclusion

Rothschild (2005) writes of the 'dream of the perfect child', yet it is the nightmare of the non-perfect child which seems capture the parental imagination today. This chapter has explored some of the impacts of technology on parenting. The 'hope' of genetic enhancement has given glimpses of being able to create exactly the child one would wish for. Until that becomes possible, some parents seek to use technology and other skills to control and enrich their children. Hyper-parenting and competitive parenting reflect the desire of parents to produce the ideal child. Government rhetoric, backed up by legal sanctions, reinforces this by emphasizing that parents are responsible for their children in ways that are increasingly onerous and unrealistic. The chapter concluded with a different vision

for parenthood. Parenthood is not a job for which parents need equipment and special training to ensure production of the ideal product. It is a relationship (Smith, 2010) where the child teaches, nourishes, and cares for the parent as much as the parent does these things for the child.

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(1.) *Gillick v West Norfolk and Wisbech AHA* [1986] 1 AC 112, 170.

(2.) *R v Secretary of State for Education and Employment ex parte Williamson* [2005] UKHL 15 [72].

(3.) *Re B-H* [2015] EWCA Civ 389 [66].

(4.) *Ibid.* [67].

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Human Rights and Information Technologies

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Abstract and Keywords

The social changes brought about by the deployment of information technologies are wide-ranging and fundamental. A human rights analysis of such technologically driven changes shows how they implicate significant opportunities as well as risks. The chapter argues that human rights are a core aspect of regulating such technologies, particularly as human rights provide a unifying purposive perspective for diverse technologies and deployment contexts. To this end, the chapter examines how the opportunities and risks of information technologies affect and relate to the fundamental values of freedom, dignity, and equality, as well as specific human rights, such as privacy or freedom of expression.

Keywords: human rights, information society, information technologies, freedom, dignity, privacy, equality, freedom of speech

1. Introduction

INFORMATION technology (IT) has transformed all domains of individual and communal life: economic structures, politics, and administration, communication, socialization, work, and leisure. We look with a mixture of wonder and fear at the continuing stream of IT innovations: search engines, social networks, robotic factories, intelligent digital assistants, self-driving cars and airplanes, systems that speak, understand, and translate language, autonomous weapons, and so on. In fact, most social functions—in the economy as well as in politics, healthcare or administration—are now accomplished through socio-technical systems (on this notion see Vermaas and others 2011: ch 5) where ITs play a large and growing role. As ITs have such a broad impact on humanity—influencing not only social structures, but also the nature and self-understanding of individuals and communities—they also affect the fundamental human interests that are protected as human rights. As we shall see, on the one hand, ITs enhance human rights, as they offer great opportunities for their realization that can be made available to everybody. On the other

hand, they put human rights at risk, as they provide new powerful means for interfering with such rights.

(p. 425) The role of human rights with regard to regulating IT is not limited to that of an object of protection, as the human rights discourse contributes to frame the debate on the governance of the information society, as this chapter argues (Mueller 2010: ch 2). Indeed, this discourse has the capacity of providing a unifying perspective over the fragmented regulation of information technologies; it provides a purposeful framework able to cover the variety of IT technologies and contexts of their deployment, and to support the integration of diverse valuable interests pertaining to multiple stakeholders.

2. Opportunities of IT

This section examines how IT is now a fundamental part of modern social and public life. IT provides great opportunities for individuals and communities, in relation to promoting economic development, providing education, building knowledge, enhancing public administration, and supporting co-operation and moral progress. In many domains of social life, only in partnership with IT can we achieve the level of performance that is today required.

2.1 Economic Development

First of all, ITs contribute to economic development. In IT-driven socio-technical systems, a vast amount of information can be collected, stored, and acted upon, through the integrated effort of humans and machines, with a speed and accurateness previously impossible. Thus, not only new kinds of products and services are made available—such as computer and network equipment, software, information services, and so on—but ITs support a vast increase in productivity in all domains, from agriculture and industry to services, administration, and commerce (on the information economy, see Varian, Farrell, and Shapiro 2004; Brynjolfsson and Saunders 2010). Moreover, the coupling of computing and telecommunications allows for innovation and development to be rapidly transmitted and distributed all over the world, transcending geographical barriers. While centuries were necessary for industrial technologies to spread outside of Europe, ITs have conquered all continents in a few decades. In particular, economic efficiency can be supported by the processing of personal data, that enables offers to be targeted to individual consumers, and allows for the automation of customer management. Through data analytics, (p. 426) such data can be used to extrapolate trends, anticipate demand, and direct investments and commercial strategies.

2.2 Public Administration

No less significant is the contribution of IT to public administration. ITs not only provide for the collection, storage, presentation, and distribution of data of any kind, but they also support decision-making, and the online provision of services to citizens (Hood and Margetts 2007). Workflows can be redesigned and accelerated, repetitive activities can

be automated, citizens' interactions with the administration can be facilitated, documents can be made publicly accessible, and participation in administrative proceedings can be enhanced, and so can controls over the exercise of administrative discretion. All public services and activities can in principle be affected: healthcare, environmental protection, security, taxation, transportation management, justice, legislation, and so on. The preservation of a 'social state' under increasingly stringent economic constraints also depends on the ability to use ITs to reduce the cost of the delivery of public services, even though cost reduction, rather than the quality of service, often becomes the overriding consideration in the deployment of ITs. Efficiency in the public administration may require the processing of personal data, so as to determine the entitlements and obligations of individual citizens, manage interactions with them, and anticipate and control social processes (in diverse domains such as public health, education, criminality, or transportation).

2.3 Culture and Education

ITs enhance access to culture and education. They facilitate the delivery of information, education, and knowledge to everybody, overcoming socio-economic and geographical barriers. In fact, once information goods have been created (the cost for their creation having been sustained) and made available online, it is basically costless to provide them to additional online users, wherever located. Moreover, ITs enable the provision of interactive educational services, including multiple sources of information. Automated functions can be integrated with human educators, with the first providing standardized materials and tests, and the second engaging individually with students through the IT infrastructure. Finally, new technologies contribute to education by reducing the costs involved in the production of educational goods (such as typesetting, recording, revising, modifying, and processing data).

(p. 427) 2.4 Art and Science

ITs contribute to human achievements in art and science. They provide new creative tools for producing information goods, which make it possible to publish texts, make movies, record music and develop software at a much lower cost, and with much greater effectiveness than ever before. An increasing number of people can contribute to the decentralized production of culture, creating contents that can be made accessible to everybody. Similarly, ITs provide opportunities to enhance scientific research. ITs support the handling of data extracted from experiments in natural sciences (they have given a decisive contribution to the identification of DNA patterns, for instance) as well as from social inquiries, and they enable scientists to engage in simulations and control complex devices. In general, IT provides powerful cognitive technologies, expanding human capacities to store information, retrieve it, analyse it, compute its implications, identify options, create both information and physical objects (on cognitive technologies, see Dascal and Dror 2005).

2.5 Communication, Information, Interaction, and Association

ITs contribute to communication, information, interaction, and association. The integration of computing and telecommunication technologies makes remote communication ubiquitously available, thus facilitating human interaction (for instance, through email, online chats, and Internet telephony). This expands each person's ability to find and exchange opinions, and freely establish associative links. A number of Internet platforms—from websites devoted to cultural, social, and political initiatives, to forums, discussions groups, and social networks—support the meeting of people sharing interests and objectives. ITs also provide new opportunities for those belonging to minorities in culture, ethnicity, attitudes, and interests, enabling them to enter social networks where they can escape solitude and discrimination. Finally, ITs are available that support the anonymity of speakers and the confidentiality of communications, protecting speakers such as journalists and political activists from threats and repression. In particular, anonymity networks enable users to navigate the Internet without being tracked, and cryptography enables messages to be coded so that only their addressees can decipher their content.

2.6 Social Knowledge

ITs enable the integration of individual contributions into social knowledge. In the so-called Web 2.0, content is provided by the users through platforms delivering and (p. 428) integrating their contributions. Non-organized 'crowdsourcing' in content repositories, such as YouTube and Twitter, delivers huge collective works aggregating individual contributions. Moreover, individual inputs can be aggregated into outputs having a social significance: blogs get clustered around relevant hubs, individual preferences are combined into reputation ratings, spam-filtering systems aggregate user signals, links to webpages are merged into relevance indices, and so on.

2.7 Cooperation

ITs contribute to cooperation. New communication opportunities enable people to engage in shared projects pertaining to business, research, artistic creation, and hobbies, regardless of physical location. In the technical domain, the collaborative definition of standards for the Internet exemplifies how open discussion and technical competence may direct different stakeholders to converge towards valuable shared outcomes. Collaborative tools—from mailing lists, to wikis, to systems for tracking and coordinating changes in documents and software products—further facilitate engagement in collaborative efforts. They support the 'peer-production' of open source software (such as Linux), intellectual works (for example, Wikipedia), and scientific research (Benkler 2006).

2.8 Public Dialogue and Political Participation

ITs contribute to public dialogue and political participation. They provide new channels for political communication, debate, and grouping around issues and views. They enable speakers to address potentially unlimited audiences, through websites and online plat-

forms. They also facilitate contacts between citizens and political institutions (for example, through online consultation on legislative proposals) and citizens' involvement in political participation (for example, through online voting and petitioning: see Trechsel 2007). Political equality can be enhanced as people can act online anonymously, or pseudonymously, adopting identities that abstract from their particular individual or social conditions, so that they may be immune from the stereotypes associated with such conditions. Rationality can be enhanced as citizens can avail themselves of the evidence accessible through ITs and of the insights obtainable by processing such evidence. It is true that the Internet has failed to maintain the expectation that it would bring about a new kind of politics, based on extended rational discussion and deliberation: the dynamic of information exchanges does not always make the most rational view emerge, as it may rather emphasize prejudice and polarization (Sunstein 2007). However, e-democracy can meet more realistic expectations, enabling a broader and more informed (p. 429) participation of citizens in relation to political and social debates as well as legislative and regulatory procedures. Where political debate and communication are constrained by repressive governments, the Internet and various IT tools (websites and blogs, encryption for having secret communications, hacking techniques for overcoming informational barriers and monitoring governmental activities, etc.) have enabled citizens to obtain and share information about governmental behaviour, in order to spread criticisms and build political action. This remains true even though the excitement concerning the role of the Internet in recent protest movements, such as the Arab Spring, has made way for some disillusionment, as it has appeared that the Internet could not bring about the expected democratic change, in the absence of adequate social and institutional structures (Morozov 2010).

2.9 Moral Progress

Finally, ITs may promote moral progress. By overcoming barriers to communication, offering people new forms of collaboration, and reducing the costs involved in engaging in joint creative activities, ITs may favour attitudes inspired by universalism, reciprocity, altruism, and collaboration. In particular, it has been argued that the idea of benefiting others through one's own work becomes more appealing when the work to be done is rewarding in itself, there is little cost attached to it, and a universal audience can access it, as is the case for many projects meant to provide open digital content (such as Wikipedia) or open source software (Benkler and Nissenbaum 2006). For this moral dimension to obtain, however, it is necessary that engagement in non-profit collaborative enterprises be a genuine choice, in an economic and social ecology where alternative options are also legitimately and practically available. We should not put undue pressure on creators to give up their individuality, or to renounce the possibility of making a living from their work (for a criticism of the sharing economy, see Lanier 2010).

3. Risks of ITs

While offering great opportunities for the enhancement of human values, ITs also put such values at risk. In particular, different uses of IT pose risks of social alienation, inequality, invasion of privacy, censorship, and virtual constraint over individual choice, as well as challenges to fundamental normative frameworks. (p. 430) In the context of human rights law, these risks reframe the analysis, as considered in section 4.

3.1 Unemployment/Alienation

As an increasing number of physical and intellectual tasks are performed by ITs—on their own, or with a limited number of human operators—many workers may become redundant or be confined to accessory tasks. Those losing the ‘race against the machine’ (Brynjolfsson and McAfee 2011) may be deprived of a decent source of living. Even when protected against destitution by adequate social safety networks, they could lose the ability to play an active role in society, missing the opportunity to engage in purposeful and rewarding activities and to acquire and deploy valuable skills.

3.2 Inequality

ITs amplify the productivity of, and the demand for, higher-paying jobs requiring creativity and problem-solving skills that cannot (yet) be substituted by machines. At the same time, ITs take over—in particular, through artificial intelligence and robotics—lower level administrative and manual activities. This process contributes to amplifying the divergence in earnings between the more educated and capable workers and their less-skilled colleagues. Moreover, as ITs enable digital content and certain business processes to be easily replicated, a few individuals—those recognized as top performers in a domain (such as art or management)—may be able to satisfy all or almost all of the available demand, extracting superstar revenues from ‘winner-take-all’ markets (Frank and Cook 1995). Others, whose performance may be only marginally inferior, may be excluded (on technology and inequality, see Stiglitz 2012: ch 3). Finally, inequality may be aggravated by the differential possibilities of information and action provided by ITs. In particular, a few big players (such as Google and Facebook) today control huge quantities of data, collected from virtual and physical spaces. These data remain inaccessible not only to individuals, but also to public administrations and small economic operators, who are correspondingly at a disadvantage.

3.3 Surveillance

ITs have made surveillance much more easy, cheap, and accurate, for both public powers and private actors. Hardware and software devices can upload traces of (p. 431) human behaviour from physical and virtual settings (for example, recording life scenes through street cameras, intercepting communications, hacking computers, examining queries on search engines and other interactions with online services). Such information can be

stored in digital form and processed automatically, enabling the extraction of personal data and, in particular, the detection of unwanted behaviour.

3.4 Data Aggregation and Profiling

ITs enable multiple data concerning the same individuals, extracted from different sources, to be aggregated into profiles of those individuals. Probable features, attitudes, and interests can be inferred and associated with such individuals, such as expected purchasing behaviour or reaction to different kinds of advertisement, or a propensity to engage in illegal or other unwanted behaviour. The analysis of a person's connections to other people—as obtained by scrutinizing communications or social networks—also enables software systems to make inferences about that person's attitudes. In this way, electronic identities are constructed, which may provide a false or misleading image of the individuals concerned.

3.5 Virtual Nudging

As IT-based systems supplement social knowledge with rich profiles of individuals, they can attribute interests and attitudes as well as strengths and weaknesses to such individuals. On this basis, these systems can anticipate behaviour and provide information, suggestions, and nudges that trigger desired responses (see Hildebrandt 2015), as in relation to purchasing or consumption. They can even create or reinforce desires and attitudes, for instance, by gamifying choices, that is, by facilitating desired choices and reinforcing them through rewards.

3.6 Automated Assessment

ITs may rely on collected and stored information about individuals in order to assess their behaviour, according to criteria possibly unknown to such individuals, and make decisions affecting them (for example, give or refuse a loan, a tenancy, an insurance policy, or a job opportunity: see Pasquale 2015: ch 2). The individuals concerned could be denied a fair hearing, being deprived of the possibility to obtain reasons from, and make objections to, a human counterpart.

(p. 432) 3.7 Discrimination and Exclusion

Information stored in computer systems may be used to distinguish and discriminate between individuals, by classifying them into stereotypes without regard for their real identity, or by taking into invidious consideration certain features of them, so as to subject them to differentiated treatment with regard to employment, access to business and social opportunities and other social goods (Morozov 2013: 264).

3.8 Virtual Constraints

As human action takes place in IT-based environments—devices, infrastructures, or socio-technical systems—it is influenced by, and thus it can be governed through, the shape or architecture of such environments (Lessig 2006: ch 4). In particular, prohibitions can transform into inabilities, as unwanted actions become impossible (or more difficult or costly) within such technological environments, and obligations can transform into necessities, that is, actions that have to be performed if one wants to use the infrastructure. Thus, human users can be subject to a thick network of constraints they cannot escape, and of which they may even fail to be aware, as they seamlessly adapt to their virtual environments.

3.9 Censorship/Indoctrination

ITs for identifying, filtering, and distributing information can be used for tracking and eliminating unwanted content, and identifying those involved in producing and distributing it. Moreover, ITs may support the creation and distribution of whatever is considered useful for distraction or indoctrination by those controlling an IT-based socio-technical environment (Morozov 2010: ch 4).

3.10 Social Separation and Polarization

The possibility of engaging in social interactions transcending geographic limits may lead individuals to reject physical proximity as a source of social bond. They may choose to avoid unanticipated encounters and unfamiliar topics or points of views, so as to interact only with those sharing their attitudes and backgrounds and to access only information that meets their preferences or stereotypes (Sunstein 2007: ch 3), this information being possibly preselected through personalized filters (as anticipated by Negroponte 1995: ch 11). Thus, they may lose contact with (p. 433) their broader social environment, including with the political and social problems of their fellows.

3.11 Technowar

The recent developments in intelligent weapons may be the beginning of a new arms race, based on IT. Warfare will be increasingly delegated to technological devices, of growing destructive power and precision, with outcomes engendering not only the lives of particular individuals and communities, but potentially the very future of humanity (on autonomous weapons, see Bhuta and others 2015).

3.12 Loss of Normativity

IT-based guidance—through surveillance, virtual constraints, and virtual nudging—may supplement or substitute moral and legal normativity (for a discussion, see Yeung 2008). IT-driven humans may no longer refer to internalized norms and values, in order to constrain their self-interests considering what they owe to their fellows, and in order to question the justice of social and legal arrangements. In short, they may no longer experience

their position as member of a norm-governed community or a 'community of rights' (Brownsword 2008: ch 1), as bearers of justifiable moral entitlements and responsibilities.

4. What Role for Human Rights?

The regulation of ITs—to ensure the opportunities and prevent the risks just described—requires the integration of different legal measures (concerning data protection, security, electronic commerce, electronic documents, and so on) and public policies (addressing economic, political, social, educational issues), and the involvement of different actors (legislators, administrative authorities, technical experts, civil society). Given the complexity and rapid evolution of ITs, as well as of the socio-technical ecologies in which they are deployed, it is impossible to anticipate with detail and certainty the long-term social impacts of such technologies. Consequently, regulators tend to adopt a strategy of social engineering through 'piecemeal tinkering'. They focus on limited objectives, in determined (p. 434) areas (specific technologies or fields of their deployment), and engage in processes of trial and error, that is, 'small adjustments and readjustments which can be continually improved upon', while taking care of many unintended side effects (Popper 1961: 66). This approach is indeed confirmed by the evolution of IT law, where sectorial legislation is often accompanied by a thick network of very specific regulatory materials—such as security measures for different kinds of computer systems, or privacy rules for cookies or street cameras—which are often governed by administrative authorities with the involvement of private actors, and are subject to persistent change.

However, the fragmentation of IT law does not exclude, but rather requires, an overarching and purposeful view from which the regulation of different technologies in different domains, under different regimes, may be viewed as single enterprise, aiming at a shared set of goals. The human rights discourse can today contribute to such a unifying view, since it has the unique ability to connect the new issues emerging from ITs to persisting human needs and corresponding entitlements. This discourse can take into account the valuable interests of the different social actors involved, and can bring the normative discussion on impacts of new technologies within a larger framework, including norms and cases as well as social, political, and legal arguments.

It is true that authoritative formulations, doctrinal developments, and social understandings of human rights cannot provide a full regulatory framework for ITs. On the one hand, the scope and the limitations of human rights are the object of reasonable disagreements. On the other hand, economic and technological considerations, political choices, social attitudes, and legal traditions also play a key role, along with individual rights, in regulating technologies. The relative indeterminacy of human rights and the need to combine them with further considerations, however, does not exclude, but in fact explains, the specific role of human rights in the legal regulation of ITs: as beacons for regulation, indicating goals to be achieved and harms to be prevented, and as constraints over such regulations, to be implemented according to proportionality and margins of appreciation.

The importance of human rights for the regulation of IT is confirmed by the increasing role that the human rights discourse plays in the debate on Internet governance, where such discourse provides a common ground enabling all stakeholders (governments, economic actors, civil society) to frame their different perspectives and possibly find some convergence. In particular, human rights have become one of the main topics—together with technical and political issues—for the two leading UN initiatives on Internet governance, the 2003–2005 World Summit on the Information Society and the Internet Governance Forum, established in 2006 (Mueller 2010: chs 4 and 6). Human rights were explicitly indicated as one of the main themes for the 2015 Internet Governance Forum. Their implications for the Internet have been set out in an important soft law instrument, the Charter of Internet Rights and Principles established by the Dynamic Coalition for Internet Rights and Principles (Dynamic Coalitions are established in context of the Internet Governance Forum as open groups meant to address specific issues through the involvement of multiple stakeholders).

It has been argued that information ethics and information law should go beyond the reference to human interests. They should rather focus on the preservation and development of the information ecology, a claim similar to the deep-ecology claim that natural ecosystems should be safeguarded for their own sake, rather than for their present and future utility for humans. In particular, Luciano Floridi (2010: 211) has argued that:

information ethics evaluates the duty of any moral agent in terms of contribution to the growth of the infosphere and any process, action, or event that negatively affects the whole infosphere—not just an informational entity— as an increase in its level of entropy and hence an instance of evil.

The intrinsic merits of information structures and cultural creations may well go beyond their impacts on human interests. However, as long as the law remains a technique for enabling humans to live together and cooperate, human values and, in particular, those values that qualify as human rights, remain a primary and independent focus for legal systems. Their significance is not reducible to their contribution to the development of a rich information ecology (nor to any other transpersonal value, see Radbruch 1959: 29). Moreover, the opposition between human rights and the transpersonal appeal to information-ecology can be overcome to a large extent, as a rich informational ecology is required for human flourishing, and grows through creative human contributions.

It is true that the so-called 'Internet values' of generativity, openness, innovation, and neutrality point to desired features of the infosphere that do not directly refer to human interests. However, these values can also be viewed as proxies for human rights and social values. Their implementation, while supporting the development of a richer, more diverse, and dynamic information ecology, also contributes to the promotion of human values within that ecology (for instance, innovation contributes to welfare, and openness to freedom of speech and information).

As ITs, as we shall see, affect a number of human rights and values, many human rights instruments are relevant to their regulation, in particular the 1948 Universal Declaration of Human Rights, the International Convention on Civil and Political Rights, the International Convention on Social, Economic, and Cultural Rights, the European Convention on Human Rights, and the EU Charter of Fundamental Rights (for a discussion of human rights and ITs, see Klang and Murray 2005; Joergensen 2006). The case law of international and transnational courts is also relevant, in particular that of the European Court of Human Rights and the Court of Justice of the European Union (De Hert and Gutwirth 2009). Broadly scoped charters of IT-related rights have also been adopted in national legal systems, such as the 2014 Brazilian Civil Rights Framework for the Internet (*Marco Civil da Internet* (2014)) and the 2015 Italian Declaration of Internet Rights (*Carta (p. 436) dei diritti in Internet*, a soft law instrument adopted by the Study Committee on Internet Rights and Duties of Italy's Chamber of Deputies). This chapter will only focus on the 1948 Universal Declaration of Human Rights ('the Declaration'), which provides a reference point for considerations that may be relevant also in connection with the other human rights instruments.

5. Freedom, Dignity, and Equality

Different human rights are engaged by the opportunities and risks arising in the information society. This section considers the three fundamental values mentioned in Article 1 of the Declaration, namely, freedom, dignity, and equality, referring back to the opportunities and risks of ITs introduced in sections 2 and 3, while the sections 6 and 7 similarly address other rights in the Declaration.

5.1 Freedom

Article 1 of the Declaration ('All human beings are born free and equal in dignity and rights') refers to the broadest human values, namely, freedom and dignity. Freedom,¹ as autonomous self-determination, and dignity, as the consideration and respect that each person deserves, provide fundamental, though largely undetermined, references for assessing the opportunities and risks of ITs. Both values are controversial and multifaceted, and different aspects of concrete cases may be relevant to their realization, possibly pulling to opposite directions. For instance, the exercise of the freedom to collect information and express facts and views about other people may negatively affect the dignity of these people, by impinging on their privacy and reputation.

Freedom, comprehensively understood, includes one's ability to achieve the outcomes one wants or has reasons to want, as well one's ability to get to those outcomes through processes one prefers or approves; it includes, as argued by Sen (2004: 510), opportunity to achieve, autonomy of decision and immunity from encroachment. Thus, the possession of freedom by an individual requires the absence of interferences that eliminate certain (valuable) possibilities of action, but also covers the possession of resources and entitlements that enable one to have a sufficient set of valuable options or opportunities at one's

disposal. It has also been observed that arbitrary interference in one's freedom of action, or 'domination', mostly affects freedom within a political community, as it denies people discursive control, namely, (p. 437) the entitlement to actively participate in discursive interactions, aimed at shaping people's sphere of action, as reason-takers and reason-givers (Pettit 2001: ch 4). Discursive control is denied when one is subject to hostile coercion, deception, or manipulation, interferences that also have an impact on one's dignity.

The value of freedom is affected by the opportunities and risks resulting from the deployment of ITs. Economic development (s 2.1) and efficiency in public administration (s 2.2) can contribute to the resource dimension of freedom, assuming that everybody benefits from increases in private and public output. Automation can reduce the load of tiring and repetitive tasks, opening opportunities to engage in leisure and creative activities. By expanding access to culture and education (s 2.3), as well as the possibility to participate in art and science (s 2.4) and in new productive activities (s 2.1), ITs increase the range of valuable options available to autonomous choices. The additional possibilities to communicate (s 2.5), create and access social knowledge (s 2.6), and cooperate with others (s 2.7) enhance the social dimension of autonomy, namely, the possibility to interact and achieve shared goals. The opportunity to engage in political debate and action is increased by the new channels for information and participation provided by ITs (s 2.8), and so is also the dimension of human freedom that consists in making moral commitments towards our fellows (s 2.9). The non-domination aspect of freedom is enhanced to the extent that ITs for communication, creativity, and action are available at an accessible market price, or through non-profit organizations, without the need to obtain authorizations and permissions.

On the other hand, many of the risks mentioned above negatively affect freedom. In the absence of adequate social measures, ITs could substantially contribute to unemployment and alienation, depriving people of the opportunity to engage in valuable and meaningful activities (s 3.1). A more direct attack on people's freedom would result from pervasive surveillance (s 3.3) and profiling (s 3.4), as they may induce people to refrain from activities that—once detected and linked to their identity—might expose them to adverse reactions. Automated assessment (s 3.6) may expose people to discourse-averse domination, individuals being subject to automated judgments they cannot challenge through reasoned objections (in EU law, the possibility to challenge the automated assessment of individuals is established by Article 15 of the 1995 Data Protection Directive). People's freedom would also be affected should they be excluded (s 3.7) from activities they value, as a consequence of automated inferences (Pasquale 2015).

Virtual constraints (s 3.8) on online activities—more generally, on interaction with ITs—also affect freedom, as a large part of people's lives is today taking place online. A threat to freedom as reasoned choice among valuable alternatives may also be exercised by IT-based 'nudging' (s 3.5). Through hidden persuasion and manipulation, nudging may indeed lead to a subtle discourse-averse domination. Freedom is also obviously diminished by censorship and indoctrination (s 3.9), which affect one's ability to access, form, and ex-

press opinions. Finally, the loss of normativity (p. 438) (s 3.11) also affects freedom, as it deprives people of the attitude to exercise moral choices.

As access to the Internet is a necessary precondition for enjoying all online opportunities, a right to access to the Internet may today be viewed as an essential aspect of freedom; blocking a person's access to the Internet represents a severe interference in freedom, which also affects private life and communication as well as participation in politics and culture. The issue has recently emerged not only where the use of the Internet for political criticism has been met with repression (as in China, and in countries in Northern Africa and in the Middle East), but also when exclusion from the Internet has been imposed as a sanction against repeated copyright violation (including in European countries, such as France and the UK).

The aforementioned Charter of Human Rights and Principles for the Internet requires governments to respect the right to access the Internet, by refraining from encroaching on that right, that is, from excluding or limiting access. The Charter also requires governments to protect and fulfil this right, by supporting it through measures meant to ensure quality of service and freedom of choice of software and hardware systems, so as to overcome digital exclusion. The Charter also includes a more questionable request, namely, that governments ensure net neutrality, preventing any 'special privileges for, or obstacles against, any party or content on economic, social, cultural, or political grounds'. Net neutrality broadly understood is the principle that network operators should treat all data on the Internet in the same way. In particular, such operators should not negatively or positively discriminate (for example, slow down or speed up, or charge more or less for) information pertaining to different services or originating from different service providers. Net neutrality is probably advisable not only on innovation and competition grounds, as argued for instance by Lemley and Lessig (2001), but also on human rights grounds. In fact, under a regime of net neutrality it may be more difficult to invidiously limit access for certain individuals or groups, or restrict services for users lacking the ability to pay higher fees. However, it may also be argued that net neutrality is an issue pertaining to the governance of the market of Internet services, only indirectly relevant to the protection of human rights. Accordingly, a restriction of net neutrality would affect human rights only when the differential treatment of some services or providers would really diminish the concrete possibility of accessing Internet-based opportunities to an extent that is incompatible with human rights (on net neutrality, see Marsden 2010; Crawford 2013).

5.2 Dignity

Dignity² is an even more controversial value than liberty, as its understanding is based on multiple philosophico-political perspectives—from Giovanni Pico della (p. 439) Mirandola and Immanuel Kant, to the many views animating the contemporary debate (McCrudden 2013)—on what is valuable in every person and on how it should be protected as a legal

value or fundamental right (Barak 2013). Roger Brownsword (2004: 211) argues that ‘dignity as empowerment’ requires

that one’s capacity for making one’s own choices should be recognised; that the choices one freely makes should be respected; and that the need for a supportive context for autonomous decision-making (and action) should be appreciated and acted upon.

The value of dignity as empowerment, broadly understood, approaches the value of liberty as sketched above, and thus is positively or negatively affected by the same opportunities and risks. In particular, under the Kantian idea that human dignity is grounded in the ability to engage in moral choices, human dignity would be negatively affected should ‘technoregulation’—through surveillance (s 3.3), virtual constraints (s 3.4), and nudges (s 3.5)—pre-empt moral determinations, including those determinations that are involved in accepting, complying with, or contesting legal norms (Brownsword 2004: 211). Under another Kantian idea—that ‘humanity must in all his actions, whether directed to himself or also to other rational beings, always be regarded at the same time as an end’ (Kant 1998: 37)—dignity is also affected where the use of ITs for surveillance (s 3.3), profiling (s 3.4), and virtual nudging (s 3.5) prejudicially impinges on the individuals concerned for purposes they do not share, without a compelling justification. Dignity is also affected when discursive standing is not recognized, in particular where a person is the object of unchallengeable automated assessments (s 3.6). The use of autonomous weapons to deploy lethal force (s 3.11) against human targets would also presuppose disregard for human dignity, as life-and-death choices would be entrusted to devices that are—at least at the state of the art—unable to appreciate the significance of human attitudes and interests.

Dignity may also provide a reference (though a very partial and undetermined one) for collective initiatives meant to support human flourishing in the IT-based society. This may involve supporting the provision and access to rich, diverse, stimulating digital resources, promoting human contacts, and favouring the integration of the virtual and the physical world. Respect for human dignity also supports providing ways of integrating humans and machines in work environments that emphasize human initiative and control, so as to avoid work-related alienation (s 3.1).

5.3 Equality

The value of equality,³ like freedom and dignity, is subject to different interpretations. Even though we might agree that ‘no government is legitimate that does not show equal concern for the fate of all those citizens over whom it claims dominion (p. 440) and from whom it claims allegiance’ (Dworkin 2002: 1), it is highly debatable what equal concern entails with regard to the distribution of resources, welfare, or opportunities. Equality of opportunity may indeed be promoted by ITs, in particular as they facilitate universal access to culture, education, information, communication, public dialogue, and political participation (ss 2.3, 2.5, 2.8). However, as observed above, there is evidence that, in the absence of redistributive policies, ITs contribute to economic inequality, as they magnify the

revenue impacts of differences in skills and education (s 3.2). Such inequalities may lead to a deprivation so severe as to prevent the exercise of fundamental rights and liberties (s 3.1). Inequality in access to information is also relevant in the era of monopolies over big data (s 3.2). This inequality can be addressed through measures promoting competition and ensuring fair access to informational resources.

Equality supports the right to non-discrimination, which prohibits:

any distinction, exclusion, restriction or preference which is based on any ground such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status, and which has the purpose or effect of nullifying or impairing the recognition, enjoyment or exercise by all persons, on an equal footing, of all rights and freedoms.

(General Comment No. 18, in *United Nations Compilation of General Comments*: 135 at [7])

This right may be affected by differential restrictions on access to IT resources, to the extent that these resources are needed to exercise human rights, such as the right to information and education. Preventable economic or other barriers excluding sections of the population from accessing the Internet may be viewed, from this perspective, as instances of discrimination.

The right to non-discrimination is also at issue where the capacities of ITs to collect, store, and process information are used for treating people differently on the basis of classifications of them, based on stored or inferred data (s 3.7). Such data may concern different aspects of individuals, such as financial conditions, health, or genetic conditions, work and life history, attitudes, and interests. On these bases, individuals may be excluded from opportunities and social goods, possibly through automated decision-making, also based on probabilistic assessments (s 3.6). A distinctive requirement in this regard is the transparency of algorithmic decision-making, so that unfair discriminations can be detected and challenged.

6. Rights to Privacy and Reputation

Article 12 of the Declaration sets out a cluster of rights that are particularly significant for information technologies: the rights to privacy, to correspondence, and to (p. 441) honour and reputation ('No one shall be subjected to arbitrary interference with his privacy, family, home, or correspondence, nor to attacks upon his honour and reputation'). The informational aspect of the right to privacy is strongly and most directly affected by ITs, as they make it possible to capture and process a large and increasing amount of personal information. This information is often used for the benefit of the data subjects concerned, enabling them to obtain individualized responses appropriate to their interests and needs, both in the private and in the public sector (as in healthcare or in the financial administration). Moreover, personal data can often be used (ss 2.1 and 2.2) to improve economic

performance (in particular, through data analytics) or for valuable public purposes (such as healthcare management, traffic control, and scientific research). However, the processing of personal data also exposes the individuals concerned to dangers pertaining to the adverse use of such data, as well to the chilling effect of being exposed to such dangers.

Privacy may be negatively affected by ITs through the automated collection of personal information (s 3.3), its storage, its combined processing (s 3.4), its use for anticipating and guiding behaviour (s 3.5), and for assessing individuals (s 3.6). Such effects can be multiplied by the communication or publication of the same information. The General Assembly of the United Nations recognized the human rights relevance of digital privacy by adopting on 18 December 2013 the Resolution 68/167 on the Right to Privacy in the Digital Age. It affirmed that the right to privacy should be respected in digital communications, and urged states to end violations and provide legislative and other measures to prevent such violations, with particular regard to the surveillance of communications.

The scope of the right to privacy is controversial, as different legal instruments and different theories carve in different ways the conceptual area occupied by this right. In particular, while Article 12 of the Declaration speaks of ‘privacy’, the European Convention of Human Rights at Article 8 uses the apparently broader notion a right to ‘private life’, while the EU Charter of Fundamental Rights includes, next to the right to private and family life (Article 7), a separate right to data protection (Article 8). For our purposes, it is sufficient to consider that the right to privacy in the Declaration undoubtedly has an informational aspect, namely, it also addresses the processing of information concerning identifiable individuals. This right includes both aspects referred to by Paul De Hert and Serge Gutwirth (2006) under privacy (in a strict sense) and data protection: a right to ‘opacity’ (so that the processing of one’s information is limited) and ‘transparency’ (so that legitimate processing is legally channelled, fair, and controllable). Stefano Rodotà characterizes privacy in this broad sense as ‘the right to keep control over one’s own information and determine the manner of building up one’s own private sphere’ (Rodotà 2009: 78).

It seems to me that a human right to informational privacy, including data protection, can be viewed as a principle—or as the entitlement resulting from a principle—in the sense specified by Robert Alexy (2003: 46). That is, the right to informational privacy is an objective whose achievement is to be protected and supported, so long (p. 442) as advancing its realization does not lead to a more serious interference in other valuable individual or collective objectives. Privacy as an abstract *principle* could cover any IT-based processing of personal data, subjecting such processing to the informed determinations of the data subject concerned. The recognition of privacy as a principle, however, would not entail the prohibition of every instance of processing that is not explicitly authorized by the data subject, as such a principle must be balanced with other rights and protected interests according to proportionality (see Barak 2012: ch 12). Thus, when due attention is paid to all competing legitimate interests, as they are framed and understood in different social relationships, according to the justified expectations of the parties, the broadest recogni-

tion of a right to privacy seems compatible with the idea that privacy addresses the ‘contextual integrity’ of flows of information (Nissenbaum 2010).

That limitations of privacy should be justified has been affirmed, with regard to surveillance, in the 2013 Joint Statement on Surveillance Programs and Their Impact on Freedom of Expression by the UN Special Rapporteur on Freedom of Opinion and Expression and the Special Rapporteur for Freedom of Expression of the OAS Inter-American Commission on Human Rights. The Joint Statement provides that surveillance measures may be authorized by the law, but only with appropriate limitations and controls, and ‘under the most exceptional circumstances defined by legislation’ (on privacy and surveillance, see Scheinin and Sorrell 2015).

The right to privacy enters in multiple relationships with other valuable interests, in different contexts. In many cases, there is a synergy between privacy and other legal values, as privacy facilitates free individual choices—in one’s intimate life, social relations, or political participation—by preventing adverse reactions that could be addressed against such choices, reactions that could be inspired by prejudice, stereotypes, or conflicting economic and political interests. In other cases, conflicts between privacy and other individual rights or social values may be addressed by appropriate organizational and technical solutions, which could enable the joint satisfaction of privacy and parallel interests. For instance, by ensuring confidentiality and security over the processing of health data, both the privacy and the health interests of patients may be jointly satisfied. Similarly, anonymization, often enables the joint satisfaction of privacy and research interests. In other cases, by contrast, privacy may need to be restricted, according to proportionality, so as to satisfy other people’s rights (such as freedom of expression or information) or to promote social values (such as security or public health).

The right to privacy also supports the secrecy of data and communications, that is, the choice of speakers not to be identified and to keep the confidentiality of transmitted content. In particular, a right to use ITs for anonymity and encryption may be claimed under Article 8 of the Declaration, as affirmed by the Charter of Human Rights and Principles for the Internet.

ITs are highly relevant to the right to reputation (also affirmed in Article 12 of the Declaration). They can contribute to reputation, as they provide tools (such as (p. 443) blogs, social networks, and participation in forums) through which a person may articulate and communicate his or her social image (s 2.5). However, they may also negatively affect one’s reputation, as they can be used to tarnish or constrain social identities, or to construct them in ways that fail to match the reality and desires of the individuals concerned. First of all, ITs, by facilitating the distribution of information, also facilitate the spread of information that negatively affects the reputation of individuals, and this information may remain accessible and searchable even if false or inaccurate, or may no longer reflect relevant aspects of the personality of the data subjects in question. The protection of reputation requires people’s empowerment to access their information and to have it rectified. This right is indeed granted by the European Data Protection Directive, under Article 11.

However, with regard to the publication of true information or opinions about individuals, the conflict between the right to reputation and freedom of expression and information raises difficult issues, differently approached by different legal systems.

The right to reputation is also affected by the construction of digital profiles of individuals (s 3.4), on the basis of which both humans and machines can form opinions in the sense of inferred higher-level representations (for example, the assessment that one is or is not creditworthy), and take actions accordingly (for example, refuse a contract or a loan: ss 3.5 and 3.6). Thus, the right to reputation becomes a right to (digital) identity, involving the claim to be represented in computer system according to one's real and actual features or according to one's chosen image. This also supports a right to be forgotten, namely, the right that access to prejudicial or unwanted information, no longer reflecting the identity of the person concerned, be restricted. This right has been recognized by the Court of Justice of the European Union in the Google-Spain case (Case C-131/12 *Goggle-Spain SL, Google Inc. v Agencia Española de Protección de Datos (AEPD), Mario Costeja González* [2014]), where the Court affirmed a person's entitlement, against search engines, to have personal information delisted from results obtained using the name of that person as a search key, a right that applies in particular when the information is no longer relevant to the public (see Sartor 2016).

7. Other Declaration Rights

There are a number of other Declaration rights that are relevant in the context of the deployment of ITs. This section considers these other rights, which include: the right to the security of the person, the right to private property, the right to freedom of association, rights to speech and expression of opinion, the right of political participation, the right to education and to work, rights to cultural participation and (p. 444) to intellectual property, and the right to an effective remedy for breaches of human rights. This long list highlights how a human rights discourse is pertinent as an overarching paradigm for analysing the social and normative dimensions of ITs.

Article 3 of the Declaration grants the right to the Security of the Person ('Everyone has the right to life, liberty and security of person'). It covers first of all physical integrity, which is affected by the deployment of IT-based weapons (s 3.11), and also where IT failures in critical infrastructures may cause deaths or injuries. However, we may understand the 'security of person' as also covering the human mind, and not only one's 'embodied' mind (what is inside a person's head), but also one's 'extended mind', that is, the devices where one has stored one's thoughts and memories, and the tools one uses to complement one's cognitive and communicative efforts. Epistemologists and experts in cognitive science have in fact observed that human cognition (and memory) does not take place only inside one's head, but is also accomplished by interacting with external tools, from pencil and paper to the most sophisticated technologies (Clark and Chalmers 1998; Clark 2008). As individuals increasingly rely on IT tools for their cognitive operations, interference with such tools—regardless of whether they reside on a personal computer or

on remote systems—will deprive these individuals of a large part of their memory (data, projects, links to other people) and cognitive capacities, impeding the normal functioning of such individuals. This may be understood as a violation of the security of their (extended) personality.

The German Constitutional Court has indeed affirmed that the fundamental right to personal self-determination needs to be supplemented by a new fundamental right to the integrity of IT systems, as people develop their personality by using such systems. This right was disproportionately affected, according to the German Court, by a law authorizing the police to install spyware on suspects' computers without judicial authorization ([BVerfGE] 27 Feb 2008, 120 Entscheidungen des BVerfGE 274 (FRG)).

The protection of property provided by Art 17 ('Everyone has the right to own property alone as well as in association with others') complements personal security, covering all IT devices that are owned by individuals and associations of them, as well as the data stored in such devices. It remains to be seen to what extent the concept of property also applies to digital data and tools access to which is dependent on third-party services. This is the case in particular for data stored or software tools available on the cloud. A right to portability—to have one's data exported from the platforms where they are stored, in a reusable format—may also be linked to a broader understanding of a person's security and property. A right to portability in relation to personal data is affirmed in Article 18 of the General Data Protection Regulation 2016.

The guarantee of the right to security of the person over the Internet does not only require that governments refrain from interferences, but it also includes the request for protection against third-party attacks, such as cybercrimes and security (p. 445) violations, as stated by Article 3 of the 2014 Charter of Human Rights and Principles for the Internet.

Article 7 of the Declaration addresses freedom of association. ITs, and in particular the Internet, greatly enhance possibilities to interact and associate (s 2.5), which must not be restricted or interfered with, for example by blocking or filtering content on websites maintained by associations, or disrupting associative interactions based on mailing lists, forums, social networks, and other platforms, or subjecting their participants to unjustified surveillance.

Article 8 of the Declaration addresses the right to 'an effective remedy by the competent national tribunal for acts violating fundamental rights.' ITs can contribute to the realization of this right by making legal information more easily accessible, through commercial and non-commercial systems (Greenleaf 2010), promoting awareness of people's rights, facilitating access to justice and increasing the effectiveness of judicial systems.⁴ On the other hand, it may be argued that the right to an effective remedy may be affected where people are subject to decisions taken by computer systems (s 3.5) without having the possibility to challenge such decisions on the basis of accurate information about their inputs and criteria.

Article 19 of the Declaration addresses the relation between humans and information content by granting freedom of opinion, expression, and access to information ('Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers'). ITs, in combination with communication technologies, have greatly enhanced the possibility of fulfilling such rights, enabling everyone to communicate all over the world. In particular, the Internet allows for costless universal distribution of information, through web pages, blogs, discussion groups, and other online ways of delivering information and intellectual creations (s 2.5). This expanded liberty has often been countered by oppressive regimes, which have restricted, for purposes of political control, the use of ITs: by blocking or filtering content, criminalizing legitimate online expression, imposing liabilities on intermediaries, disconnecting unwanted users from Internet access, cyber-attacking unwanted sites, applying surveillance to IT infrastructures, and so on. The Internet also offers new capacities for surveillance (s 3.3), in particular through online tracking, as well as for censorship and filtering (s 3.9).

Similarly, the right to participate in culture and science (Article 27: 'Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits') is supported by ITs, which facilitate, to an unprecedented level, access to intellectual and artistic works, as well as the creation of new content (s 2.4). The impact of ITs on cultural diversity is multifaceted. It is true that today most content available online is produced in developed countries, and that such content is mostly expressed in a few languages, English having a dominant role. However, ITs—by facilitating the production and (p. 446) distribution of knowledge, as well as the development of social networks—enable ethnic, cultural, or social minorities also to articulate their language and self-understanding, and to reach a global public.

By facilitating the reproduction and the modification of existing content, even in the absence of authorization by right holders, ITs also affect the rights of authors (Art 27: 'Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary, or artistic production of which he is the author'). In particular, there is a tension between participation in culture and copyright: while ITs enable the widest distribution and access to digital content, including software, texts, music, movies, and audiovisual materials (s 2.3), copyright confers on right holders' exclusive entitlements over duplication, distribution and communication to the public. It is still an open issue how best to reconcile the interests and human rights of the different stakeholders involved in the creation of, and access to, digital content, though many IP scholars would agree that some aspects of current copyright regulation, such as the very long duration of copyright, involve an excessive sacrifice of users' interests (Boyle 2008).

Besides the tension between copyright and access to culture, there is a conflict that is intrinsic to the dynamics of intellectual creation: authors' exclusive rights over the modified versions of their works may impede others from exercising their creativity in elaborating and developing pre-existing work (Lessig 2008). A similar conflict also concerns secrecy over the source code of computer programs, as usually programs are either distributed in

a compiled form, which is not understandable by humans, or accessed as remote services (as in the case of search engines), whose code remains in the premises of the service-provider. Therefore, users, scientists, and developers cannot study such programs, identify their failures, improve them, or adapt them to new needs. This inability affects not only the right to participate in culture and science, but also the possibility of exercising political and social criticism with regard to choices that are hidden inside computer programs whose content is inaccessible. Furthermore, the extended use of patents to protect IT hardware, and increasingly also software, is questionable from a human rights perspective. In fact, patents increase the costs of digital tools and so reduce access to them, also where such tools are needed to exercise human rights. Moreover, patents limit the possibility of exercising creativity and developing economic initiatives through the improvement of patented products (Stiglitz 2008). Whether the negative impacts of intellectual property on human rights may be viewed as proportionate compared with the benefit that IP allegedly provides by incentivizing production depends on controversial economic evidence concerning whether and to what extent intellectual property contributes to creation and innovation (for a very negative view on patents, see Boldrin and Levine 2013).

By facilitating the production and worldwide distribution of educational resources (s 2.3), ITs contribute to fulfilling the goals of Article 26 of the Declaration ('Everyone has the right to education'). A most significant example of an electronic educational resource is provided by Wikipedia, the most popular encyclopaedia now (p. 447) available, which results from the cooperative efforts of millions of authors and offers everybody costless access to a huge range of high-quality content. Interactive learning tools can also reduce the cost of education and increase quality and accessibility, in the context of various e-learning or mixed models, as shown by the huge success of the so-called MOOCs (Massive Open Online Courses), and by the growing offer of online courses. However, such initiatives should be complemented by personal contact with teachers and colleague students, so as to foster critical learning and prevent the loss of social contact.

ITs are also having an impact on political participation (Art 21: 'Everyone has the right to take part in the government of his country, directly or through freely chosen representatives'), as they provide new forms of political interaction between citizens, and between citizens and their representatives or administrative authorities. They offer new opportunities for civic engagement and participation (s 2.8). The right to political participation entails that governments may not interfere with the use of IT-based tools for political participation and communications (through blocking, filtering, or putting pressure on ISP providers: s 3.10), nor with the political freedom of those using such tools (through surveillance, threat, and repression: s 3.3). It also supports the right to use anonymity and cryptography for political communication (s 2.5).

Finally, ITs also affect the right to work (Art 23). They offer new opportunities for developing economic initiatives and create new jobs (s 2.1). However, they devalue those skills that are replaced by automated tools and even make the corresponding activities redundant. In this way, they may undermine the lives of those possessing such traditional but outdated skills (section 3.1). ITs enhance human creativity and productivity (s 2.4), but al-

so enable new forms of monitoring and control.⁵ IT systems may indeed affect workers' freedom and dignity through surveillance (s 3.3) and may place undue constraints on workers' activity (s 3.8). An effective protection of the right to work in the IT context requires providing for the education and re-qualification of workers, ensuring privacy in the workplace, and engineering man-machine interaction in such a way as to maintain human initiative and responsibility.

8. Conclusion

Human rights obligations with regard to ITs include respect for human rights, their protection against third-parties' interference, and support for their fulfilment. Thus, first, governments should not deprive individuals of opportunities to exercise human rights through ITs (by, for example, blocking access to the Internet), nor use ITs to impede or constrain the enjoyment of human rights (as through online censorship). Second, they should protect legitimate uses of ITs against attacks from (p. 448) third parties, including cyberattacks, and prevent third parties from deploying ITs in such a way as to violate human rights, e.g., to implement unlawful surveillance. Third, governments are also required to intervene positively so as to ensure that the legitimate uses of ITs are enabled and facilitated, for example, by providing disadvantaged people with access to Internet and digital resources.

ITs correspondingly generate different human rights entitlements. Some of these entitlements pertain to a single human right, as characterized in the Declaration or in other international instruments. They may concern the freedom to exercise new IT-based opportunities, such as using the Internet for expressing opinions or for transmitting and accessing information. They may also concern protection against new IT-based threats, such as violations of privacy through surveillance, profiling, or hacking.

Some entitlements are multifaceted, since they address IT-enabled opportunities or risks affecting multiple human rights. For instance, access to the Internet is a precondition for enjoying all opportunities provided by the Internet, and therefore it can be viewed both as an aspect of a general right to freedom, and as precondition for the enjoyment of a number of other human rights. Another more specific, but still overarching, entitlement pertains to the right to anonymity and to the use of cryptography, which may also be viewed as necessary not only for privacy, but also for the full enjoyment of political rights.

In conclusion, the analysis of the relationship between ITs and human rights shows that such technologies are not only sources of threats to human rights, to be countered through social policies and legal measures. ITs also provide unique opportunities, not to be missed, to enhance and universalize the fulfilment of human rights.

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Notes:

- (1.) See also Chapter 1, in this volume ('Law, Liberty and Technology').
- (2.) See also Chapter 7, in this volume ('Human Dignity and the Ethics and Regulation of Technology').
- (3.) See also Chapter 2, in this volume ('Equality: Old Debates, New Technologies').
- (4.) See also Chapter 10, in this volume ('Law and Technology in Civil Judicial Procedures').
- (5.) See also Chapter 20, in this volume ('Regulating Workplace Technology: Extending the Agenda').

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The CoExistence of Copyright and Patent Laws to Protect InnovationA Case Study of 3D Printing in UK and Australian Law

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Abstract and Keywords

The chapter considers the challenges faced by intellectual property (IP) laws, in particular copyright and patent laws, in responding to emerging technologies and innovation like 3D printing and scanning. It provides a brief introduction to 3D printing before moving to detailed analysis of relevant UK and Australian jurisprudence. Through this comparative analysis, the chapter explores whether copyright and patent laws can effectively protect innovation in this emerging technology, including consideration of both subsistence and infringement. The chapter suggests that 3D printing, like most other technologies, has a universal reach, yet subtle differences in the wording and interpretation of IP legislation between jurisdictions could lead to anomalies in levels of protection. It explores the possibility of a sui generis regime of IP protection for 3D printing, but submits that a nuanced reworking of existing regimes is, in the vast majority of circumstances, likely to be a sufficient response.

Keywords: 3D printing, 3D scanning, innovation, intellectual property, copyright, patent, UK, Australia

1. Introduction

PATENTS and copyrights, more than any other class of cases belonging to forensic discussions, approach what may be called the metaphysics of law, where the distinctions are, or at least may be, very subtle and refined, and, sometimes, almost evanescent—Justice Joseph Story.¹

The overriding aims of intellectual property (IP) laws are to ensure that creativity and innovation are facilitated, and that society is provided with the fruits of these creative and innovative efforts (Howell 2012). The most effective way to achieve (p. 452) these ends is to ensure that an optimal balance is struck between the rights of originators and users of works, processes, and products. The IP framework historically drew a clear distinction

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between the creative world of books, music, plays, and artistic works protected by copyright laws, and the inventive, functional world of machines, medicines, and manufacturing protected by patent laws (George 2015). Increasingly, however, the neat legal divide between creativity and functionality is blurring, a fact aptly exemplified by the technological advances wrought by three-dimensional (3D) printing, resulting in gaps in protection in some circumstances, and overlapping protection in others (Weatherall 2011).

Legislatures, courts, and IP offices have struggled to come to terms with the problem of how to apply existing IP laws to emergent technologies (McLennan and Rimmer 2012). One example of the types of dilemmas being faced by lawmakers is the question of whether software is a literary work that provides the reader with information, or an inventive work designed to perform a technical function (Wong 2013). Similarly, is a 3D object a creative artwork, or a functional object? In biomedicine, is a DNA sequence a newly isolated chemical, or simply a set of information?

This chapter considers these issues in the context of 3D printing and scanning (technically known as ‘additive manufacturing’) and focuses on the coexistence of copyright and patent laws in the UK and Australia. These jurisdictions share a common origin, notably the Statute of Monopolies² for patent law and the Statute of Anne³ for copyright law. These ancient statutory foundations continue to resonate in Australian IP law. The concept of manufacture from section 6 of the Statute of Monopolies remains the touchstone of patentability in the Patents Act 1990 (Cth)⁴ and, in this regard, Australian IP law now mirrors US law more closely than UK law. Like Australia, the US has a broad subject matter requirement of ‘machine, manufacture or composition of matter’.⁵

In contrast, the UK’s accession to the European Community (subsequently the European Union, or EU) resulted in the adoption of a more European-centric focus in IP laws. The European Commission has engaged in extensive programmes concerning harmonisation of copyright laws (Sterling and Mendis 2015). For example, during the last few years, nine copyright Directives⁶ have been implemented. In contrast, patents remain the least harmonized area within the EU (Dunlop 2016). Regardless, the impact of these Directives is that a level of protection similar to that provided in the Directives must be maintained or introduced in EU countries, including the UK.⁷

This chapter, divided into two main parts, considers the coexistence of copyright and patent laws in responding to innovative technologies, using 3D printing as a case study. The reasons for focusing on copyright and patent laws are twofold. First, since the initial development of 3D printing technologies, 9145 patents related to those technologies have been published worldwide (from 1980 to 2013) (UK Intellectual Property Office 2013), indicating a high level of patent activity in this field. Second, it is clear that a 3D-printed object can only become a reality if it (p. 453) is based on a good design file (Lipson and Kurman 2013: 12), and it is this specific element that separates 3D printing from traditional manufacturing. The presence of a ‘creative’ dimension in the process of 3D design and 3D modelling leading to 3D printing requires a consideration of its status and protection under both copyright and patent laws (Guarda 2013).

1.1 Three-Dimensional Printing: A Definition

Three-dimensional printing is a process whereby electronic data provides the blueprint for a machine to create an object by ‘printing’ layer by layer. The term ‘3D printing’ ‘is a term used to describe a range of digital manufacturing technologies’ (Reeves and Mendis 2015: 1). The electronic data source for this design is usually an object design file, most commonly a computer-aided design (CAD) file. The electronic design encoded in the CAD file can be created *de novo* or derived from an existing physical object using scanning technology (Reeves, Tuck and Hague 2011). CAD files have been described as being the equivalent of the architectural blueprint for a building, or the sewing pattern for a dress (Santoso, Horne and Wicker 2013). The CAD file must be converted into another file format before the design can be 3D-printed, with the industry standard file format being stereolithography (STL) (Lipson and Kurman 2013: 79).

Each component of the 3D printing and scanning landscape is likely to have some form of IP associated with it, in the form of patents, copyright, industrial designs, trade marks, trade secrets, or other IP rights, whether attached to the object being printed, the software, hardware, materials, or other subject matter. The focus in this chapter will be on the physical objects being printed and their digital representations in CAD files.

2. Subsistence, Enforcement, and Infringement of Copyright Laws for 3D Printing: A View from the UK and Australia

A 3D printer without an attached computer and a good design file is as useless as an iPod without music (Lipson and Kurman 2013: 12). With software and CAD files playing such an integral part in the 3D printing process, it is important to provide (p. 454) a detailed consideration to their eligibility for copyright protection (and for patent protection as discussed in Section 3 of this chapter). In this section, the authors consider the applicability of copyright law to 3D models, CAD files, and software under UK and Australian laws.

2.1 The Application of UK Copyright Law to 3D Printing: Subsistence and Protection

In the UK, section 4(1) of the Copyright, Designs and Patents Act 1988 (as amended) (hereinafter CDPA 1988) states that ‘a graphic work, photograph, sculpture or collage, irrespective of artistic quality ... or a work of artistic craftsmanship’ is capable of artistic copyright protection. Section 4(2) defines a ‘sculpture’ as a ‘cast or model made for purposes of sculpture’.

According to the above definition, it can be deduced that a *3D model or product*, which comes into being from a CAD-based file, can be considered an artistic work (CDPA 1988 s 17(4)). A number of legal decisions in the UK have attempted to clarify this position, particularly the meaning of ‘sculpture’,⁸ including 3D works such as models. In *Lucasfilm*,⁹

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the Supreme Court, agreeing with the Court of Appeal's decision, held in favour of the defendant, claiming that the *Star Wars* white helmets were 'utilitarian' as opposed to being a work of sculpture, and therefore not capable of attracting copyright protection.¹⁰ This case indicates that copyright protection for a sculpture (or work of artistic craftsmanship), which is industrially manufactured, is limited to objects created principally for their artistic merit, that is, the fine arts. Elements such as 'special training, skill and knowledge' that are essential for designing 3D models—whether utilitarian or artistic, such as the *Star Wars* white helmets—were deemed to be outside the scope of this section. Therefore, unless the sculpture or 3D model encompasses an original image or an engraving, for example, it will not attract copyright. This can be viewed as a significant limitation of UK copyright law in relation to the protection of industrially produced 3D models. Section 51 of the CDPA 1988, on which this decision was based, states that

it is not an infringement of any copyright in a design document or model recording or embodying a design for anything other than an artistic work or a typeface to make an article to the design or to copy an article made to the design.

To clarify, it is not copyright in the design itself, but copyright in the design document or model, which is affected by this section.¹¹ Furthermore, section 52(2) of the CDPA limits copyright protection for these types of artistic works to 25 years, where more than 50 copies have been made, which favoured the defendant in *Lucasfilm*.¹²

(p. 455) A change to UK copyright law will mean that *Lucasfilm* will have little effect in the future.¹³ A repeal of section 52 of CDPA 1988, which came into force on 28 July 2016, will provide more protection for designers of 3D objects by offering the same term of protection as other artistic works (life of the creator plus seventy years).¹⁴ In determining 'artistic craftsmanship' under the repealed section 52, consideration of 'special training, skill and knowledge in production' will be taken into account as well as the quality (aesthetic merit) and craftsmanship of the artistic work (UK Intellectual Property Office 2016: 7). This brings the UK closer to the Australian position, although as discussed below, a higher level of protection is afforded to a designer in Australia under section 10(1) of the Australian Copyright Act 1968.

Moving on from a physical 3D model to the applicability of copyright law to CAD design files supporting the model, section 3(1) of the CDPA 1988 and the EU Software Directive¹⁵ offers some guidance. According to section 3(1), a computer program and its embedded data are together recognized as a literary work under copyright law¹⁶ and, according to Recital 7 of the Software Directive, a 'computer program' is considered to 'include programs in any form including those which are incorporated into hardware'. It also 'includes preparatory design work leading to the development of a computer program provided that the nature of the preparatory work is such that a computer program can result from it at a later stage'. An analysis of Recital 7 of the Software Directive ascertains that 'the protection is ... bound to the program code and to the functions that enable the computer to perform its task. This in turn implies that there is no protection for elements without such functions (i.e. graphical user interface (GUI), or "mere data") and which are

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not reflected in the code (i.e. functionality in itself is not protected, since there could be a different code that may be able to produce the same function).'¹⁷ In other words, copyright protection will attach to the expression of the computer code and will not extend to the functionality of the software.

From the UK perspective, and in applying section 3(1) of CDPA 1988 ('computer program and its embedded data are together recognised as a literary work') to 3D printing, it can be argued that a computer program encompasses a design file or CAD file within its definition and is therefore capable of copyright protection as a literary work. Some support for this view can be found in *Autospin (Oil Seals) Ltd. v Beehive Spinning*,¹⁸ where Laddie J makes reference, in obiter dictum, to 3D articles being designed by computers and states that 'a literary work consisting of computer code represents the three dimensional article'.¹⁹ Similarly, in *Nova v Mazooma Games Ltd*, Jacob LJ, referring to the Software Directive implemented by the CDPA 1988, confirmed that for the purposes of copyright, the program and its preparatory material are considered to be one component, as opposed to two.²⁰ However, as discussed in the Australian context, this is an intractable question that requires clarification, which could come about in the form of a case in the future.

(p. 456) 2.2 The Application of Australian Copyright Law to 3D Printing: Subsistence and Protection

In Australia, the definition of 'artistic work' in section 10(1) of the Copyright Act 1968 (Cth) (Copyright Act) includes:

- (a) a painting, sculpture, drawing, engraving or photograph, whether the work is of artistic quality or not;
- (b) a building or a model of a building, whether the building or model is of artistic quality or not; or
- (c) a work of artistic craftsmanship whether or not mentioned in paragraph (a) or (b); ...

Original 3D-printed objects would seem to fall within the definition of artistic works and accordingly, qualify for copyright protection. If they are classified as sculptures or engravings, paragraph (a) of the definition specifies that their artistic quality is irrelevant.²¹ If they are models of buildings, likewise paragraph (b) removes the requirement for artistic quality. This is a significant departure from the position in the UK. Should a case similar to *Lucasfilm* be brought in Australia, it is possible that the *Star Wars* helmet would be considered a sculpture, even though it is primarily utilitarian. Accordingly, even though 3D-printed products are within the realm of functional products, if they incorporate some artistic component, such as an original image, engraving, or distinctive shape, they would qualify as artistic works in Australia.²²

Interestingly, according to section 10(1)(c) of the Copyright Act, works of artistic craftsmanship (as opposed to works falling under paragraphs (a) or (b)) require a level of artistic quality. Although there is no requirement for them to be 'handmade', they must demonstrate originality and craftsmanship unconstrained by functional considerations.²³

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In other words, creativity becomes paramount when considering works of this type, and objects that are primarily utilitarian in nature would fail to qualify.

This lack of attention to artistic quality for all but works of artistic craftsmanship in Australia differs from the position in the UK (and the US) (Rideout 2011: 168; Weinberg, 2013: 14–19), where a clear distinction is drawn between creative and functional works. Notably, however, there is an important qualification in Australian law that makes this difference less significant in practical terms. The Copyright Act precludes actions for infringement of copyright in artistic works (other than buildings or models of buildings, or works of artistic craftsmanship) that have been applied industrially,²⁴ or in respect of which a corresponding industrial design has been registered under the Designs Act 2003 (Cth).²⁵ An artistic work will be taken to have been applied industrially if applied:

- (a) to more than 50 articles; or
- (b) to one or more articles (other than hand-made articles) manufactured in lengths or pieces.²⁶

(p. 457) This exception leaves a gap in IP protection for objects falling within s 10(1)(a) of the Copyright Act that have been industrially applied, but in respect of which industrial design protection has not been sought. This gap in protection is similar to that arising in the UK as a result of the *Lucasfilm* case, albeit through a different route. This failure to protect a functional item is not inconsistent with the central tenet of copyright law, but the potential for both Australian and UK copyright law to fail to protect creative objects that are also functional is exaggerated in the 3D-printing scenario where the distinction between creative and functional is not always clearly demarcated.

In relation to the computer files behind 3D printing, the Australian legal position is again different. The starting point for copyright protection of software is section 10(1) of the Copyright Act (as amended), which includes computer programs within the definition of literary works. Computer programs are further defined as a ‘set of instructions designed to bring about a particular result’.²⁷ The current definition is a result of a number of revisions and legal decisions. For example, the 1984 definition of computer programs referred to the requirement for the program to ‘perform a particular function’.²⁸ The majority in the High Court case of *Data Access Corp*²⁹ acknowledged that, while there were difficulties in accommodating computer technology in copyright law, the Act expressly required them to do so.³⁰ Emmett J in *Australian Video Retailers Association Ltd* confirmed that the ‘underlying concept’ of the earlier definition was retained in the new definition.³¹ As such, it would appear that the functionality requirement remains a key feature of computer program copyright in Australia—which distinguishes it from EU and UK copyright jurisprudence.

As for the copyright status of CAD files themselves, this is a more intractable question. CAD files certainly resemble software in that they provide the necessary instructions (or a blueprint) (Lipson and Kurman 2013: 12) to a printer as to how to print a particular object. However, it can be argued that rather than software, they are data files (Rideout

2011), more in the nature of computer-generated works (Andrews 2011),³² which have been held under Australian law to be outside the scope of works of authorship.³³

As in the UK, the underlying electronic design included in a CAD file could constitute an artistic work under Australian law. There is no doubt a CAD file may digitally represent an (as yet unprinted) original article, and that significant creative thought might go into the design of the object. As such, considering the law in Australia, it can be concluded that the electronic design underpinning a CAD file could constitute an artistic work in the form of a drawing, which 'includes a diagram, map, chart or plan.'³⁴ This is the case, even though the CAD file is electronically generated.

2.3 Enforcement and Infringement: The Capacity of UK Copyright Law to Protect

The preceding sections considered whether copyright could subsist in different elements of the 3D printing process, in both UK and Australian law. This section, and (p. 458) the one that follows, considers how enforceable these rights are in each jurisdiction. Section 2.1 above concluded that UK copyright could subsist in 3D-printed designs created for 3D printing as artistic works, while protection as literary works remains open for debate. However, the ability to share the design file with ease for purposes of 3D printing means that this technology generally lends itself to infringement more easily. As replication becomes easier, IP rights will become increasingly difficult to enforce.³⁵ The fact that 3D-printed products are created digitally makes it easier to produce copies and harder to detect infringement.³⁶ The lack of control for IP rights holders brought about by 3D printing (Hornick 2015: 804–806) and the ease with which digital files may be transferred compound this problem.

Online platforms dedicated to the dissemination and sharing of 3D designs provide online tools (Reeves and Mendis 2015: 40)³⁷ that facilitate creation, editing, uploading, downloading, remixing, and sharing of 3D designs. This allows users to modify shared CAD files. This in turn raises questions as to whether modified CAD designs infringe the original design or attract new copyright, and whether online platforms could be liable for authorizing infringement. These issues are considered in turn.

In considering original CAD designs, guidance on 'originality' in the UK has been established through a line of cases ranging from *Graves' Case*³⁸ to *Interlego*³⁹ to *Sawkins*,⁴⁰ among others.⁴¹ In *Interlego*, the Court concluded that the plaintiff's engineering drawings of its interlocking toy bricks, re-drawn from earlier design drawings with a number of minor alterations, did not qualify for copyright protection (Ong 2010: 172).⁴² Lord Oliver further clarified the English courts' approach to skill, labour, effort, and judgement by pointing out that 'skill, labour or judgement merely in the process of copying cannot confer originality'.⁴³ It was established by the Court that if there is to be 'modification' there has to be

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some element of material alteration or embellishment which suffices to make the totality of the work an original work (...) but copying, *per se*, however much skill or labour may be devoted to the process, cannot make an original work.⁴⁴

A reading of Lord Oliver's dictum implies that it is the *extent* of the change, in particular a 'material' change, which will qualify the work as an original work thereby attracting a new copyright (Ong 2010: 165–199).⁴⁵

An application of these cases raises the question of whether a 3D model, which is created from a scan and transformed through the use of online tools, can attract new copyright where the scanning (angle, lighting, positioning) and 'cleaning up' of the scanned data requires skill, labour, effort, and judgement. Some guidance for answering this question can be drawn from the above-mentioned cases as well as from *Antiquesportfolio.com*,⁴⁶ *Johnstone*,⁴⁷ and *Wham-O Manufacturing*,⁴⁸ which suggest that if a 'substantial part' is taken from another creator in designing a 3D model, then it can lead to an infringing work. Therefore, it is quite clear that where a work is 'copied' without authorization, it will constitute copyright infringement.

(p. 459) On the other hand, the application of the European 'authorial input' jurisprudence, as seen in cases such as *Infopaq*,⁴⁹ requires the personal touch of the creator (rather than being an exact replica) before it can attract new copyright. As such, it could be argued that making creative choices, such as selecting particular views of the physical object when a 3D digital model is created through scanning an object, is sufficient to make the 3D digital model an 'intellectual creation of the author reflecting his personality and expressing his free and creative choice' (Mendis 2014)⁵⁰ in its production.

On the second point of authorising infringement, it can be argued that online platforms that authorise or facilitate infringement, can be held liable for secondary or indirect infringement (Daly 2007).⁵¹ Such activity is prohibited in the UK by section 16(2) of CDPA 1988.⁵² Online file-sharing services such as Pirate Bay, among others, which have authorized the sharing of content in the knowledge that they are infringing articles, have been held liable for secondary infringement (Quick 2012).⁵³ In taking this view, the courts established that the facilitators had knowledge of the infringing activity taking place.⁵⁴ It is suggested that 3D printing opens up a new type of content sharing, while at the same time raising similar problems as have already been seen in issues relating to Games Workshop (Thompson 2012: 1–2) and Pokémon,⁵⁵ among others.

2.4 Enforcement and Infringement: The Capacity of Australian Copyright Law to Protect

Under the Australian Copyright Act, trans-dimensional as well as uni-dimensional copying may found a copyright infringement action.⁵⁶ For example, producing a 3D copy of a protected CAD file could infringe copyright, as could producing a CAD file from a copyright-protected item, for example, by scanning the product. Although reproducing in another medium (for example, by making an artistic work from a written description protected by literary work copyright) will not infringe,⁵⁷ an action in infringement for indirect copying

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of an artistic (or other) work may arise through use of a verbal or written description of the work.⁵⁸ The question here is whether this description ‘conveys the form (shape or pattern) of those parts of the design which are the copyright material alleged to have been “copied” or whether the description conveys only the basic idea of the drawing or artefact.’⁵⁹ It is not inconceivable that this might include a CAD file, which contains a detailed digital version of a product.

In establishing infringement for scanning protected works, evidence of derivation from the protected work is required, as well as objective similarity between works.⁶⁰ Provided sufficient similarity can be objectively established between an original and an allegedly infringing work, some degree of modification is to be expected,⁶¹ for (p. 460) example by using online tools to modify a file. As under UK law, use of a ‘substantial part’ of a protected work will be sufficient to establish infringement.⁶² It is quite possible that copyright in a new work might arise during the course of infringement if the new work is sufficiently original. But even so, under current Australian law the creator will still be liable for infringement of the original work.⁶³

As a further point, to date the Australian Government has refused to entertain the notion of a fair use exception under Australian copyright law, despite this being a firm recommendation of the Australian Law Reform Commission (Australian Law Reform Commission 2014: chs 4 and 5). An exception of this nature would incorporate the concept of transformative use in asking whether a particular use is different to the purpose for which the copyright work was created (Australian Law Reform Commission 2014). This matter is once again receiving further consideration at a reform level (Productivity Commission 2016). Should changes be made to Australia’s very limited fair dealing exception to copyright law,⁶⁴ the implications for IP holders in the context of copying through 3D printing could be significant. This is because a fair use defence could protect those scanning and modifying files from infringement, but only to the extent that the intended use is transformative.

As for indirect copyright infringement in the context of 3D printing, sections 36(1A) and 101(1A) of the Copyright Act provide that a person can be liable for authorizing direct infringement committed by another party. The complexity of these provisions is mirrored in the density of interpretive case law, which is impossible to analyse comprehensively in this chapter. In determining whether a person has authorized infringement, the following (non-exhaustive) factors must be taken into account by the court:

- (a)** the extent (if any) of the person’s power to prevent the doing of the act concerned;
- (b)** the nature of any relationship existing between the person and the person who did the act concerned;
- (c)** whether the person took any reasonable steps to prevent or avoid the doing of the act, including whether the person complied with any relevant industry codes of practice.

These factors have been interpreted by the High Court of Australia as requiring a court to ask whether an alleged infringer ‘sanctioned, approved or countenanced’ infringement by a third party.⁶⁵ However, these ‘Moorhouse requirements’ have subsequently been given a relatively narrow reading: the relevant question now is whether the authoriser had any direct power to prevent infringement.⁶⁶ The onerous nature of the task of exercising the power is a critical factor (Lindsay 2012; McPherson 2013). For example, an Internet Service Provider (ISP) would be unlikely to be liable for authorization where the only direct power it has to prevent infringement is to terminate the contractual services it provides,⁶⁷ particularly (p. 461) where identifying infringers would be a difficult and time-intensive inquiry.⁶⁸ Although not yet tested in the 3D printing context, the implications of this narrow reading are significant: proprietors of file-sharing websites such as Thingiverse and Shapeways are unlikely to be in a position to identify and prevent uploading of potentially infringing CAD files, or subsequently found liable for authorizing infringement under Australian copyright law.

3. Subsistence, Enforcement, and Infringement of Patent Laws in the 3D Printing Context: A View from the UK and Australia

Having considered the challenges for copyright law from the perspective of the UK and Australia, the chapter now considers the implications for patent law. The issues inherent in copyright law in traversing the informational/physical divide become even more pronounced in patent law as its realm has expanded to incorporate subject matter characterized not by physicality, but by intangibility that results in some tangible effect. This has distinct implications for 3D printing products and processes, manifesting primarily in exclusions from patent eligibility.

3.1 Patent Subsistence

A patent is a monopoly right over an invention, which gives the inventor or owner the exclusive right to exploit that invention in return for fully disclosing it to the public. For patent eligibility, the first hurdle is whether there is patentable subject matter, which recently has been the focus of judicial attention in many jurisdictions, particularly in the context of computer-implemented and biological subject matter (Feros 2010). In the distant past, there was reluctance to accept computer programs as patentable subject matter because they were regarded as merely reciting mathematical algorithms (Christie and Syme 1998). Similarly, products from the natural world were regarded as unpatentable discoveries. Over time, it became widely accepted that, if a computer program is applied to some defined purpose, which has some tangible effect, this may be enough for it to be patentable.⁶⁹ Likewise, if a product taken from the natural world has some artificiality, or some material advantage (p. 462) over its naturally occurring counterpart, it, too, could be

patentable.⁷⁰ These issues are explored below in the context of UK and Australian patent law.

3.2 The Application of UK Patent Law to 3D Printing: Subsistence and Protection

Under UK law, the requirements for patentability are contained in section 1 of the Patents Act 1977, which specifies that an invention is patentable if it is new, involves an inventive step, and is capable of industrial application.⁷¹ On the face of it, there is scope for many 3D-printing products and processes to meet these patent criteria. However, section 1 goes on to list a number of specific exclusions from patent eligibility, some of which appear to be directly applicable to 3D-printing technology.⁷² The exclusion of computer programs is of particular relevance here.⁷³ Section 4A provides additional exclusions relating to methods of medical treatment and diagnosis. Relevantly, these exclusions translate from the European Patent Convention ('EPC').⁷⁴ The scope of the exclusions in section 1 is limited, only extending to 'that thing as such'. Although 'technical' subject matter may thus be patentable, what falls within this purview has been subject to diverging interpretations (Feros 2010). In early decisions, the European Patent Office (EPO) and the UK courts employed a 'technical contribution' approach, as illustrated in *Vicom*⁷⁵ and *Merrill Lynch*,⁷⁶ where it was held that some technical advance on the prior art in the form of a new result needed to be identified.

Recent EPO cases have demonstrated a shift in approach to excluded matter, with a broader 'any hardware' approach now being the EPO's test of choice.⁷⁷ In the UK, by contrast, *Aerotel*⁷⁸ now provides a comprehensive four-stage test for determining whether subject matter that relates to the section 1 exclusions is patentable: 1) properly construes the claim for patentability; 2) identifies the actual contribution; 3) asks whether it falls solely within the excluded subject matter; and 4) checks whether the actual or alleged contribution is actually technical in nature. This approach is deemed equivalent to the prior UK case law test of 'technical contribution',⁷⁹ but not necessarily the EPO 'any hardware' approach (Feros 2010). It was confirmed in *Symbian*⁸⁰ that exclusion from patent eligibility will not automatically occur merely on the ground that the use of a computer program was involved;⁸¹ technical contribution and improved functionality are key.⁸²

Functional aspects of 3D printing software will thus be patent eligible following the *Aerotel* approach.⁸³ This would incorporate design-based software associated with 3D printing, provided it meets all of the criteria listed in *Aerotel*. However, the patentability of CAD files themselves is more questionable. Because they are purely informational, it seems unlikely that the courts would consider them to fulfil any sort of technicality requirement. Tangible inputs into and outputs from 3D printing are another matter. Their physical form and technicality would qualify them for (p. 463) patent protection, provided they meet the other patent criteria of novelty, inventiveness, and industrial application.⁸⁴ Some functionality must be demonstrated, so that purely artistic 3D-printed works will not be eligible for protection under UK law.

3.3 The Application of Australian Patent Law to 3D Printing: Subsistence and Protection

Although Australian patent law includes the same basic criteria of subject matter, novelty, inventiveness, and industrial applicability as UK patent law, there are some significant differences in the ways in which these criteria are applied. Most relevantly, unlike the UK, there is no express list of subject matter that is considered to be patent ineligible. Rather, section 18 of the Patents Act 1990 simply requires that there is a ‘manner of manufacture within the meaning of section 6 of the Statute of Monopolies’. Section 18 of the Act also includes the other patent criteria.⁸⁵ The seminal decision of the Australian High Court in 1959 in *National Research and Development Corporation (NRDC)*⁸⁶ provides the definitive interpretation of the manner of manufacture test. The Court held that the test is not susceptible to precise formulation, but rather the relevant question is: ‘[i]s this a proper subject of letters patent according to the principles which have been developed for the application of section 6 of the Statute of Monopolies?’⁸⁷ In the particular circumstances of the case, the court held that the requirement was satisfied because the subject matter in issue was an artificially created state of affairs that had economic utility.⁸⁸ This two-limbed application of the manner of manufacture requirement became the standard test for patentable subject matter in subsequent cases, including those involving computer-implemented inventions.⁸⁹

Much like in the US,⁹⁰ the Australian subject matter requirement was applied favourably to computer-implemented subject matter in early jurisprudence.⁹¹ However, three decisions of the Full Court of the Federal Court of Australia in *Grant*,⁹² *Research Affiliates*⁹³ and *RPL Central*⁹⁴ emphasized that there must be some physically observable effect to satisfy the requirement for an artificially created state of affairs, and that ingenuity must lie in the way in which the computer is utilized. Attachment to the physical, rather than the informational, world was also a key feature of the recent decision of the High Court of Australia in *D’Arcy*,⁹⁵ which related to a nucleotide sequence coding for a protein linked with hereditary breast cancer. The Australian Productivity Commission has since questioned whether software and business methods should be considered to be patentable subject matter.⁹⁶

As a consequence of these judicial decisions, it seems clear that CAD files would fail at the manner of manufacture hurdle because they are, in essence, information. It has been argued that consideration be given to expanding the scope of patentable subject matter to make protection available for CAD files (Brean 2015). The authors (p. 464) suggest, however, there is little hope of success, primarily because CAD files simply lack the core features of patentable subject matter. In contrast to the situation with regard to CAD files, 3D objects that form the inputs into and outputs from 3D printing are less likely to fall foul of the manner of manufacture requirement, because they have the necessary physicality. However, as with the UK, they would still need to satisfy the other patent criteria.

3.4 Enforcement and Infringement: The Capacity of UK Patent Law to Protect

As in Section 2, the following two sections reflect on how enforceable both UK and Australian patent laws are in relation to those aspects of 3D printing to which patent protection attaches in each jurisdiction. Under UK law, acts of direct patent infringement include making the invention, disposing or offering to dispose of or using the invention, importing the invention, and keeping the invention.⁹⁷ It is clear that 3D printing a replica of a product that contains all the essential elements of an invention would fall within the statutory definition of ‘make’, but simply creating a CAD file of a patented item would not. 3D printing permits a significant degree of modification or ‘repair’ to occur by scanning an object and making changes within a CAD file. The act of ‘repair’ falls outside the scope of direct patent infringement. And yet it will not always be clear in the 3D printing context when something has been ‘repaired’, as opposed to ‘made’.⁹⁸

The House of Lords considered the concepts of ‘repair’ and ‘making’ in *United Wire*,⁹⁹ holding that the right to repair is the residual right and that the disassembly of a product is in effect a new infringing manufacture. In *Schutz*,¹⁰⁰ the Supreme Court confirmed that the meaning of ‘makes’ is context specific, must be given its ordinary meaning, and requires a careful weighing of factors.¹⁰¹ It is relevant to ask whether the produced item is ‘such a subsidiary part of the patented article that its replacement (...) does not involve “making” a new article.’¹⁰²

The corollary is that the 3D printing of a spare part of an object would not amount to infringement once the spare part is deemed a subsidiary component. On the other hand, it would be likely to constitute patent infringement if the 3D-printed part is regarded as a ‘core’ component of a product (Birss 2016). Relevant questions to determine whether a part is core or subsidiary are: whether a 3D-printed part is a free-standing replaceable component; whether a particular part needs frequent substitution; whether it is the main component of the whole; whether the replacement involves more than mere routine work; and whether the market prices are significantly different after utilising the replacement.¹⁰³

Importantly however, facilitating infringement by distributing a CAD file has the potential to fall within the scope of indirect infringement under UK law. Indirect or contributory patent infringement occurs where an infringer

(p. 465)

supplies or offers to supply in the United Kingdom a person (...) with any of the means relating to an essential element of the invention...that those means are suitable for putting, and are intended to put, the invention into effect.¹⁰⁴

The requisite ‘means’ have traditionally been required to be tangible in nature, so that simple and abstract instructions would not qualify (Mimler 2013). However, in *Menashe Business Mercantile*,¹⁰⁵ it was held that the infringer’s host computer was ‘used’ in the

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UK regardless of the fact that it was physically located abroad in the Caribbean. The supply in the UK of software on CDs or via Internet download enabled customers to access the host computer, and the entire online gaming system was deemed contributory infringement. This was the case regardless of the geographical location of the alleged infringing computer system, provided that clients were given a means to access the system.

Online platforms that provide means of access to infringing CAD files would potentially be liable for contributory infringement, as would private or commercial entities that scan objects, and create and distribute CAD files representing those objects (Ballardini, Norrgard, and Minssen 2015). The important point here is the fact that, in these instances, access to infringing CAD files has been facilitated. The provision of means to infringe is key to establishing liability.

3.5 Enforcement and Infringement: The Capacity of Australian Patent Law to Protect

Section 13 of the Patents Act 1990 confers upon a patentee the exclusive right to exploit, and to authorize others to exploit an invention. 'Exploit' in relation to an invention includes making, hiring, selling or otherwise disposing of an invention (or offering to do any of these acts), using, or importing it. A similar definition applies in respect of products arising from method or process inventions.¹⁰⁶

Primary infringement is likely to be found where a product that contains all the integers of an invention is 3D printed. For example, printing a replica that contained all the integers of an invention¹⁰⁷ would constitute 'making' the invention. Further, the Australian Federal Court decision in *Bedford Industries* establishes a broad definition of 'use' that appears to encompass taking commercial advantage of a patented product by making an infringing product, and altering it before sale to produce a non-infringing product.¹⁰⁸

Creating and distributing a CAD file of an invention, whether by scanning or designing it from scratch, is a separate issue. Creating a CAD file does not reproduce all the integers of an invention in tangible form and so does not constitute 'making' an invention. Likewise, creating a CAD file could not equate to 'using' an invention in line with the use contemplated in the *Bedford Industries* case: even if a CAD file was created and the product 'tweaked', there is no intermediate 'making' of a tangible product. The product is 'made' later when printing occurs. Thus, a finding (p. 466) of primary infringement for CAD file creation is extremely unlikely (Liddicoat, Nielsen, and Nicol 2016).

But the Patents Act 1990 also provides a patentee with the capacity to sue for secondary infringement. Authorizing another to infringe a patent is a form of secondary infringement,¹⁰⁹ as is supply of a product for an infringing use.¹¹⁰ To take authorization infringement first, the Patents Act 1990 contains no guidelines as to what criteria can be taken into account in determining whether infringement has been authorized, although the term has been held to have the same meaning as the corresponding provision in the Copyright Act 1968.¹¹¹ Accordingly, the Copyright Act guidelines are also relevant in this context.¹¹²

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In contrast with the position under copyright law, however, a broad reading of the *Moorhouse* requirements (discussed in Section 2.4) continues to be applied in patent law. Creating a file that embodies an infringing product and uploading it to a file-sharing website would put the creator at risk of infringement by authorization, should the file be downloaded and printed. Liability could simply be avoided by choosing not to create the file. This is the case even on a narrow reading of the *Moorhouse* requirements. A broad reading would also conceivably lead to a finding of infringement on the part of the ISP, provided they have the resources and power to identify and remove infringing files.

Finally, supply infringement under the Patents Act 1990 provides that supply of a product for an infringing use may constitute infringement,¹¹³ provided certain conditions are met.¹¹⁴ It is not clear whether a CAD file would fit the definition of 'product', although given that it can be an item of commerce,¹¹⁵ there seems to be a strong argument that it does. It appears that it will be sufficient if it can be objectively assessed that the use for which the product was supplied was an infringing one.¹¹⁶ Hence, evidence that a CAD file embodying an infringing product was created and distributed by some means will be strong evidence that the CAD file was supplied to facilitate an infringing use. A CAD file has only one reasonable use: as a tool to print the product it represents. In this respect, under Australian law, supply infringement, like authorization infringement, is an effective tool through which distributors of infringing CAD files might be pursued for patent infringement.

4. Conclusion

Since their inception, IP laws have needed to evolve due to changes wrought by emerging technologies. This trend has been apparent in various technologies from the printing press to the photocopy machine, to bit torrent technology in more recent times (p. 467) (Nwogugu 2006; Thambisetty 2014). In each of these cases, the challenge has been to keep pace with these technologies while striking a fair balance between protecting the effort of the creator and providing exceptions for the user (Story 2012). In this sense, 3D-printing technology is no different. As the market for 3D-printed objects continues to expand and the technology itself continues to develop, existing IP laws will need to be reviewed for their adequacy in balancing the interests of originators and users. Online platforms for sharing design files raise particular concerns in this regard.

This chapter has explored the applicability of copyright and patent laws to 3D printing from the perspective of UK and Australian law. In doing so, it has highlighted certain differences between the two jurisdictions while also identifying gaps in the law. The authors considered the subsistence of artistic copyright in relation to CAD files embodying a 3D model and, in this respect, identified section 17(4) CDPA 1988 as the basis for protecting 3D models or products in UK law. However, cases such as *Lucasfilm* have challenged this position, indicating that copyright protection for a sculpture (or work of artistic craftsmanship), which is industrially manufactured (that is, utilitarian), is limited to objects created principally for their artistic merit.

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Australian law takes an opposing view, at least on the face on it. According to section 10(1) of the Copyright Act 1968, artistic works other than works of artistic craftsmanship are protected irrespective of their artistic quality. In other words, in Australian law, the *Star Wars* helmet would be a copyright-protected sculpture, even though it is primarily utilitarian. Interestingly, though, the Australian Copyright Act precludes actions for infringement of copyright in artistic works (other than buildings or models of buildings, or works of artistic craftsmanship) that have been applied industrially, or in respect of which a corresponding industrial design has been registered under the Designs Act 2003. As a result, there is a similar gap in protection in both the UK and Australia, albeit through different routes. The UK's repeal of section 52 of CDPA 1988 will spell good news for 3D designers and modellers in that jurisdiction. Yet the failure to protect creative objects that are also functional in both jurisdictions needs to be addressed, particularly in the 3D-printing scenario, where the distinction between the creative and the functional is not always clearly demarcated.

The copyright protection of CAD files themselves is a more intractable question and has been debated by a number of academics. It is clear that legal development is required in this area and this has been recognized by the UK Intellectual Property Office following its 2015 Commissioned Study. A striking feature between the jurisdictions is that, in Australia, the functionality requirement remains a key feature of computer program copyright, departing significantly from EU and UK copyright jurisprudence.

In the patent law context, the authors suggest that CAD files simply lack the core features of patentable subject matter under UK and Australian patent law, although (p. 468) 3D objects may be patentable provided that they fulfil the standard patent criteria. In both jurisdictions, information is not patentable *per se*. There must be some added functionality or technicality. This is the case even though the legal tests for patentable subject matter vary considerably between jurisdictions, with the UK having an express statutory list of excluded subject matter, and Australia leaving this determination to judicial interpretation.

In considering patent infringement, the authors conclude that it would be difficult to establish direct infringement purely by making and distributing a CAD file. In the UK and Australia, there must be physical reproduction of all of the essential integers of the invention as claimed. However, there are possible avenues for recourse under secondary infringement provisions in both jurisdictions. In UK law, liability for indirect infringement may arise for providing the means to infringe, which could include providing access to CAD files without permission of the patent owner. Likewise, liability could arise in Australia for supply infringement. Australian patent law also includes another thread of infringement for authorization of direct infringement by a third party. In sum, although the precise wording of the relevant provisions in Australian and UK patent statutes vary considerably, the outcomes in terms of subsistence and infringement may not be that different, depending, of course, on judicial interpretation.

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These conclusions raise some interesting considerations and familiar conundrums. Like many technologies, 3D printing and its associated elements such as online platforms and CAD files, are universal in their reach. Yet the law is territorial. This anomaly reflected through the universality of the technology, coupled together with ever-growing distribution networks may ultimately lead to the law being shaped in different legal regimes, in different ways, resulting in a lack of certainty for creators and users and incompatibility of rights and working conditions across common technological systems.

One option to deal with the unique aspects of 3D-printing technology and the perceived failure of existing IP laws to provide appropriate protection for originators and appropriate rights for users might be to create a *sui generis* regime of IP protection. Such regimes were created for circuit layouts and plant variety rights,¹¹⁷ and are at times called for when new technologies present new IP challenges (as in relation to gene sequencing: Palombi 2008). However, in the authors' submission, it would be a rare circumstance when an emergent technology is so disruptive that an entirely new and bespoke response is justified. Rather, even though gaps and inconsistencies have been identified in current laws, nuanced reworking of these regimes is, in the vast majority of circumstances, likely to be a sufficient response.

As we look to the future, creators, users, and legislators should take heart from past experience, which has taught some difficult lessons but also demonstrated adaptability, both from the point of view of the law and technology (Mendis 2013). For example, the chapter outlined the initial reluctance in Australia to accept computer programs as patentable subject matter because they were regarded as merely (p. 469) reciting mathematical algorithms (Christie and Syme 1998). However, over time, it became widely accepted that if a computer program is applied to some defined purpose, thereby having some tangible effect, that may be enough for its patentability. In the context of computer-implemented subject matter, the explicit exclusion of 'programs for computers' initially led to the blanket exclusion of all software from patentability under European law. However, the need for global harmonization prompted the EU/UK to shift towards patentability, provided a 'hardware' or a 'technical effect' exists.¹¹⁸ Copyright law, in general, has broadened its exceptions to incorporate creative works and their use in the digital era, which was not the case a decade ago (Howell 2012).

These examples demonstrate the manner in which the law has evolved to keep pace with emerging technologies, while the convergence of patent and copyright laws, especially in their applicability to computer software, has been increasingly evident (Lai 2016). This is the case in both jurisdictions examined: the interplay between copyright and patent law regimes has permitted adaptability in protection mechanisms and allowed developers to explore the 'best fit' for their particular technology. As 3D printing continues to develop, it is very likely that patent and copyright laws will be strongly challenged but will continue to evolve and co-exist as they have done over the years in response to various technologies.

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Notes:

- (1.) *Folsom v Marsh*, 9 F. Cas. 342, 344 (C.C.D. Mass. 1841) (no. 4901, Story J).
- (2.) Statute of Monopolies 1624 21 Jac 1, c 3.
- (3.) Statute of Anne 1709 8 Ann c21.
- (4.) Patents Act 1990 (Cth) s 18(1)(a).
- (5.) Patents Act 35 USCS §101.
- (6.) These have included the protection of computer programs, rental/lending rights and related rights, satellite broadcasting and cable retransmission, term of protection, protection of databases, copyright in the information society, artist's resale right, orphan works, and collective rights management, as well as the enforcement Directive, which is of wider application.
- (7.) The future of UK Intellectual Property law within the context of the European Union remains to be seen, following the EU Referendum on 24 June 2016, in which the UK voted to leave the EU. The process of a Member State withdrawing from the EU is set out in Article 50 of the Treaty on European Union (TEU) and must be carried out in line with the UK constitutional tradition. At the time of writing, none of these elements have been triggered, thereby leading to a time of uncertainty for UK law.
- (8.) *Wham-O Manufacturing Co., v Lincoln Industries Ltd* [1985] RPC 127 (NZ Court of Appeal); *Breville Europe Plc v Thorn EMI Domestic Appliances Ltd* [1995] FSR 77; *J & S Davis (Holdings) Ltd, v Wright Health Group Ltd* [1988] RPC 403; *George Hensher Ltd v Restawhile Upholstery (Lancs) Ltd* [1976] AC 64; *Lucasfilm Ltd & Others v Ainsworth and Another* [2011] 3 WLR 487.
- (9.) *Lucasfilm Ltd & Others v Ainsworth and Another* [2011] 3 WLR 487.
- (10.) *Lucasfilm Ltd & Others v Ainsworth and Another* [2011] 3 WLR 487 [44].
- (11.) 'It was the Star Wars film that was the work of art that Mr. Lucas and his company created ... the helmet was utilitarian, in the sense that it was an element in the process of production of the film': *Lucasfilm Ltd & others v Ainsworth and another* [2011] 3 WLR 487 [44].
- (12.) CDPA 1988, s 52(2).
- (13.) *Lucasfilm, Hensher (George) Ltd v Restawhile Upholstery (Lancs) Ltd* [1975] RPC 31 (HL) is another case that was considered for the repeal of section 52.
- (14.) See <https://www.gov.uk/government/consultations/transitional-arrangements-for-the-repeal-of-section-52-cdpa> accessed 4 September 2016.

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(15.) Parliament and Council Directive 2009/24/EC of 23 April 2009 on the legal protection of computer programs [2009] OJ L111/16, recital (7).

(16.) CDPA 1988, s 3(1)(b), (c) (as amended).

(17.) Case C-406/10 *SAS Institute Inc, v World Programming Ltd* [2012] 3 CMLR 4. See also Guarda P, 'Looking for a Feasible Form of Software Protection: Copyright or Patent, Is that the Question?' [2013] 35(8) *European Intellectual Property Review* 445, 447.

(18.) *Autospin (Oil Seals) Ltd v Beehive Spinning* [1995] RPC 683.

(19.) *Autospin (Oil Seals) Ltd v Beehive Spinning* [1995] RPC 683, 698.

(20.) [2007] RPC 25.

(21.) 3D-printed models of buildings would be treated in the same way: Copyright Act 1968 (Cth), s 10(1)(b).

(22.) *Wildash v Klein* [2004] NTSC 17; (2004) 61 IPR 324.

(23.) *Burge v Swarbrick* (2007) 232 CLR 336.

(24.) Copyright Act 1968 (Cth), ss 77(1), 77(2).

(25.) Copyright Act 1968 (Cth), s 75.

(26.) Copyright Regulations 1969 (Cth), reg 17(1).

(27.) This definition was introduced by the Copyright Amendment (Digital Agenda) Act 2000 (Cth).

(28.) The Copyright Amendment Act 1984 (Cth) introduced this definition: an expression, in any language, code or notation, of a set of instructions (whether with or without related information) intended [for] (a) conversion to another language, code or notation; (b) reproduction in a different material form, to cause a device having digital information processing capabilities to perform a particular function.

(29.) *Data Access Corp v Powerflex Services Pty Ltd* (1999) 202 CLR 1 [20].

(30.) *Data Access Corp v Powerflex Services Pty Ltd* (1999) 202 CLR 1 [25].

(31.) *Australian Video Retailers Association Ltd v Warner Home Video Pty Ltd* (2002) 53 IPR 242 [80].

(32.) Examples include software, databases, and satellite images generated using automated processes.

(33.) *IceTV Pty Ltd v Nine Network Pty Ltd* (2009) 239 CLR 458; *Telstra Corporation Ltd v Phone Directories Co Pty Ltd* [2010] 194 FCR 142.

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(34.) Copyright Act 1968 (Cth), s 10(1).

(35.) See, Mendis D and Secchi D, *A Legal and Empirical Study of 3D Printing Online Platforms and an Analysis of User Behaviour* (UK Intellectual Property Office, 2015) 41. The legal and empirical study concluded that ‘the current landscape of 3D printing online platforms appears to be diverse and many options are presented to users ... as 3D printing continues to grow, there is evidence of IP infringement, albeit on a small scale at present, on these online platforms. For example, trademarked or copyrighted designs, like an Iron Man helmet or figurines from Star Wars and the videogame Doom or Disney figures are easy to locate. This shows that interest and activity is growing exponentially every year highlighting the potential for future IP issues’.

(36.) See Bad Vibrations: ‘UCI Researchers Find Security Breach in 3-D Printing Process: Machine Sounds Enable Reverse Engineering or Source Code’, UCI News (2 March 2016) <https://news.uci.edu/research/bad-vibrations-uci-researchers-find-security-breach-in-3-d-printing-process/> accessed 30 May 2016.

(37.) Amongst others, these include for example, Meshmixer www.meshmixer.com; 123D Catch www.123dapp.com/catch (by Autodesk) Makerbot Customizer; www.thingiverse.com/apps/customizer (by Thingiverse); WorkBench <http://grabcad.com/workbench> (by Grabcad).

(38.) *Graves Case* (1868-69) LR 4 QB 715.

(39.) *Interlego AG v Tyco Industries Inc* [1988] RPC 343.

(40.) *Sawkins v Hyperion Records Ltd* [2005] EWCA Civ 565.

(41.) *Walter v Lane* [1900] AC 539 (HL); *Antiquesportfolio.com Plc v Rodney Fitch & Co Ltd* [2001] FSR 23 are other examples.

(42.) *Interlego v Tyco Industries Inc, and Others* [1988] RPC 343.

(43.) *Interlego v Tyco Industries Inc, and Others* [1988] RPC 343, 371 per Lord Oliver.

(44.) *Interlego v Tyco Industries Inc, and Others* [1988] RPC 343, 371 per Lord Oliver.

(45.) It should be noted that the Privy Council’s decision in *Interlego v Tyco* was based on a very specific policy concern—that copyright law should not be used as a vehicle to create fresh intellectual property rights over commercial products after the expiry of patent and design rights, which had previously subsisted in the same subject matter. See *Interlego v Tyco Industries Inc, and Others* [1988] RPC 343, 365-366.

(46.) *Antiquesportfolio.com v Rodney Fitch & Co Ltd* [2001] FSR 345.

(47.) *Johnstone Safety Ltd v Peter Cook (Int.) Plc* [1990] FSR 16 (‘substantial part’ cannot be defined by inches or measurement).

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(48.) *Wham-O Manufacturing Co v Lincoln Industries Ltd* [1985] RPC 127 (NZ Court of Appeal).

(49.) *Infopaq International A/S v Danske Dagblades Forening* [2010] FSR 20.

(50.) *Painer v Standard Verlags GmbH* [2012] ECDR 6 (ECJ, 3rd Chamber) para 99.

(51.) The article describes how the facilitators of online platforms actively encouraged infringement by their advertising and benefitted financially from these activities. See Maureen Daly, 'Life after Grokster: Analysis of US and European Approaches to File-sharing' [2007] 29(8) *European Intellectual Property Review* 319, 323–324 in particular.

(52.) Section 16(2) ('Copyright in a work is infringed by a person who without the licence of the copyright owner does, or authorises another to do, any of the acts restricted by the copyright').

(53.) *Dramatico Entertainment Ltd & Ors v British Sky Broadcasting Ltd & Ors* [2012] EWHC 268 (Ch).

(54.) 'Contributory Infringement' was brought against online companies such as Napster. In establishing 'contributory infringement' two elements need to be satisfied: (1) the infringer knew or had reason to know of the infringing activity; and (2) actively participated in the infringement by inducing it, causing it or contributing to it.

(55.) 'Pokémon Targets 3D Printed Design, Citing Copyright Infringement' (World Intellectual Property Review, 21 August 2014), available at <http://www.worldipreview.com/news/pok-mon-targets-3d-printed-design-citing-copyright-infringement-7067>.

(56.) Copyright Act 1968 (Cth) s 21(3).

(57.) *Cuisenaire v Reed* [1963] VR 719, 735; applied in *Computer Edge Pty Ltd v Apple Computer Inc* (1968) 161 CLR 171, 186–187 (Gibbs CJ), 206–7 (Brennan J), 212–214 (Deane J).

(58.) *Plix Products Ltd v Frank M Winstone (Merchants) Ltd* (1984) 3 IPR 390.

(59.) *Plix Products Ltd v Frank M Winstone (Merchants) Ltd* (1984) 3 IPR 390, 418.

(60.) *Elwood Clothing Pty Ltd v Cotton On Clothing Pty Ltd* (2008) 172 FCR 580 [41].

(61.) *EMI Songs Australia Pty Ltd v Larrikin Music Publishing Pty Ltd* (2011) 191 FCR 444.

(62.) *Elwood Clothing Pty Ltd v Cotton On Clothing Pty Ltd* (2008) 172 FCR 580 [41].

(63.) *A-One Accessory Imports Pty Ltd v Off-Road Imports Pty Ltd* [1996] FCA 1353.

(64.) See Copyright Act 1968 (Cth) s 40.

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(65.) *University of New South Wales v Moorhouse* (1975) 133 CLR 1, 20 (Jacobs J with whom McTiernan ACJ agreed).

(66.) *Roadshow Films Pty Ltd v iiNet Ltd* (2012) 248 CLR 42.

(67.) *Roadshow Films Pty Ltd v iiNet Ltd* (2012) 248 CLR 42, 69–71 (French CJ, Crennan and Kiefel JJ), 88–89 (Gummow and Hayne JJ).

(68.) *Roadshow Films Pty Ltd v iiNet Ltd* (2012) 248 CLR 42, 68 (French CJ, Crennan and Kiefel JJ), 88–89 (Gummow and Hayne JJ).

(69.) See, for example, the seminal US case of *Gottshalk v Benson* 409 US 63 (1972).

(70.) One of the best examples of this move towards patentability of synthetically produced biological products is another key US case, *Diamond v Chakrabarty* 447 US 303 (1980).

(71.) Patents Act 1977 (UK) s 1(1).

(72.) See Patents Act 1977 (UK) s 1(2).

(73.) Patents Act 1977 (UK) s (1)(2)(c).

(74.) The Convention on the Grant of European Patents of 5 October 1973 as amended by the act revising Article 63 EPC of 17 December 1991 and by decisions of the Administrative Council of the European Patent Organisation of 21 December 1978, 13 December 1994, 20 October 1995, 5 December 1996, 10 December 1998 and 27 October 2005.

(75.) *Vicom System Inc's Patent Application* [1987] 2 EPOR 74.

(76.) *Merrill Lynch* [1989] RPC 561.

(77.) See *Controlling Pension Benefits System/PBS Partnership* T 0931/95 [2001], *Auction Method/Hitachi* T 0258/03 [2004] OJEP 575; *Clipboard Formats I/Microsoft* T 0424/03 [2006].

(78.) [2007] RPC 7.

(79.) UK Intellectual Property Office, *Manual of Patent Practice: Patentable Inventions* (2014) [1.08]; *Aerotel v Telco* [2006] EWCA Civ 1371; *Macrossan's Patent Application* [2006] EWHC 705 (Ch).

(80.) *Symbian Ltd v Comptroller General of Patents* [2008] EWCA Civ 1066.

(81.) Currently the EPO follows the 'any hardware' approach in *Pension Benefits System* where 'the character of a concrete apparatus in the sense of a physical entity' could be demonstrated; *Pension Benefits System* [2001] OJ EPO 441.

(82.) *Symbian Ltd v Comptroller General of Patents* [2008] EWCA Civ 1066 [53]–[55].

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(83.) *Aerotel v Telco* [2006] EWCA Civ 1371; *Macrossan's Patent Application* [2006] EWHC 705 (Ch).

(84.) Patents Act 1977 (UK) s 1(1).

(85.) Patents Act 1990 (Cth) s 18(1).

(86.) *National Research and Development Corporation v Commissioner of Patents* (1959) 102 CLR 252.

(87.) *National Research and Development Corporation v Commissioner of Patents* (1959) 102 CLR 252, 269.

(88.) *National Research and Development Corporation v Commissioner of Patents* (1959) 102 CLR 252, 277.

(89.) See, for example, *CCOM Pty Ltd v Jiejing Pty Ltd* (1994) 28 IPR 481, 514.

(90.) *State Street Bank and Trust Company v Signature Financial Group, Inc* 149 F.3d 1368 (Fed. Cir. 1998), but note the later US Supreme Court decisions in *Bilski v Kappos* 130 S Ct 3218 (2010) and *Alice Corporation Pty Ltd v CLS Bank International* 134 S Ct 2347 (2014).

(91.) *Welcome Real-Time SA v Catuity Inc* (2001) 51 IPR 327.

(92.) *Grant v Commissioner of Patents* [2006] FCAFC 120.

(93.) *Research Affiliates LLC v Commissioner of Patents* [2014] FCAFC 1.

(94.) *Commissioner of Patents v RPL Central* [2015] FCAFC 177. It should be noted that the High Court refused special leave to appeal: *RPL Central Ltd v Commissioner of Patents* [2016] HCASL 84

(95.) *D'Arcy v Myriad Genetics Inc* [2015] HCA 35.

(96.) Productivity Commission, *Inquiry into Australia's Intellectual Property Arrangements: Final Report* (2016: Commonwealth of Australia, Canberra).

(97.) Patents Act 1977 (UK) s 60(1).

(98.) *United Wire Ltd v Screen Repair Services (Scotland) Ltd* [2001] RPC 24.

(99.) *United Wire Ltd v Screen Repair Services (Scotland) Ltd* [2001] RPC 24.

(100.) *Schutz (UK) Ltd v Werit UK Ltd* [2013] UKSC 16, [2013] 2 All ER 177.

(101.) *Schutz (UK) Ltd v Werit UK Ltd* [2013] UKSC 16, [2013] 2 All ER 177 [26]–[29] per Lord Neuberger (with whom Lord Walker, Lady Hale, Lord Mance, and Lord Kerr agreed).

(102.) *Ibid* [61].

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(103.) Ibid [44], [74], [75].

(104.) Patents Act 1977 (UK) s 60(2).

(105.) *Menashe Business Mercantile Ltd and another v William Hill Organisation Ltd* [2003] 1 All ER 279, [2003] 1 WLR 1462.

(106.) Patents Act 1990 (Cth) sch 1 (definition of 'exploit').

(107.) *Walker v Alemite Corp* (1933) 49 CLR 643, 657–658 (Dixon J); *Bedford Industries Rehabilitation Association Inc v Pinefair Pty Ltd* (1998) 87 FCR 458, 464 (Foster J); 469 (Mansfield J); 479–480 (Goldberg J).

(108.) *Bedford Industries Rehabilitation Association Inc v Pinefair Pty Ltd* (1998) 40 IPR 438.

(109.) Patents Act 1990 (Cth) s 13(1).

(110.) Patents Act 1990 (Cth) s 117.

(111.) *Rescare Ltd v Anaesthetic Supplies Pty Ltd* (1992) 25 IPR 119, 155 (Gummow J); *Bristol-Myers Squibb Co v FH Faulding & Co Ltd* (2000) 97 FCR 524 [97] (Black CJ and Lehane J); *Inverness Medical Switzerland GmbH v MDS Diagnostics Pty Ltd* (2010) 85 IPR 525, 568–570 (Bennett J); *SNF (Australia) v Ciba Special Chemicals Water Treatments Ltd* (2011) 92 IPR 46, 115 (Kenny J); *Bristol-Myers Squibb Co v Apotex Pty Ltd* (No 5) (2013) 104 IPR 23 [409] (Yates J); *Streetworx Pty Ltd v Artcraft Urban Group Pty Ltd* [2014] FCA 1366 (18 December 2014) [388]–[396] (Beach J).

(112.) See most recently *Inverness Medical Switzerland GmbH v MDS Diagnostics Pty Ltd* (2010) 85 IPR 525, 568–570 (Bennett J); *SNF (Australia) v Ciba Special Chemicals Water Treatments Ltd* (2011) 92 IPR 46, 115 (Kenny J); *Streetworx Pty Ltd v Artcraft Urban Group Pty Ltd* [2014] FCA 1366 (18 December 2014) [388]–[396] (Beach J).

(113.) Patents Act 1990 (Cth) s 117.

(114.) Patents Act 1990 (Cth) s 117(2). These requirements are:

- ((a)) if the product is capable of only one reasonable use, having regard to its nature or design—that use; or
- ((b)) if the product is not a staple commercial product—any use of the product, if the supplier had reason to believe that the person would put it to that use; or
- ((c)) in any case—the use of the product in accordance with any instructions for the use of the product, or any inducement to use the product, given to the person by the supplier or contained in an advertisement published by or with the authority of the supplier.

(115.) 'Product' has its ordinary meaning: *Northern Territory v Collins* (2008) 235 CLR 619.

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(116.) Unlike s 117(2)(b), ss 117(2)(a) and (c) do not appear to require a mental element: *Zetco Pty Ltd v Austworld Commodities Pty Ltd* (No 2) [2011] FCA 848 [77].

(117.) In Australia, for example, see Circuit Layouts Act 1989 (Cth) and Plant Breeder's Rights Act 1994 (Cth).

(118.) *Aerotel v Telco* [2006] EWCA Civ 1371; *Macrossan's Patent Application* [2006] EWHC 705 (Ch).

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Regulating Workplace Technology: Extending the Agenda

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Abstract and Keywords

The development of workplace technology has tended to reflect the interests of employers in promoting profitability, whereas worker concerns have been acknowledged in legislation that restricts the most egregious of employer practices. This chapter explores that history and the current legal and regulatory framework, which is explicable with reference to resistance. However, it is suggested that we could also view technology in the workplace as potentially enabling of workers, enhancing their capabilities in overcoming disability, building voice, and accessing learning opportunities. Extending the agenda for regulation in this way has the potential to offer a more positive picture of possibilities in relation to technology in the workplace and more could yet be done to realize these.

Keywords: labour law, work, technology, capability, disability, voice

1. Introduction

THERE is a long history of suspicion of new technology among workers in the context of their employment. The incentives for technological changes to machinery and other forms of equipment for employers were obvious at the outset, in so far as such changes can enhance productivity and diminish the need for labour and its associated costs. Hence the response of the ‘Luddites’, but also resistance to computerization of printing in the 1970s and contemporary concerns regarding, for example, usage of call centres and their capacity for swift work relocation across borders enabled by information and communication technology (ICT). Notably, in this context, regulatory efforts have predominantly served employers’ interests through case law and legislation governing the contract of employment, redundancy, and collective action.

Further, ICT and new technologies that can be applied to monitoring of work-related activity or testing (for drugs, alcohol, and more general fitness) offer  employers new opportunities for surveillance. These methods can offer employers scope to enhance productivity and customer service, but also protect employers from forms of disloyalty and

reputational harm. Limits have been placed, however, on the extent to which employers can use surveillance technology to serve their interests. For example, there has been legislative engagement with this issue in the form of 'blacklisting' and 'whistle-blower' legislation, which offer partial protections for workers. Developments in technology have led to concerns regarding data protection and privacy of employees. Here courts have attempted more carefully to reconcile the interests of both parties to the employment relationship within the frame of the human rights discourse of 'proportionality'.

The dominant narrative of tensions regarding regulation of technologies links to employer interests and worker resistance (in line with appreciation of their own needs). However, it is not the only story that need be contemplated. It is possible to extend the agenda by considering how new technologies may be enabling not only for employers but also for workers, enhancing their capacity for self-determination (or 'capabilities').

Using technology to enhance worker self-determination is possible in a number of ways. For example, new technologies can redress disadvantage of members of the population previously excluded from work by virtue of disability. There is therefore a potential right to work and an equality rationale for facilitating introduction of new integrative forms of technology into work. Further, ICT has the potential to offer workers collective voice and even democratic engagement within the workplace, which can be linked to broader human rights-based entitlements to freedom of association and freedom of speech. There is capacity for new technologies (but ICT in particular) to create opportunities for workers' collective learning and also their broader democratic and political engagement, within and beyond the workplace. Notably, current legislative mechanisms for enhancing these more positive aspects of technological engagement (in terms of workers' interests) are limited. It is suggested here that more could be done to consider the capability-building features of technology and its regulation.

2. A Narrative of Tensions: Employer Interests and Worker Resistance

The use of new technologies in the workplace is usually understood in terms of employers' interests in promoting improved productivity and delivery of services, alongside protection of their reputation. Legal mechanisms are deployed through (p. 479) which employers' ambitions are protected and workers' attempts at resistance are constrained. This approach to work and technology can be understood in terms of the legacy of industrialization and a legal framework constructed, and subsequently built upon, to protect the managerial prerogative of employers. In so doing, employers are allowed, and arguably positively encouraged, to invest in new technologies for the enhancement of the profitability of their enterprise. What may be viewed with more suspicion are heavy-handed attempts by employers at surveillance, which tend to be limited to an appreciation of business needs (enhancing productivity or service provision, preventing disloyalty, and

avoiding reputational harm) and are recognized to be subject to a worker's right to privacy. The balancing of these competing interests remains controversial.

2.1 Legal Protection of Managerial Prerogative to Introduce New Technologies

The starting point for any history of regulation of work technology in the UK is arguably the industrial revolution. There were clearly significant incentives for employers to take advantage of technological advances and implement these in the workplace. Employers would be enabled to provide a more consistent finished product, which could be produced more rapidly with potentially fewer workers. A reduction in the number of jobs available could lead to competition for those that remained, such that the level of wages at which persons would accept jobs would be reduced. Further, the wage premium paid previously to 'skilled' employees would vanish (as their skills were replaced by machines). In this setting also emerges a sharper distinction between daily life and working time (Thompson 1967: 80, 96). This was the start of sweated labour and long working times coordinated around use of machinery. On this basis, one can see the reasons for worker resistance to technological innovation by the employer, even though by 1821 the economist Ricardo was already arguing that, although temporary disruption would be caused to workers' lives in the short term, technological innovation could bring new employment opportunities and improved terms and conditions over time (Ricardo 1951).

The impact of technological change on industrialization has to be understood against the backdrop of the 'master and servant' relationship devised through statute and reified by common law (Deakin and Wilkinson 2005: 62–74). Under common law the servant had to follow the lawful and even unreasonable instructions of the master.¹ The individual servant was thereby obliged simply to change their way of working (in terms of time and equipment) when the master demanded this and learn new skills as required.

Further, there were strict legislative controls on workers who sought to act in combination to resist technological advances and its consequences (Thompson (p. 480) 1968: 553–572). These were applied notoriously to resistance by those engaged in skilled handcrafts (such as knitters, shearers, and weavers) to the introduction of new machinery in their line of work and the institution of lower wages and changes in working conditions which followed (Deakin and Wilkinson 2005: 60). Workers responded by destruction of new machinery as advocated by 'Ned Ludd' (which may have been a pseudonym) or 'Luddites' (which has its own negative connotations today) (Pelling 1973: 28–29; Grint and Woolgar 1997: 40ff). These collective acts of rebellion were actively repressed through the application of statute which made them a capital offence; while older laws which had allowed justices to fix wages were not enforced and then repealed.² In other words, the opportunity for wage reductions that new machines offered to employers was exploited with the support of the state.

It can be observed that, since the Luddite activities of the early nineteenth century, both individual employment law and collective labour law have developed considerably and

significantly. However, contemporary legal regimes still favour employers' interests in technological change. This may be due to an enduring consensus that technological innovation in terms of manufacturing (and service delivery) promotes growth, profitability of private business, efficacy of public institutions and generates employment in the longer term (Fahrenkrog and Kyriakou 1996). The difficulty, however, is that technological advances would seem to have disparate effects, with some employees being rendered particularly vulnerable (especially through redundancy) (Brynjolfsson and McAfee 2012).

The common law regulating the individual contract of employment still requires that employees adapt their performance of the contract to the employer's instructions as regards introduction of new technology, where these instructions are lawful and reasonable. In the case of *Cresswell v Board of Inland Revenue*,³ Cresswell and a number of other civil servants refused (on the advice of their union) to start using a new computerized system for managing tax codes and correspondence. As Walton J explained in the introductory remarks which prefaced his judgment:

It is, I think, right that the stance of the union in this matter should be appreciated. It is not really a Luddite stance seeking to delay the march of progress. On the contrary ... the union ... recognises quite clearly that the ... the system [will] provide for its operators a job which will be free from much of the drudgery at present associated with it. But therein lies the catch. However much it will (whatever they now think) benefit its operators, it will certainly lead to a diminution in the number of staff required to operate the new system. Naturally, the union does not relish the loss of membership ... And so the union has sought a pledge from the revenue that there will be no compulsory retirements involved in the system being put into operation.⁴

As these union demands were not met, members were claiming that the new work arrangements amounted to a breach of contract and sought declaratory relief accordingly. However, Walton J declined the issue of such relief holding that:

(p. 481)

there can really be no doubt as to the fact that an employee is expected to adapt himself to new methods and techniques introduced in the course of his employment ... In an age when the computer has forced its way into the schoolroom and where electronic games are played by schoolchildren in their own homes as a matter of everyday occurrence, it can hardly be considered that to ask an employee to acquire basic skills as to retrieving information from a computer or feeding such information into a computer is something in the slightest esoteric or even, nowadays, unusual.⁵

This judgment remains a precedent, affecting our understanding of when there is a need for the employee to obey the new orders of their employer or where, in the alternative,

the extreme nature of the retraining required means that there is a termination of a contract of employment by way of redundancy.⁶

Furthermore, while collective action taken by workers to protect their interests is now given statutory protection by virtue of industrial legislation,⁷ the scope of this entitlement remains limited. There are balloting and notice requirements which have to be followed by trade unions if they are to be immune from civil liability, but also only certain objectives are regarded as the subject of a 'lawful trade dispute'.⁸ In particular, there must be a dispute 'between workers and their employer' which 'relates wholly or mainly' to one of a list of items. Collective action can lawfully address the introduction of new technology which affects their 'terms and conditions of employment, or the physical conditions in which any workers are required to work' or which could lead to redundancies.⁹ If there is no obvious effect, it may be that the industrial action taken will not fall within the statutory immunity,¹⁰ although a genuine apprehension could be sufficient.¹¹ In past cases, mere speculation as to the effects of privatization was not considered sufficient to meet the 'wholly or mainly' test;¹² nor were the potential effects of a transfer of an undertaking.¹³ We have yet to see case law on the introduction of new technology per se.

The vulnerability of workers in this respect was ably illustrated by the Wapping dispute in 1986, when Rupert Murdoch sought to introduce new computer technology so as to replace the craft of set printing in his newspapers. This change would obviously lead to a reduction in jobs. After certain concessions were offered by the printers' unions but rejected by management, over 5,000 News International workers were called out on strike. Those workers were then dismissed by reason of the strike (as there had been no selective dismissal or re-engagement) and would in any case have (in the main) been regarded as redundant. New workers took over jobs at a newly built plant in where the computerized technology had been installed (Ewing and Napier 1986). This dispute was seen by some in management as an opportunity to 'break the grip of the unions' (Marjoribanks 2000: 583). Union representation was allowed but by a different union, which would agree to a 'no-strike' clause (Ewing and Napier 1986: 288, 295–298). Subsequently, other newspapers such as the *Financial Times*, the *Daily Telegraph*, and the Mirror Group used this precedent to achieve union agreement to proposed technological changes, which in turn (p. 482) led to significant redundancies and the weakening of trade union influence (Ewing and Napier 1986: 581).

Technology now enables more dramatic movements of sites of work to cut employer labour costs, such as for example with the offshoring of call centres (Taylor and Bain 2004; Erber and Sayed-Ahmed 2005; Farrell 2005). This shift abroad is made possible by the reach of IT beyond national borders but also by limited trade union influence in the private sector, alongside statutory restrictions placed on industrial action (Bain and Taylor 2008). The threat of a move of site can also be used as a bargaining tool to push domestic unions to accept lowered terms and conditions (Brophy 2010: 479; see also Ball 2001 and Ball and Margulis 2011). More recently, new forms of computerized technology

have been used by employers as an excuse for treating workers as self-employed in the so-called 'gig' economy (De Stefano 2016).

Technology therefore presents apparent advantages for employers; but UK individual employment law or collective labour legislation does not currently mitigate the stark short-term adjustment effects for workers. This is interesting, given alternative regulatory options offered in countries like Germany, where works councils deliberate upon and assist these forms of adjustment in more gradual ways (Däubler 1975; Frege 2002). By way of contrast, UK institution of EU works councils' requirements¹⁴ for transnational companies have been half-hearted,¹⁵ and there has been limited take-up of possible national-level arrangements for information and consultation (Lorber and Novitz 2012: ch 6).

2.2 The Case for Employer Surveillance and Its Limits

Employer surveillance of their workers' activities within the workplace is not by any means a new phenomenon. For some considerable period of time the element of 'control' has been considered to be a defining feature of the contract of employment.¹⁶ In this way, employers have long sought to ensure that workers follow their instructions and do so promptly (Thompson 1968). Further, employers' entitlement to protect their property interests has long been connected to their interest in protecting their information from leaks to competitors and also defending their commercial reputation. For this reason, it has been thought appropriate for employers to keep data relating to their employees and maintain certain forms of surveillance of their activities both inside and outside the workplace. It is our emergent ICT which has enabled employers more than ever before to operate forms of scrutiny effectively, but this efficacy has caused concern. Tracing the movements of workers by remote devices has even come to be known pejoratively as 'geo-slavery' (Dobson and Fisher 2003; Elwood 2010). In this respect the exceptions identified to legitimate employer surveillance have never been more significant. These relate both to public interest, such as the capacity of the worker to 'blow the whistle' on an employer's illegal activity, and the individual interest of the worker in privacy.

(p. 483) In various cases, the judiciary has endorsed employers' use of surveillance and control over workers' computer usage. For example, film surveillance of an employee's home to assess the validity of his worksheets was regarded as defensible.¹⁷ Further, an employee was obliged to surrender emails and other documents stored on a home computer in England in relation to the employer's business.¹⁸ Certainly, staff can be disciplined and even dismissed for their conduct on social media of which the employer becomes aware.¹⁹ This arguably follows from the potential vicarious liability of an employer for any harassment or other behaviour which takes place online directed by one colleague against another.²⁰ UK unfair dismissal legislation indicates that an employer's view of misconduct (within a broad band of reasonable responses) is sufficient justification for dismissal as long as appropriate procedures are followed.²¹

Employers can (and often do) bolster their position at the outset by stating in a contract or explicit written instructions that any use of ICT (email, text or pager messages, Inter-

net activity, electronic diaries, or calendars, etc.) will be subject to scrutiny. Surveillance can also relate to investigation of the physical health of an employee or checking that they have not taken illegal substances which will affect their work or the employer's reputation.²² Often, this is done by reference to a policy set in place for that particular workplace; or practices may simply be implemented to which the employee is taken to have consented either through the commencement or continuation of their employment. This idea of implicit consent is a feature of the English common law (Ford 2002: 148). Whether there is true consent (or agreement between the parties) might be called into question, given the fundamental imbalance of bargaining between the parties, which has also been acknowledged by the UK Supreme Court.²³ Certainly, the inherent limitations of the contractual approach adopted under the common law have given rise to statutory regulation of various forms of employer surveillance, particularly when it seems that the legitimate business interests of the employer are not what is being pursued, but rather some other objective.

2.2.1 Public Interest as a Limit

At some point the employer's objectives may fail to be regarded as legitimate. Here blacklisting and whistle-blowing legislation offer two useful exceptions, recognized through legislation. This is because there is perceived public interest in the capacity of workers (whether individually or collectively) to, without fear, engage in trade union business and promote such issues as health and safety or environmental standards. For example, information gathered, kept, and used by employers and circulated regarding workers' trade union activities are now addressed by the UK Employment Relations Act 1999 (Blacklists) Regulations 2010. This regulatory initiative was taken following extensive blacklisting activities undertaken by the 'Consulting Association' in respect of blacklisting in the construction sector (Barrow 2010: 301–303),²⁴ and (p. 484) arguably indicates the limitations of the UK Data Protection Act 1998 (discussed below) in addressing such conduct. The Regulations state that no one may 'compile, use, sell or supply' a 'prohibited list', which 'contains details of persons who are or have been members of trade unions or persons who are taking part or have taken part in the activities of trade unions' and has been compiled for a 'discriminatory purpose'. However, the Regulations operate more to control what employers do with the information that follows from workplace surveillance than exercise control over the form and scope of the surveillance itself. Further, the Regulations are restricted to 'trade union' activity or discrimination.²⁵ Other forms of worker activism are not covered as they are in other jurisdictions where collective or 'concerted' action is protected regardless of actual union membership (see Gorman 2006 and Creighton 2014, discussing the US and Australia respectively). Further, in the UK, the status of 'worker' may be a difficult precondition to meet for those hired through agencies, such that they fall outside the scope of standard trade union protections.²⁶

Whistle-blowing also operates as a crucial exception to the otherwise well-accepted common law rule that an employee owes a duty of confidentiality in respect of an employer. At common law, the employee only has to follow the lawful orders of an employer and is entitled to disclose criminal acts or other illegal conduct on grounds of overriding public in-

terest.²⁷ In 1998, this capacity to disclose information was extended. A ‘qualifying’ disclosure may now relate to a wider range of events, such as endangerment of health and safety, damage to the environment or even deliberate concealment of the same. Nevertheless, the worker must seek primarily ‘internal’ disclosure within the workplace, with ‘external disclosure’ limited to a very limited range of circumstances.²⁸ The most popular example of surveillance-oriented whistle-blowing is that of US National Security Agency employee Edward Snowden, but cases also arise in other workplace contexts (Fasterling and Lewis 2014). What is also becoming clear is that the public interest usually linked to a disclosure defence may further be linked to freedom of expression and collective capabilities,²⁹ discussed in section 3.3.

2.2.2 Private Interests as a Limit

It is also possible for private interests—indeed, the very right to privacy—to operate as a limitation on employer surveillance through usage of ICT. There are legislative restrictions in the form of the EU Data Protection legislation operative in the UK, but also the human right to protection of privacy and family life under Article 8 of the Council of Europe’s European Convention on Human Rights 1950, which has legislative force in the UK by virtue of the Human Rights Act 1998. The latter offers the most flexible and therefore helpful tool to constrain managerial discretion. However, importantly, that right remains subject to a proportionality test also sensitive to employer needs. The ways in which this process of balancing takes place are now discussed.

(p. 485) (a) Data Protection

Employers’ capacity for surveillance of worker activity is limited by legislation specifically concerned with the handling of data, particularly personal information. In the UK, the Data Protection Act 1998 (DPA) transposes the Data Protection Directive 95/46/EC into domestic law.³⁰ That legislation can now also be understood to be governed by the EU Charter of Fundamental Rights, Article 8 of which sets out the obligation that:

1. Everyone has the right to the protection of personal data concerning him or her.
2. Such data must be processed fairly for specified purposes and on the basis of the consent of the person concerned or some other legitimate basis laid down by law. Everyone has the right of access to data which has been collected concerning him or her, and the right to have it rectified.
3. Compliance with these rules shall be subject to control by an independent authority.

Treatment of technology in the workplace is dealt with under the DPA by a combination of hard law (in the form of legislative requirements) and soft law (the guidance offered by the ‘independent authority’, the Information Commissioner). The UK DPA (the hard law) draws a distinction between ‘personal data’ and ‘sensitive personal data’ (to which additional protections apply); and places certain restrictions on the ‘processing’ of such data by a ‘data controller’.³¹ In our workplace scenario, the data controller will be the employ-

er, while records of correspondence between workers or their access to social networks can be regarded as ordinary 'personal information'. Trade union membership certainly constitutes 'sensitive personal information', which also covers personal details regarding a worker such as racial or ethnic origin, political opinions, and religious belief.³² The legislation is enforced by an 'Information Commissioner', an office which now has extensive powers including that to issue monetary penalty notices of up to £500,000 for serious breaches.³³

Further, the Information Commissioner's Office (ICO) first issued 'The Employment Practices Code' (EPC) in 2003, which is non-binding soft law, but seeks to spell out for employers the extent of their obligations as data controllers to their workers as data subjects. The Code has since been revised and supplemented³⁴ (and even abridged for smaller employers).³⁵ Two crucial issues arguably arise for the worker. One is the issue of consent to use of personal data: should we be applying common law principles indicating that implicit consent is sufficient? The other key issue is the purpose (or purposes) for which data can legitimately be kept by the employer.

Under the DPA, 'consent' is stated as a precondition for collection of personal data and 'explicit consent' for 'sensitive personal data', but this is deceptive. For, if any of the other exceptions apply (more generous for bare 'personal' information than that which is 'sensitive'), then consent is not needed whether implicit (p. 486) or explicit. Hazel Oliver has expressed concern at this formulation. First, it offers potential for justification of usage of sensitive personal information without a worker's consent, which arguably reduces the worker's capacity for agency. Second, perhaps even more significantly, it enables a worker to 'contract out' of one's privacy rights, even if the further criteria are *not* met, without any justification being established (Oliver 2002: 331).

Under Article 6 of the EC Directive, data may only be used for 'specified, explicit and legitimate purposes and not further processed in a way incompatible with those purposes'. It is recommended as 'good practice' that employers 'consult workers, and/or trade unions or other representatives over these purposes and their practices'.³⁶ The EPC acknowledges that collection of data such as 'monitoring e-mail messages from a worker to an occupational health advisor, or messages between workers and their trade union representatives, can give rise to concern'.³⁷ However, the EPC does not comment on 'black-listing', which is perhaps curious given that adoption of the 2010 Blacklisting Regulations was prompted by the prominent prosecution by the ICO of the Consulting Association concerning information regarding 3,213 workers in the construction industry.

The EPC advises that the employer should consider the potential 'adverse impact' of gathering health-related information which is intrusive, might be seen by those who do not have 'a business need to know', could impact upon the relationship of trust and confidence between the employer and worker and may in its collection be 'oppressive or demeaning'.³⁸ There is also guidance as to when might be an appropriate circumstance in which to test, for example after an 'incident'. In this respect, it may be relevant that there is a European Workplace Drug Testing Society (EWDTs), which provides non-binding

guidance on workplace drugs testing (Agius and Kintz 2010). In terms of genetic testing, the EPC is clear that this should not be used for the purpose of obtaining 'information which is predictive of a worker's future general health' and is only appropriate where a genetic predisposition could cause harm to others in the workplace or endanger the worker themselves.³⁹ Further, the UK Human Genetics Commission has to be informed of any proposals to use genetic testing for employment purposes (Agius and Kintz 2010). The EPC may be regarded as helpful, therefore, in terms of limiting the scope of employer surveillance but the Code is non-binding.

(b) Privacy

Both the hard and soft law relating to data protection remain subject to interpretation in line with the 'Convention right' to privacy.⁴⁰ The entitlement of workers to privacy casts doubt on whether mere consent to workplace surveillance is sufficient, where either the employer's aims cannot be regarded as legitimate, or the (p. 487) measures taken are disproportionate in the light of those aims. Article 8 of the ECHR provides that:

1. Everyone has the right to respect for his private and family life, his home and his correspondence.
2. There shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.

This means that the right to respect for privacy in paragraph 1 is ultimately subject to whether there is any legitimate basis for interference with the right, which can be regarded as proportionate. Notably, the limitation of privacy must be lawful and 'necessary in a democratic society'—so discrimination against trade union members, for example, would not suffice. The state is allowed to interfere with a worker's privacy where this entails the 'protection of the rights and freedoms' of the employer, such as an employer's property rights (under Article 1 of Protocol 1 to the ECHR). Still, this is only the case if the measure is proportionate,⁴¹ although a margin of discretion is left to ratifying states in this respect.

One case which highlighted the issues arising regarding a worker's behaviour in the digital era was *Pay v UK*.⁴² Pay was an employee of the Lancashire Probation Service who was dismissed for being a director of an organization that operated a bondage website and organized related events. This was not illegal conduct, but conduct which could cause embarrassment to Pay's employer. The European Court of Human Rights (ECtHR) reversed the finding of the UK Court that privacy under Article 8 was not engaged here (Mantouvalou 2008). Sexual life was one of a number of 'important elements of the personal sphere protected by Article 8'; further, the fact that private behaviour was recorded by others and displayed over the web did not make it any the less private. The Court also

observed that Article 8 protects ‘the right to establish relationships with other human beings and the outside world’. Much turned on what could be regarded, on the facts, as a ‘reasonable expectation of privacy’. In this particular case, ‘given in particular the nature of the applicant’s work with sex offenders and the fact that the dismissal resulted from his failure to curb even those aspects of his private life most likely to enter into the public domain’, the Court did not consider that the measures taken against Pay were disproportionate.

A difficulty with the judgment in *Pay* is this notion of a ‘reasonable expectation of privacy’, which creates a kind of perverse incentive that the more that an employer makes explicit their surveillance of workers’ behaviour, the less there may be a ‘reasonable expectation’ of privacy (Ford 2002; Oliver 2002). For example, the US case of *City of Ontario v Quon*⁴³ suggested that an employer is best protected from (p. 488) a privacy-related action when there is a workplace policy regarding ICT and the surveillance is proportionate to a legitimate interest of the employer; noting *obiter* that this issue might have to be revisited as surveillance became more extensive or effective in practice.

There has also been one recent judgment of the ECtHR concerning workplace surveillance, which seems to confirm that this is also likely to be the approach adopted under the ECHR. *Kopke v Germany*⁴⁴ concerned the covert video surveillance of an employee stealing from a supermarket. The Court was satisfied that a video recording made at her workplace ‘without prior notice on the instruction of her employer’ affected her ‘private life’ under Article 8. Yet, in this case, the employer’s interference with Kopke’s privacy was justified, with reference to the employer’s entitlement to its property rights under Article 1 of Protocol No 1 to the ECHR.⁴⁵ The requirement of proportionality was satisfied because ‘there had not been any equally effective means to protect the employer’s property rights’ which would have ‘interfered to a lesser extent with the applicant’s right to respect for her private life’.⁴⁶ The ‘public interest in the proper administration of justice’ was also taken into account.⁴⁷ The judgment did however contain the following *obiter* statement:

The competing interests concerned might well be given a different weight in the future, having regard to the extent to which intrusions into private life are made possible by new, more and more sophisticated technologies.⁴⁸

Of course, privacy is just one human right which could operate to constrain employer surveillance. Arguably, freedom of association (which includes the right to form and join trade unions under Article 11) is another, such that when an employer illegitimately holds data relating to trade union activities this is not only a violation of privacy but of another human right. In this way, human rights can operate as ‘boundary markers’ (Brownsword and Goodwin 2012: ch 9), but perhaps also as sources of claims for worker-oriented engagement with technology in the workplace. This possibility is explored further in section 3 below.

3. A Story of Capabilities: Technology for Access to Work and Voice

Thus far, this chapter has addressed the ways in which employer's interests have been served, and worker resistance limited, by the introduction of new technology in the workplace. This is a negative narrative, which is perhaps mitigated by legislative action relating to such matters as blacklisting, whistle-blowing, and data (p. 489) protection. A human right to privacy may also limit the scope for employer surveillance. However, it may be possible to extend the technology agenda to embrace other possible approaches to regulation. In particular, the theory of capabilities could be drawn on to understand what technology could contribute in a more positive way to workers' lives. Examples may be found in use of technology to assist participation in work and enhancement of equality, as well as access to voice at work.

3.1 Why Capability?

My aim here is to build on a vision oriented towards 'capabilities' proposed by Amartya Sen (1985, 1999), who argues for the establishment of 'both *processes* that allow freedom of actions and decisions, and the actual *opportunities* that people have' (Sen 1999: 17). Sen's focus is on the ability to achieve human 'functionings', namely 'the various things a person may value doing or being' (Sen 1999: 75). Sen focuses on 'liberty to achieve' (Sen 1999: 117–118). He envisages learning and discursive processes which enable any given individual, group and society to determine what is to be valued as a goal. In his account, the significance of workers and their capabilities was explicitly acknowledged (Sen 1999: 27–30, 112–116). In early economic-led research into technology and employment, Sen was concerned with fundamental questions concerning the benefits of enhanced productivity and (ultimately in the longer term, employment), noting that employment was not only beneficial in terms of income and production, but the esteem and fulfilment that might come from doing a job (Sen 1975: ch 9).

Martha Nussbaum, seeking to develop the application of Sen's ideas, has stressed that 'capabilities have a very close relationship to human rights' (Nussbaum 2003: 36). Further, she considers that Sen's approach to capability provides a basis on which to critique, interpret, and apply human rights. In her view, a focus on capabilities requires us to go beyond neo-liberal insistence on negative liberty, such as prevention of incursions on privacy. Instead, she identifies 'Central Human Capabilities' based on her understanding of human dignity and places amongst these the positive need for 'affiliation' (Nussbaum 2000: ch 1). Affiliation is understood to include being able 'to engage in various forms of social interaction; to be able to imagine the situation of another'. She further explains that this entails 'protecting institutions that constitute and nourish such forms of affiliation, and also protecting the freedom of assembly and political speech' (Nussbaum 2003: 41–42). Empathetic engagement in social interaction is also understood to require protection against discrimination on basis of race, sex, sexual orientation, religion, caste, ethnicity, and national origin. IT has already been recognized as contributing to develop-

ment and capabilities (Alampay 2006: 10–11; Heeks 2010; Johnstone 2007: 79). This chapter seeks to build on the potential affirming role of human rights in enabling people (p. 490) to utilize ICT to promote access to work and thereby non-discrimination, but also, as I have argued elsewhere, to facilitate freedom of speech and association which promotes broader democratic participation (Novitz 2014).

3.2 Access to Work and Equality Issues

Employers may have an interest in facilitating the access of exceptionally high skilled employees to work, so that when their existing employees experience disability employers may have an incentive to offer technological assistance to retain their ability to do a job (rather than requiring exit). Voice-activated software for those suffering from rheumatism, arthritis, or repetitive strain injury is one example. Similarly, speaking telecommunications services and software may be useful for those experiencing progressive or long-term problems with sight (Simpson 2009).

Yet it is the workers (or potential workers) themselves who possess such disabilities who also have significant interests in access to work. Their entitlements (and indeed that of all those who seek to work) are broadly acknowledged under international and European law. Article 23(1) of the UN Declaration on Human Rights states that: ‘Everyone has the right to work, to free choice of employment, to just and favourable conditions of work and to protection against unemployment’. Similarly, Article 1 of the Council of Europe’s European Social Charter sets out the ‘right to work’, referring (inter alia) to the importance of protecting ‘effectively the right of the worker to earn his living in an occupation freely entered upon’.⁴⁹

Further, the UN Convention on the Rights of Persons with Disabilities (UNCRPD) indicates that states have obligations regarding the provision of ‘assistive technologies’. Under Article 26(1), in particular, it is stated that:

States Parties shall take effective and appropriate measures ... to enable persons with disabilities to attain and maintain maximum independence, full physical, mental, social and vocational ability, and full inclusion and participation in all aspects of life.

In Article 26(3), this is to include an obligation to promote ‘the availability, knowledge and use of assistive devices and technologies, designed for persons with disabilities, as they relate to habilitation and rehabilitation’. One would also expect assistive technologies to assist in promoting workplace equality under Article 27 of the UNCRPD and therefore to be a key aspect of ‘reasonable accommodation’ envisaged for those persons with disabilities in the workplace. The text of the UNCRPD has recently affected the application of disability discrimination provisions in the EU Framework Directive 2000/78/EC now implemented in the UK by virtue of the Equality Act 2010. The Court of Justice of the EU has found in Case C-335/11 *HK Danmark v Dansk almennyttigt Boligselskab*⁵⁰ that the UNCRPD and the ‘social model’ of ‘disability’ advocated there must be respected. Whether there is ‘disability’ should be determined with regard to the requirements of the

job of the (p. 491) person concerned; in other words, their capacity for participation in 'professional life'. This determination should, in turn, affect what the national court considers to be a 'reasonable accommodation'. It is to be hoped that a move from a 'medical model' of disability focusing on incapacity to a 'social model' will address the continuing exclusion of workers with disabilities from the labour market (Fraser Butlin 2010). So far, legal provisions addressing disability discrimination have proved a blunt tool, with Bob Hepple reporting that 'disabled people are 29 per cent less likely to be in work than non-disabled people with otherwise similar characteristics' (Hepple 2011: 32).

3.3 Access to Voice: Freedom of Speech and Association alongside Democratic Engagement

Aside from privacy (under Article 8 of the ECHR), other forms of human rights protections are potentially available. These might include Article 10 on freedom of speech and Article 11 on freedom of association. Freedom of speech has often arisen as an issue alongside the right to privacy, and the ECtHR has preferred each time to deal with the latter, finding allegation was 'tantamount to restatement of the complaints under Article 8' and did not 'therefore find it necessary to examine them separately'.⁵¹ This would seem to be due to the cross-over with 'communication' in Article 8(1), but it is possible to conceive of a scenario where a worker seeks to be able to make a very public statement on an employer's website so as to engage other workers in debate. The question then becomes one of assessing whether the employer's proprietary interests are sufficient to limit the worker's reliance on freedom of speech under Article 10(2). One possibility is that where workers have grounds for reliance on more than one ECHR Article, this should be seen as adding to the normative weight of their case, so that it gains additional persuasive force (Bogg and Ewing 2013: 21–23).

Further, there is scope for protecting (and promoting) workers' communications through workplace ICT under Article 11 of the ECHR. The significance of Article 11(1) of the ECHR is that it states that: 'Everyone has the right to ... freedom of association with others, including the right to form and join trade unions'. The inclusive nature of this wording enables broad protection of all workers' affiliative behaviour and collective action, even if this has yet to be supported by a trade union. Given the decline in trade union membership, the increase in a representation gap, and the growth in spontaneous action by groups of workers not able to access trade union representation (Pollert 2010), this seems vital to the worker's voice. In this way, workers' capabilities for voice could be supported and built up, rather than abandoned where they do not fit a particular state-authorized mould (Bogg and Estlund 2014). This might entail providing broader-based protection for workers' (p. 492) collective activity online. The TUC Head, Frances O'Grady, has requested that if Conservatives are to change strike balloting rules requiring a turnout of at least 50 per cent, then electronic balloting should be introduced: 'the government should be making it easier for people to vote right across society'.⁵² The Trade Union Act 2016 (TUA), section 4 now provides that the Secretary of State 'shall commission an independent review ... on the delivery of secure methods of electronic balloting' for the purpose of industrial action ballots, to be commissioned within six months of the passing of

the TUA. However, the Secretary of State owes only a duty to publish a 'response' to the independent review rather than to actually implement secure electronic balloting.

Proactive endorsement and usage of technology may also allow workers scope to engage more broadly with national-level policy debates beyond the workplace, so as to influence the broader experience of their working lives (Ewing 2014). Notably, that would tally with Oliver and Ford's appreciation that privacy rights are themselves 'affiliative' in nature. Hazel Oliver understands privacy as not just 'freedom from' interference but 'freedom to' engage democratically: 'Privacy allows individuals to develop their ideas before 'going public', and can be described as essential to democratic government due to the way in which it fosters and encourages moral autonomy' (Oliver 2002: 323). Further, Michael Ford has advocated an approach taken previously by the Court to privacy in *Niemitz v Germany*,⁵³ such that privacy is not solely concerned with an 'inner circle' within which an individual leads some kind of protected existence, but also must 'comprise to a certain degree the right to establish and develop relationships with other human beings' (Ford 1998: 139).

This would seem to lead on to Ford's attempt to promote a procedural dimension to privacy rights 'imposing duties to provide information to workers and, above all, collective consultation in relation to forms of surveillance regardless of whether or not private life is engaged may offer a better solution' (Ford 2002: 154–155). Collective engagement by workers with these issues, whether from a trade union perspective or more spontaneous forms of workplace organization, may offer a different perspective on the appropriate treatment of technology in the workplace to that of human rights organizations, which have less interest in the ongoing success of the business of their employer (Mundlak 2012). Contrary to common assumptions, there may be a win-win scenario possible for the 'good' employer that enables capability. This again suggests that the more discursive avenue of works councils could be helpful as a regulatory tool, which should not by any means indicate a lack of trade union involvement, but rather a breadth of union influence, while enabling speech when trade unions are not present in a given workplace. Nevertheless, whatever the strength of the arguments in favour of workers' access to voice through technology, there has been little legislative intervention aimed at achieving this end. Currently, legislative recognition of the positive potential for ICT to further worker voice is limited to two aspects of trade union engagement. The first is the provision for the Union Learning Fund, which envisaged IT support.⁵⁴ The second is the trade union (p. 493) recognition procedure, which affects only a relatively small number of workers in a minimal way.⁵⁵ In respect of the latter, the Code of Practice: Access and Unfair Practices During Recognition and Derecognition Ballots 2005 (AUP)⁵⁶ partially recognizes the significance of ICT in determining capacity for trade union recruitment and organization imposing new, if moderate requirements on employers.

For example, in the context of a ballot for statutory recognition, the employer need only allow workers access to the union's website, if the employer usually allows such Internet use. If it is not allowed, the employer should 'consider giving permission to one of his workers nominated by the union to down-load the material' and circulate it. Similarly, ac-

cess to sending an email message should be allowed, but only if the employer generally allows email use for non-work-related purposes or the employer is using email in a campaign in this way.⁵⁷ The Code states that campaigning by the employer or the union can 'be undertaken by circulating information by e-mails, videos or other mediums' as long as it is not intimidatory or threatening.⁵⁸ Still, the union is not necessarily to be given access to the workers' email addresses unless the workers concerned have authorized disclosure by the employer.⁵⁹

It is therefore fair to surmise that the scope of these entitlements regarding ICT access for unions is extremely limited. Indeed, the statutory recognition procedure is not utilized extensively.⁶⁰ Moreover, these are only entitlements that apply for a short window of time and for a limited purpose (a 'period of access' leading up to a statutory recognition ballot),⁶¹ and the Code only seems to envisage access by trade unions and not individual workers. There is therefore greater scope to facilitate access to voice for workers through legislative means.

4. Conclusion

There is a well-worn familiar narrative, which is that technological change in the workplace is good for employers, but often not so beneficial for the workers directly affected. In this respect, UK individual employment law and collective labour legislation has enabled employers to develop technologically improved forms of production and service delivery, while allowing only limited forms of dissent from workers. The use of surveillance methods by employers, while legitimate in terms of common law recognition of 'control' as essential to the employment relationship, has been restricted by statute. This has been achieved by hard law (in the form of legislative protections for workers) offered by black-listing, whistle-blowing, and data protection legislation; but also by soft law mechanisms such as the Employment Practices Code (or EPC) developed to offer guidance to employers regarding data (p. 494) management and forms of health testing in the workplace. Further, 'hard' and 'soft' law in the field remain subject to human rights obligations, which have been significant particularly as regards privacy-based limitations on employer conduct.

Yet, it can and should be possible to extend the workplace technology agenda further, such that not only the interests of employers, but also the well-being of workers, are enhanced through technological development. Human rights need not only operate as boundary-markers, but as the basis for legislative intervention that enhances realization of workers' capabilities. Two examples are given here. The first is that of access to the workplace, which is of significance to workers with disabilities in terms of enhancing a broader equalities agenda. The second is that of voice, such that workers' capacity for freedom of speech and freedom of association is improved, having repercussions for further democratic engagement both within and outside the workplace. These are possibilities that have yet to be fully recognized by statutory mechanisms, although there are some nascent indications of change in this regard. While clearly not a technological fix for

broader workplace-related issues, grounded in the assumptions that underlie our current employment law, these examples might provide the foundations for a broader technology agenda at work.

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Notes:

(1.) *Turner v Mason* [1845] 14 M & W 112.

(2.) In this way, the law of the market would prevail for wages, but workers could not act in combination to affect the operation of that market. See discussion of the Statute of Artificers of 1562 5 Elizabeth I c 4 by Deakin and Wilkinson (2005: 49ff) and its repeal by 1814 in Pelling (1973: 29).

(3.) [1984] ICR 508.

(4.) *Ibid* 511.

(5.) *Ibid* 518–519.

(6.) Where there is a unilateral introduction of entirely new duties on the part of an employee, an employer will not be able to insist on compliance with these. See *Bull v Nottinghamshire and City of Nottingham Fire and Rescue Authority; Lincolnshire County*

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Council v Fire Brigades Union and others [2007] ICR 1631 (concerning new duties previously carried out by emergency healthcare specialists rather than new technological methods).

(7.) See the Trade Union and Labour Relations (Consolidation) Act 1992 (TULRCA) s 219.

(8.) TULRCA, s 244.

(9.) TULRCA, s 244(1)(a) and (b).

(10.) See *Hadmor Productions Ltd v Hamilton* [1982] IRLR 102.

(11.) See *Health Computing Ltd v Meek* [1980] IRLR 437.

(12.) *Mercury Communications v Scott-Garner* [1983] IRLR 494.

(13.) *University College London NHS Trust v UNISON* [1999] IRLR 31.

(14.) Council Directive 94/45/EC of 22 September 1994 on the establishment of a European Works Council or a procedure in Community-scale undertakings and Community-scale groups of undertakings for the purposes of informing and consulting employees [1994] OJ L254/64. Extended to the United Kingdom by Council Directive 97/74/EC of 15 December [1997] OJ L10/22.

(15.) See Transnational Information and Consultation of Employees Regulations 1999 and for commentary, see Lorber (2004).

(16.) See *Montgomery v Johnson Underwood* [2001] IRLR 270 (Buckley LJ).

(17.) *McGowan v Scottish Water* [1995] IRLR 167.

(18.) *Fairstar Heavy Transport NV v Adkins and Anor* [2013] EWCA Civ 886. This was not a pure proprietary right, but was based on an agency argument for reasons of business efficacy.

(19.) For a case of 'discipline' following comments made on Facebook to other work colleagues critical of gay marriage, see *Smith v Trafford Housing Trust* [2012] EWHC 3221, judgment of 16 November 2012. See also *Weeks v Everything Everywhere Ltd* ET/2503016/2012.

(20.) *Otomewo v Carphone Warehouse* [2012] EqLR 724 (ET/2330554/11), where a sexual orientation harassment claim succeeded against an employer where colleagues had posted inappropriate comments on their fellow employee's Facebook page while at work.

(21.) See Employment Rights Act 1998, s 98; as applied in *Foley v Post Office* [2000] ICR 1283 (CA). See also Trade Union and Labour Relations (Consolidation) Act 1992, ss 207 and 207A; ACAS Code of Practice; and *Polkey v Dayton* [1988] ICR 142 per Lord McKay at 157. This is the case even where the right to privacy under Article 8 of the European Con-

vention on Human Rights is engaged—see *Turner v East Midlands Ltd* [2012] EWCA Civ 1470.

(22.) Note that this practice is fiercely contested by the UK Trades Union Congress (TUC), which alleges drug testing to be unnecessary. See Trade Union Congress, 'UK Workers Are Overwhelmingly Drug Free—Study' (2012) <www.tuc.org.uk/workplace-issues/drugs-and-alcohol/uk-workers-are-overwhelmingly-drug-free-study> accessed 28 January 2016; Trade Union Congress, 'Drug Testing in the Workplace' (2010) <www.tuc.org.uk/workplace-issues/health-and-safety/drugs-and-alcohol/guides-and-reports-reps/drug-testing-workplace> accessed 28 January 2016.

(23.) *Autoclenz v Belcher* [2011] UKSC 41, [2011] IRLR 820 [35]. Discussed by Bogg (2012).

(24.) House of Commons, Scottish Affairs Committee, *Blacklisting in Employment: Interim Report*, Ninth Report of Session 2012–2013 HC 1071.

(25.) Especially TULRCA, ss 146–152.

(26.) *Smith v Carillion and Schal International Management Ltd* UKEAT/0081/13/MC, judgment of 17 January 2014.

(27.) *Initial Services v Putterill* [1968] 1 QB 396.

(28.) See Public Interest Disclosure Act 1998 incorporated into the Employment Rights Act 1996, ss 43A–43H.

(29.) See *Heinisch v Germany* App no 28274/08 (ECHR, 21 October 2011); [2011] IRLR 922.

(30.) Note the further constraints imposed by the Regulation of Investigatory Powers Act 2000 (RIPA) and the Telecommunications (Law Business Practice) (Interception of Communications) Regulations 2000; but neither is concerned specifically with workplace surveillance.

(31.) See European Parliament and Council Directive 95/46/EC of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data [1995] OJ L281/31, art 6; also Data Protection Act 1998 (DPA), Schedules 1–3.

(32.) DPA, s 2.

(33.) See amendment of the DPA by Criminal Justice and Immigration Act 2008, s 144.

(34.) Published November 2011 (96 pages in length) and available at: <www.ico.org.uk/for_organisations/data_protection/topic_guides/~media/documents/library/Data_Protection/Detailed_specialist_guides/the_employment_practices_code.pdf> accessed 28 January 2016.

(35.) Also published November 2011 (but only 26 pp in length) and available at: <www.ico.org.uk/for_organisations/data_protection/topic_guides/~media/documents/library/Data_Protection/Practical_application/quick_guide_to_the_employment_practices_code.pdf> accessed 28 January 2016.

(36.) EPC, 13.

(37.) Ibid, 56.

(38.) Ibid.

(39.) EPC, 95.

(40.) Human Rights Act 1998, s 3.

(41.) *Autronic AG v Switzerland* App no 12726/87 (ECHR, 22 May 1990), para 61.

(42.) *Pay v UK* App no 32792/05 (ECHR, 16 September 2008); [2009] IRLR 139.

(43.) *City of Ontario v Quon*, 130 SCt 2619, 560 US.

(44.) App no 420/07 (ECHR, 5 October 2010)—admissibility decision.

(45.) Ibid [49].

(46.) Ibid [50].

(47.) Ibid [51].

(48.) Ibid [52].

(49.) See also reiteration of this principle in the EU Charter of Fundamental Rights, art 15.

(50.) [2013] IRLR 571.

(51.) *Halford v UK* App no 20605/92 (ECHR, 25 June 1997), para 72.

(52.) BBC news item: 'TUC Head Frances O'Grady Attacks Tories Union Curb Plans' 17 March 2015.

(53.) App no 13710/88 (ECHR, 16 December 1992) para 29.

(54.) Union Learn with the TUC, 'Union Learning Fund' <www.unionlearn.org.uk/union-learning-fund> accessed 28 January 2016.

(55.) TULRCA, Schedule A1. See Bogg (2009).

(56.) Department for Business, Innovation & Skills, 'Code for Practice: Access and Unfair Practices during Recognition and Derecognition Ballots' (gov.uk, 2005) <www.gov.uk/gov-

ernment/publications/code-of-practice-access-and-unfair-practices-during-recognition-and-derecognition-ballots> accessed 28 January 2016.

(57.) AUP 27.

(58.) Ibid 45.

(59.) Ibid 17.

(60.) Central Arbitration Committee, CAC Annual Report (gov.uk, 2012-13) <www.cac.gov.uk/media/pdf/5/s/The_CAC_Annual_Report_2012-2013.pdf> accessed 28 January 2016, 10-11.

(61.) Ibid 19.

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Public International Law and the Regulation of Emerging Technologies

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Abstract and Keywords

As scientific and technological research develop in power and capacity to transform humankind and the global environment, public international law is increasingly being called upon to develop new forms of international regulation and governance capable of anticipating, assessing, minimizing, and mitigating the risks posed by emerging or novel technologies, including the risks of their ‘rogue’ deployment by a state or an individual acting unilaterally. This chapter offers an introduction to the possibilities and limitations of international law in responding to these challenges. In particular, it focuses on the role of international law in the regulation of geo- or climate engineering through a case study of the developing international regime for the regulation of ocean fertilization.

Keywords: International Law, Law of the Sea, biotechnology, geoengineering, climate engineering, ocean fertilization, environment

1. Introduction

PUBLIC international law is the system of rules and principles that regulate behaviour between international actors. While it may not be immediately apparent that international law should have any role to play in regulating either the development or deployment of emerging technologies, throughout its history international law has, at times, been quite creative in responding to the need to protect the international community from the excesses of, and possibly catastrophic and even existential risks posed by, technology. Admittedly, the traditional approach of international law to the regulation of emerging technologies has been one of reaction rather than pro-action; only attempting to evaluate and regulate their development or use *ex post facto*. Increasingly, however, as science and technological research is  developing in power and capacity to transform not only our global environment, but also humankind itself, on a long-term or even permanent basis, international law is being called upon to proactively develop new forms of international regulation and governance capable of anticipating, assessing, minimizing, and mitigating the risks posed by emerging or novel technologies, including the risks of their ‘rogue’

deployment by a state or individual acting unilaterally (UNEP 2012). In other words, international law is being called upon to regulate not just the past and present development and deployment of technologies, but also the uncertain futures these technologies pose. In short, international law is increasingly becoming the preserve of HG Wells' 'professors of foresight' (Wells 1932).

Whether international law is fully up to the task remains an open question. On the one hand, international law holds the promise of providing order and clarity as to the rights and obligations governing the relations between different actors, of fostering technological development and facilitating exchanges of knowledge and goods, and of providing frameworks for peacefully resolving disputes. On the other hand, regulating uncertain, unknown, and even unknowable futures requires flexibility, transparency, accountability, participation by a whole range of actors beyond the state, and the ability to obtain, understand, and translate scientific evidence into law, even while the law remains a force for stability and predictability. Despite the pretence of its ever-increasing purview over issues of global interest and concern, international law remains rooted in its Westphalian origins premised on the sovereign equality of states. This gives rise to various problems, including a fragmented and decentralized system of vague and sometimes conflicting norms and rules, uncertain enforcement, and overlapping and competing jurisdictions and institutions.

This chapter examines both the promise and the pretence of international law as a mechanism for regulating emerging technologies. In particular, it focuses on one set of emerging technologies and processes that are likely to have an impact on the global environment: geoengineering. The focus on geoengineering as a case study of the role of international law in regulating emerging technologies is rationalized both by its potential to affect the global environment and by its explicitly stated aim of positively intending to do so. It is the potential of geoengineering to affect all states and humanity generally, irrespective of location, that makes it a global issue in relation to which international law, *prima facie*, has a role to play.

This chapter begins with a brief introduction to international law as a regulator of emerging technologies in general. It then turns to a discussion of the limitations of international law as a regulator of emerging technologies, before turning to the case study of international law's role in the regulation of geoengineering, with particular reference to the emerging legal regime relating to ocean fertilization and marine geoengineering. The chapter concludes with some thoughts on the essential role of international law in the development of new international governance systems capable of anticipating, assessing, minimizing, and mitigating hazards arising from (p. 502) a rapidly emerging form of scientific and technological research that possesses the capacity to transform or impact upon the global environment.

2. International Law as Regulator of Emerging Technologies

Throughout history, new technologies have had profound implications for humankind, both positive and negative. Indeed, it was the development of new technologies such as gunpowder and cannons that made possible the rise of the nation-state (Allenby 2014), and the concomitant rise of contemporary public international law. Given its essential mission of ensuring the peaceful conduct of inter-state affairs, it is hardly surprising that international law's first brush with emerging technologies came in the context of regulating the methods and means of warfare. During the nineteenth century, the developing rules of international humanitarian law confirmed that the methods and means of injuring an enemy were not unlimited, and that certain technologies that violated the dictates of humanity, morality, and civilization should be banned (Solis, 2010: 38).

Attempts to ban particular weapons were, of course, nothing new. Poisoned weapons had been banned by the Hindus, Greeks, and Romans in ancient times. In the Middle Ages, the Lateran Council declared the crossbow and arbalest to be 'unchristian' weapons (Roberts and Guelff 2000: 3). However, the first attempt at a truly international approach came in the 1868 St Petersburg Declaration on explosive projectiles, which banned the use of exploding bullets. This led to the adoption of other declarations renouncing specific weapons and means of warfare at the 1899 and 1907 Hague Peace Conferences, and to the eventual adoption of international treaties prohibiting the development, production, stockpiling, and use of poison gas (1925), bacteriological or biological weapons (1972), chemical weapons (1993), blinding laser weapons (1995), and other forms of conventional weapons (1980), including certain types of anti-personnel land mines (1996). As its most recent concern, international humanitarian law is now struggling with the challenges posed by cyber weapons and other emerging military technologies, such as unmanned aerial vehicles, directed-energy weapons, and lethal autonomous robots (Allenby 2014).

Outside of the context of armed conflict, it has long been recognized that technological developments have the potential to underpin an increasing number of positive breakthrough innovations in products, services, and processes, and to help address major global and national challenges, including climate change, population and economic growth, and other environmental pressures. However, it has also (p. 503) been recognized that the misuse or unintended negative effects of some new technologies may have serious, even catastrophic, consequences for humans and/or the global environment (Wilson 2013). It is in these circumstances that international law becomes relevant.

Currently, no single legally binding global treaty regime exists to regulate emerging technologies in order to limit their potential risks. Nevertheless, all states are bound by the full range of principles and rules of customary international law which thus apply to the development and deployment of these technologies. These principles and rules include: the basic norms of international peace and security law, such as the prohibitions on the use of force and intervention in the domestic affairs of other states (see, for example,

Gray 2008); the basic principles of international humanitarian law, such as the requirements of humanity, distinction and proportionality (see, for example, Henckaerts and Doswald-Beck 2005); the basic principles of international human rights law, including the principles of human dignity and the right to life, liberty, and security of the person (see, for example, de Schutter 2014); and the basic principles of international environmental law, including the no-harm principle, the obligation to prevent pollution, the obligation to protect vulnerable ecosystems and species, the precautionary principle, and a range of procedural obligations relating to cooperation, consultation, notification, and exchange of information, environmental impact assessment, and participation (see, for example, Sands and Peel 2012). The general customary rules on state responsibility and liability for harm also apply (Crawford 2002).¹

In addition to these general principles of customary international law, a fragmented range of specific treaty obligations may be relevant (Scott 2013). Admittedly, some technologies, such as nanotechnology and Artificial Intelligence, remain essentially unregulated by international law (Lin 2013b). However, the question of the international regulation of synthetic biology has, for example, been discussed by the Conference of the Parties (COP) to the 1992 Convention on Biological Diversity (CBD), where the discussion relates to consideration of the possible effects of synthetic biology on the conservation and management of biological diversity. Nevertheless, in 2014, the COP resolved that there is currently ‘insufficient information available ... to decide whether or not [synthetic biology] is a new and emerging issue related to conservation and sustainable use of biodiversity’ (CBD COP 2014). Thus, application of the CBD to synthetic biology remains a matter of discussion and debate within the COP (Oldham, Hall, and Burton 2012).

International treaties do, however, regulate the development and use of at least some forms, or aspects, of biotechnology and geoengineering. In the case of biotechnology, international law has taken some interest in issues of biosafety, bioterrorism, and bioengineering of humans. With respect to biosafety, the CBD requires states to

establish or maintain means to regulate, manage or control the risks associated with the use and release of living modified organisms resulting from biotechnology which are likely to (p. 504) have adverse environmental impacts that could affect the conservation and sustainable use of biological diversity, taking into account the risks to human health’ (CBD Art 8(g)).

Although not defined in the CBD itself, a ‘living modified organism’ (LMO) is defined in the 2000 Cartagena Protocol on Biosafety to the CBD as ‘any living organism that possesses a novel combination of genetic material obtained through the uses of modern biotechnology’ (Cartagena Protocol Art 3(g)). ‘Living organism’ is defined as ‘any biological entity capable of transferring or replicating genetic material, including sterile organisms, viruses and viroids’ (Cartagena Protocol Art 3(h)). Thus, LMOs include novel viruses and organisms developed in laboratories. Of course, merely bioengineering LMOs in a laboratory does not constitute ‘release’. It does, however, constitute ‘use’ under the CBD and the more specific definition of ‘contained use’ in the Cartagena Protocol, which in-

cludes 'any operation, undertaken within a facility ... which involves LMOs that are controlled by specific measures that effectively limit their contact with, and their impact on, the external environment' (Cartagena Protocol Art 11).

These provisions reflect a recognition, at least on the part of the parties to the CBD, of both the potential benefits and the potential drawbacks of biotechnology. They seek not to prohibit the development, use, and release of LMOs, but rather to ensure that adequate protections are in place to assess and protect against the risk of their accidental or maliciously harmful release in a transboundary or global context. This is particularly important given that case studies of self-assessments of safety by scientists intimately involved with a project indicate a lack of objective perspective and the consequential need for additional, independent review (Wilson 2013: 338). Where adequate measures are not in place, parties to the CBD and the Cartagena Protocol will be internationally responsible for any transboundary damage caused by such a release.

Focused more on bioterrorism than biosafety, the 1972 Biological Weapons Convention (BWC) goes further than merely regulating conditions of use and release, and attempts to prohibit, entirely, the development, production, stockpiling and acquisition or retention of 'microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes' (BWC Art I). State parties are prohibited from transferring 'to any recipient whatsoever, directly or indirectly' and from assisting, encouraging, or inducing 'any State, group of States or international organizations to manufacture or otherwise acquire any of the agents, toxins, weapons, equipment or means of delivery specified [in Article 1]' (BWC Art III), and are to take any necessary measures to prohibit and prevent the development, production, stockpiling, acquisition, or retention of the agents, toxins, weapons, equipment, and means of delivery banned under the Convention within their territory, jurisdiction or control (BWC Art IV). However, despite its apparently prohibitive language, the application of the BWC to biotechnology is (p. 505) limited by the exceptions in Articles I and X relating to prophylactic, protective, or other peaceful purposes. Clearly, even the deadliest biological agents and toxins could be developed for peaceful purposes, yet still be susceptible to accidental or malicious release. Thus, while the BWC evidences a clear rejection of the use of biological agents and toxins as weapons, it does suggest that states accept the value of biotechnological development for peaceful purposes.

Issues of human dignity associated with biotechnology and genetic engineering have received international legal attention in the Council of Europe's 1977 Convention on Human Rights and Biomedicine (CHRB), which prohibits inheritable genetic alterations of humans on the basis that such alterations could endanger the entire human species (Council of Europe 1997). According to Article 13 of the CHRB, 'an intervention seeking to modify the human genome may only be undertaken for preventive, diagnostic or therapeutic purposes and only if the aim is not to introduce any modification in the genome of any descendants'. As will be immediately apparent, however, the CHRB is only a regional treaty with limited participation even by European states.² As with the other technologies

mentioned, international law thus takes an, as yet, limited role in the regulation of human bioengineering.

In the case of geoengineering, it is also fair to say that, at the moment, there is minimal directly applicable international regulation. Nevertheless, research and potential deployment of these technologies is not taking place within a complete regulatory vacuum. In addition to the basic principles of customary international law and treaties of general global applicability, such as the CBD, although limited in their scope and application, some forms of geoengineering involving atmospheric interventions may be governed, for their parties, by the regimes established by the 1985 Ozone Convention and its 1987 Montreal Protocol, the 1979 Convention on Long Range Transboundary Air Pollution, and even the 1967 Outer Space Treaty. Procedural obligations with respect to environmental assessment and notification are provided for in, for example, the 1991 Espoo Convention, while obligations relating to public participation and access to justice are set out in, among others, the 1998 Aarhus Convention. Unlike the atmosphere, which is not subject to a comprehensive global treaty regime, the oceans are subject to the legal regime established by the 1982 United Nations Convention on the Law of the Sea (LOSC). Geoengineering involving the marine environment is therefore governed, in the first instance, by the general rules relating to environmental protection and information sharing contained in Part XII of the LOSC. In addition, the oceans benefit from a number of specific regional and sectoral regimes which may be applicable, such as the 1959 Antarctic Treaty and its 1991 Environmental Protocol and, importantly, the 1996 London Protocol (LP) to the 1972 London (Dumping) Convention (LC). However, with the exception of the CBD, the LC, and the LP, the issue of geoengineering has not yet been specifically addressed in these other treaty regimes and the regulatory field therefore remains underdeveloped (Scott 2013; Wirth 2013). (p. 506) As discussed in the following section, international law's role in the regulation of geoengineering is also circumscribed by what might be referred to as the 'structural' limits of international law.

3. The Limits of International Law and Emerging Technologies

As history demonstrates, many emerging technologies will be perfectly benign or even beneficial for human health and environmental well-being. However, history has also shown us that, in some cases, either the misuse or the unintended negative effects of new technologies could cause serious damage to humans and human well-being on the global scale, or severe permanent damage to the earth's environment with catastrophic, and even existential, consequences (Bostrom and Ćirković 2008: 23). Even in a perfect world, managing and controlling the research and development of emerging technologies would be a daunting task, particularly as, in many cases, the risks posed by some of these technologies will not be understood until they have been further developed and possibly even deployed. In this less-than-perfect world, many limitations exist on international law's ability to respond to these challenges. In particular, the scope and application of interna-

tional law to emerging technologies is subject to a number of structural limitations inherent in the consensual nature of international law.

At the outset, it is important to remember that international law's concern with, or interest in, regulating technologies lies not in their inherent nature, form, development, or even deployment. As the International Court of Justice confirmed in its Advisory Opinion on the *Legality of the Threat or Use of Nuclear Weapons* (*Nuclear Weapons Advisory Opinion*), in the absence of specific treaty obligations freely accepted by states, the development of nuclear weapons is not prohibited by international law. Indeed, even their use is not unlawful, *per se*; at least in circumstances where the state using them faces an existential threat and otherwise complies with the laws of armed conflict. In a similar vein, the development and use of environmental modification technologies is neither regulated nor prohibited under international law, but only their hostile use in the context of an international armed conflict (1976 Convention on the Prohibition of Military or Any Other Hostile Use for Environmental Modification Techniques). Thus, in general, the principle of state sovereignty permits states to utilize their resources, conduct research, and develop and deploy, or allow their nationals to research, develop, and deploy, technologies as they see fit.

(p. 507) However, international law is concerned with the potential for harmful trans-boundary effects on humans, the environment, other states and the global commons. In particular, state sovereignty is subject to the obligation, on all states, to ensure that activities under their jurisdiction and control do not cause harm to other states or the nationals of other states (*Corfu Channel* case; *Nuclear Weapons Advisory Opinion* [29]; *Gabčíkovo-Nagymaros* case [140]). Thus, for example, the Cartagena Protocol applies not to the development of LMOs, but rather to their 'transboundary development, handling, transport, use, transfer and release' (Cartagena Protocol Art 4). Nevertheless, even this concern is subject to limitations arising from the nature of the obligations imposed by international law. By way of example, Article 8(g) of the CBD requires states to 'regulate, manage or control', but does not articulate the specific actions to be taken, leaving the precise measures to be taken to the discretion of each state (Wilson 2013: 340). Even where specific actions are articulated as, for example, in the Cartagena Protocol's requirements relating to risk assessment and risk management, national decision makers have a broad discretion to decide whether the risks are acceptable, and thereby to override a negative assessment, based on national 'protection goals' (AHTEG 2011: 18; Wilson 2013: 340).

This characteristic deference of international law to national discretion is embodied in the concept of 'due diligence', the degree and precise content of which will vary depending on the situation and the rules invoked. In the environmental context, for example, the degree of due diligence required will depend on, *inter alia*, the nature of the specific activities, the technical and economic capabilities of states, the effectiveness of their territorial control, and the state of scientific or technical knowledge (Advisory Opinion on the *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area*: [117]–[120] (*Seabed Mining Advisory Opinion*)). Of course, even legitimate scientific research may result in unintended consequences, such as the acci-

dental release of biotoxins or their malicious use by bioterrorists. Nevertheless, as long as a state has acted with due diligence, it is absolved from international responsibility for both unintentional or accidental acts as well as malicious acts by rogue individuals (Birnie, Boyle, and Redgwell 2009: 146). In such situations, the state's obligation will be one of notification to affected or potentially affected states only, although as Wilson wryly notes, mere notification 'will not likely prevent the global catastrophic or existential harm from occurring' (Wilson: 342).

Another structural limitation inherent in international law arises from the nature of the formal sources of international law. While basic principles and rules of customary international law are binding on all states, these provide only a basic framework in which the regulation of development and/or deployment of emerging technologies might take place. Specific obligations are the domain of treaty law. However, as a 'legislative' mechanism, the negotiation of treaties is a time-consuming and cumbersome exercise, and one that is generally focused on regulating specific (p. 508) current activities, rather than future ones. In other words, treaties are limited in their substantive scope. Moreover, treaties are only binding on their parties (Vienna Convention on the Law of Treaties 1969: Art 34). Nothing in international law compels a state to become a party to a treaty. Thus, the problem of 'free riders' and 'rogue states' who operate freely outside a treaty regime looms large in international law. Indeed, even where a treaty exists and a state is party to it, many treaties lack compliance or enforcement mechanisms, thereby providing the parties themselves with the freedom to fail to live up to their obligations.

Even more problematic for international law is the nature of the actors involved. Research, development, and deployment of emerging technologies is not the sole preserve of governments. Rather, these activities are often carried out by private individuals (both corporate and natural). Contemporary literature speaks of the need for 'governance' of these activities, recognizing the influence that private individuals can have in the development of 'governance' regimes, ranging anywhere along the spectrum from voluntary ethical frameworks involving self-regulation to formal regulatory of legislative measures adopted under national and/or international law (Bianchi 2009; Peters and others 2009). However, beyond the context of individual responsibility for international crimes, it may not be immediately apparent what role international law can or should play in the regulation of these private actors.

This issue may be demonstrated by reference to the issue of international law's role in the regulation of scientific research. The freedom to pursue scientific knowledge is regarded by many as a fundamental right. However, at least since the Nuremberg trials, it has been widely accepted that this freedom is not completely unfettered (Singer 1996: 218). Although the precise limits of the boundaries remain open to debate, ethical limits to scientific enquiry have been identified where the nature of the research is such that the process itself will have potentially adverse impacts on human subjects and non-human animals (Singer 1996: 223). Increasingly, perceptions as to the limits of the right have been influenced by changing conceptions of risk and the increasing recognition of the problem of uncertainty (Ferretti 2010). These changing perceptions have given rise to legal regu-

lation in some circumstances and, as analysis of the development of regulation of nuclear weapons and research on the human genome demonstrates, the presumption in favour of a freedom of gaining knowledge over prohibiting research only operates where the research is conducted 'responsibly' and for 'legitimate scientific purposes' (see, for example, Stilgoe, Owen, and Macnaghten 2013). What constitutes responsible and legitimate scientific research depends not only on an assessment of scientific plausibility, but also on its desirability within the larger social development context (Corner and Pidgeon 2012; Owen, Macnaghten, and Stilgoe 2012), and on its compliance with international legal norms (*Whaling in Antarctica* case). In this respect, international law can play a role in both articulating and in harmonizing the legal content of due diligence standards for what constitutes 'responsible' or 'legitimate (p. 509) scientific research' and in establishing mechanisms and institutions by or in which assessments of legitimacy and desirability can take place at the global level. As will be discussed in the following sections, whether agreement on such standards can be reached within the disparate and fragmented treaty regimes of international law is, of course, another matter.

4. International Law and the Regulation of Geo-engineering

The limitations of international law in regulating emerging technologies can be illustrated by reference to the case of geoengineering and, in particular, the developing regime for the regulation of ocean fertilization and other marine geoengineering activities. Geoengineering, also referred to 'climate engineering', is defined as the 'intentional large-scale manipulation of the planetary environment to counteract anthropogenic climate change' (Royal Society 2009). The term refers to an ever-increasing range of technologies, activities, and processes that are generally divided into two categories: carbon dioxide (CO₂) removal (CDR), and solar radiation management (SRM). CDR techniques involve the collection and sequestration of atmospheric CO₂. Proposals have included various techniques for collecting CO₂ from ambient air and storing either in biomass or underground, fertilizing the oceans to increase biological uptake of CO₂, and enhanced mineral weathering. SRM refers to a range of technologies and processes aimed at increasing the earth's reflectivity to counteract warming. Proposed methods include the injection of sulphur aerosols into the upper atmosphere, spraying seawater to increase cloud brightness, injecting bubbles into the ocean, and placing mirrors in space (EuTRACE 2015; Vaughan and Lenton 2011). Unlike CDM, which addresses the root cause of anthropogenic climate change—excessive CO₂ emissions—SRM is intended only to address global warming. Thus, other consequences of increased CO₂ emissions, such as ocean acidification, will continue (IPCC 2014).

It is generally accepted that geoengineering methods present a range of environmental risks, some of which may easily be assessed and managed, others not. In its Fifth Assessment Report, the IPCC described geoengineering techniques as 'untested' and warns that deployment would 'entail numerous uncertainties, side effects, risks and

shortcomings' (IPCC 2014: 25). In particular, SRM, which is currently touted as a potentially inexpensive and technically and administratively simple response to global warming (see Reynolds in this volume), brings with it a range of unknown and potentially very negative side-effects on precipitation patterns and (p. 510) availability of light, which will affect agriculture, plant productivity, and ecosystems (IPCC 2014: 25). It also presents what might be termed the 'termination' dilemma. According to the IPCC, if SRM were instituted and then terminated, it would carry its own risks of catastrophe. According to the IPCC, there is '*high confidence* that surface temperatures would rise very rapidly impacting ecosystems susceptible to rapid rates of change' (IPCC 2014: 26).

While scientists repeatedly warn of the potentially dire side-effects of geoengineering and go to great pains to stress that it should never be used, they continue to call forcefully for scientific research into the various technologies (see Reynolds in this volume). In recent years, research projects on various aspects of geoengineering have blossomed—predominately funded by US, European, and other developed country national research councils and private interests.

Those in favour of pursuing a geoengineering research agenda argue that geoengineering solutions, in particular SRM and the atmospheric injection of sulphur aerosols, may prove to be relatively cheap and administratively simple. They suggest that, if we are unable to take effective measures to mitigate climate change now, geoengineering may end up being the lesser of two evils. Thus, conducting the research now is an effective way of 'arming the future' (Gardiner 2010) to ensure we are ready to deploy the technology if we do end up needing it (Crutzen 2006; EuTRACE 2015; Keith 2013; Parson and Keith 2013; UK Royal Society 2009).

Opponents (or, at any rate, non-proponents) of geoengineering argue that focusing on costs of implementation (even if they are proven to be low) ignores the risks and costs associated with the possible, and in some cases probable, dangerous side-effects of geoengineering, and that focusing on this 'speculative' research diverts funding from research that could provide more useful gains, such as research into renewable energies (Betz 2012; Lin 2013a). They also point to the inherent uncertainty of the future progress of climate change, noting that the nightmare scenario we plan for may not actually be the one that happens and thus, there may be more appropriate ways to prepare for the future. Relying on the past as prologue, they note that the momentum of pursuing a given research agenda leads inevitably to 'technological lock-in' and implementation (Hamilton 2013; Hulme 2014) and that it is easier to avoid unethical or misguided technological projects if they are 'rooted out at a very early stage, before scientists' time, money, and careers have been invested in them' (Roache 2008: 323). Finally, they point out that 'once the genie is out of the bottle', it is impossible to control the rogue individual, company, or country from deploying geoengineering techniques without the consent of and quite possibly to the detriment of other states and the international community (Robock 2008; Victor 2008; Vidal 2013).

Whether geoengineering, particularly SRM measures, should be endorsed as a potential mitigation mechanism to avert catastrophic climate impacts remains extremely controversial. The IPCC has noted the very particular governance and ethical implications involved in geoengineering, particularly in relation to SRM (p. 511) (IPCC 2014: 26), and there is a growing body of literature that focuses on the difficult socio-political, geo-political, and legal issues relating to its research and deployment (see, for example, Bodle 2010–11; Horton 2011; Corner and Pidgeon 2012; Lin 2013b; Long 2013; Scott 2013; Lloyd and Oppenheimer 2014; EuTRACE 2015). At heart is the concern that those most adversely affected by climate change will simply suffer further harms from yet more deliberate, anthropogenic interference with the global climate system under the guise of geoengineering. Given the difficulty of predicting with any certainty what effect proposed geoengineering fixes will have on global weather patterns—and of controlling or channelling their effects in uniformly beneficial ways—ethicists and others ask whether we should even engage in research (let alone deployment) into these technologies in advance of an adequate regulatory or governance structure being established (Hamilton 2013).

The regulation of research vs regulation of deployment argument is particularly relevant in the case of techniques such as ocean fertilisation and SRM, the efficacy of which can only be tested by measures essentially equating to full scale implementation (Robock 2008). Given that any large-scale field tests of these technologies would involve the use of the oceans or the atmosphere—both part of the global commons—and that both the effects and risks (including that of unilateral rogue deployment) of these experiments would be deliberately intended to be transboundary and even global in extent, it would seem that international law must have some role to play at the research stage as well (Armeni and Redgwell 2015: 30). Indeed, even where geoengineering research is intended only to have local effects, international law may have a role to play in articulating the due diligence standards for the assessment and authorization of research proposals, the conduct of environmental impact assessments, monitoring, enforcement, and responsibility for transboundary harm (Armeni and Redgwell 2015: 30). The question is what legal form that role might take and how it might be operationalized. The response of international law in the context of ocean fertilization provides a useful illustration.

5. Ocean Fertilization: A Case Study of the Role of International Law in the Regulation of Emerging Technologies

Ocean fertilization refers to the deliberate addition of fertilizing agents such as iron, phosphorous, or nitrogen, or the control of natural fertilizing processes through, (p. 512) for example, the artificial enhancement of deep-ocean mixing, for the purposes of stimulating primary productivity in the oceans to increase CO₂ absorption from the atmosphere (Rayfuse, Lawrence, and Gjerde 2008; Scott 2015). While marine-based geoengineering proposals are not confined to ocean fertilization, it is the technique that has received the most attention to date. Originally proposed in 1990 (Martin 1990), after thirteen major

scientific experiments both its efficacy and its long-term environmental impacts are still uncertain (IPCC 2014; EuTrace 2015: 34). This has not, however, stopped commercial operators from planning to engage in fertilization activities for the purposes of selling carbon offsets on the voluntary markets (Rayfuse 2008; Rayfuse, Lawrence, and Gjerde 2008; Rayfuse and Warner 2012; Royal Society 2009).

From an international law perspective, as noted in section 2 of this chapter, a number of customary principles of international environmental law apply to geoengineering. These include the obligation to prevent harm, the obligation to prevent pollution, the obligation to protect vulnerable ecosystems and species, the precautionary principle, the obligation to act with due regard to other states, the obligations to cooperate, exchange information, and assess environmental impacts, and state responsibility for environmental harm. These principles have been articulated in a range of 'soft law' instruments relating to the environment such as the 1972 Stockholm Declaration and the 1992 Rio Declaration, as well as various treaty regimes, and their customary status has been recognized in a number of decisions of international courts and tribunals (see, for example, *Gabčíkovo-Nagymaros* case; *Pulp Mills* case; *Seabed Mining Advisory Opinion*). As Scott notes, these principles 'comprise the basic parameters of international environmental law' (Scott 2013: 330). The challenge lies, however, in the operationalization of these principles in particular contexts.

In the ocean fertilization context, the main issue that has been addressed is whether it falls under the exception, stated in identical terms, in the 1982 Law of the Sea Convention (LOSC, Art 1(5)(b)(ii)), the 1972 London Convention (LC, Art I), and the 1996 London Protocol to the London Convention (LP, Art. 2), which exempts from the dumping regime the 'placement of matter for a purpose other than the mere disposal thereof, provided that such placement is not contrary to the aims of' the LOSC or the LC/LP (Rayfuse, Lawrence and Gjerde 2008; Freestone and Rayfuse 2008). This exception could be read as excluding ocean fertilization from the general prohibition on dumping if the fertilization were for the purpose of scientific research, climate mitigation, or other commercial and environmental purposes, such as fisheries enhancement (Rayfuse 2008; Rayfuse 2012).

In 2007, concerned by the potential for ocean fertilization to cause significant risks of harm to the marine environment, the states parties to both the LC and the LP agreed to study the issue and consider its regulation (IMO 2007). The following year the Scientific Groups of the LC/LP concluded that 'based on scientific projections, there is the potential for significant risks of harm to the marine environment' (p. 513) (IMO 2008). This prompted the COP of the CBD, itself concerned with the effect of ocean fertilization on marine biodiversity, to adopt a non-binding moratorium on all but strictly controlled and scientifically justified small-scale scientific research in areas under national jurisdiction pending the development of a 'global transparent and effective control and regulatory mechanism' for those activities (CBD 2008). The Parties to the LC/LP followed suit, adopting their own non-binding resolution, agreeing that 'ocean fertilization activities, other than legitimate scientific research, should be considered as contrary to the aims of the Convention and

Protocol' and therefore prohibited (IMO 2008). For the purposes of the moratorium, ocean fertilization was defined as 'any activity undertaken by humans with the principle intention of stimulating primary productivity in the oceans, not including conventional aquaculture or mariculture, or the creation of artificial reefs'.

In 2010, the parties to the CBD extended their moratorium on ocean fertilization to a broader moratorium on all climate-related geoengineering activities that may affect biodiversity (CBD 2010). For their part, the parties to the LP adopted an Assessment Framework for ocean fertilization activities that requires proof of 'proper scientific attributes' and a comprehensive environmental impact assessment to ensure that the proposed activity constitutes legitimate scientific research that is not contrary to the aims of the LC/LP, and should thus be permitted to proceed (IMO 2010). Initially non-legally binding, after a highly controversial and unauthorized ocean fertilization was carried out by a Canadian company off the west coast of Canada in 2012 (Tollefson 2012; Craik, Blackstock, and Hubert 2013), the Assessment Framework was made mandatory in 2013 when the LP was amended to prohibit *all* marine geoengineering processes listed in a new Annex to the convention, unless conducted for legitimate scientific purposes and in accordance with a special permit issued in accordance with the Assessment Framework (IMO 2013; Verlaan 2013). Currently ocean fertilization is the only process listed, although others are under consideration.

The Assessment Framework defines 'proper scientific attributes' as meaning that proposed activities are to be designed in accordance with accepted research standards and intended to answer questions that will add to the body of scientific knowledge. To that end, proposals should state their rationale, research goals, scientific hypotheses, and methods, scale, timings, and locations, and provide a clear justification as to why the expected outcomes cannot reasonably be achieved by other methods. Economic interests must not be allowed to influence the design, conduct, and/or outcomes of the proposed activity, and direct financial or economic gain is prohibited. International scientific peer-review is to be carried out at appropriate stages in the assessment process and the results of these reviews are to be made public, along with details of successful proposals. Proponents of the activity are also expected to make a commitment to publish the results in peer-reviewed scientific publications and to include a plan in the proposal to make the data and outcomes publicly available in a specified time frame. Proposals that meet these criteria may (p. 514) then proceed to the Environmental Assessment stage. This includes requirements of risk management and monitoring and entails a number of components, including problem formulation, a site selection and description, an exposure assessment, an effects assessment, risk characterization, and risk management sections. Only after completion of the Environmental Assessment can it be decided whether the proposed activity constitutes legitimate scientific research that is not contrary to the aims of the LC/LP and should thus be permitted to proceed.

Importantly, every experiment involving marine engineering processes listed in the Annex to the convention, regardless of size or scale, is to be assessed in accordance with the Assessment Framework, although, admittedly, the information requirements will vary ac-

according to the nature and size of each experiment. This is fully consistent with the LOSC, which requires all activities affecting the marine environment to comply with its marine environmental provisions (LOSC Art 194), and it would be incompatible with both the LOSC and the Assessment Framework for parties to establish their own national thresholds to exempt some experiments (Verlaan 2013).

The Assessment Framework serves to both articulate international standards of due diligence and to harmonize the standards to be adopted by each of the states parties to the LP. However, even assuming the amendments come into force,³ the LP is only binding on its parties. As of 2015, only 45 states are party to the LP. Thus, no matter how strict an approach the parties take, the very real potential exists for proponents of ocean fertilization to undermine the LP's regulatory efforts by conducting their activities through non-contracting parties. Given its near global adherence, the CBD moratoria on ocean fertilization and geoengineering represent critically useful adjuncts to the work of the LP. However, those moratoria are non-legally binding and, in any event, the United States, home to many of the most ardent proponents of geoengineering research, is party to neither the CBD nor the LP.

Moreover, the scope of the parties to the LP to act is limited by the specific object and purpose of the LP, which is to protect and preserve the marine environment from pollution by *dumping at sea* of wastes or other matter (LP Art 2). While the parties to the LP are free to take an evolutionary approach to the interpretation and application of the treaty as between themselves by seeking to extend the Assessment Framework to other forms of marine geoengineering (Bjorge 2014), these substantive and geographic limitations mean that not all geoengineering, indeed not even all geoengineering involving or affecting the marine environment, can fall within their purview. Land and/or atmospheric-based geoengineering proposals are not addressed. By way of example, even in the ocean fertilization context, the applicability of the LP regime remains dependent on the actual fertilization technique employed (for example, ocean-based fertilization as opposed to land-based fertilization or wave-mixing machines suspended in the water column) and the locus of the fertilization (whether fertilization activities occur in areas beyond national jurisdiction or in areas under the national jurisdiction of non-party states) (Rayfuse 2012). In addition, the regulatory position will be further complicated when the purpose of the fertilization is stated to be ocean nourishment for fish propagation purposes (p. 515) rather than fertilization for climate mitigation purposes (Rayfuse 2008; Craik, Blackstock, and Hubert 2013). Of course, as noted above, the general principles of international environmental law and state responsibility continue to apply to these activities. However, in the absence of specific rules for their implementation, their application cannot be assured.

The case study of ocean fertilization provides a good illustration of the limited ability of international law to regulate research and possible deployment of geoengineering (Markus and Ginsky 2011). While there is no doubt that existing rules and principles can help shape regulation and governance of geoengineering (see, for example, Bodle 2010; Bodansky 2013; Lin 2013b; Scott 2013; Armeni and Redgwell 2015; Brent, McGee and

Maquire 2015), the difficulty lies in operationalizing these principles. Clearly the possibility exists for other treaty regimes to act to regulate geoengineering as far as relevant to the particular regime. The difficulty of this approach lies, however, in its fragmented and time-consuming nature, which is most likely to result in a complex range of non-comprehensive, uncoordinated, and possibly overlapping and incompatible regimes subject to all the existing limitations of international law. It has therefore been suggested that a single coherent regulatory approach in the form of a new global agreement on geoengineering may be needed (see, for example, Scott 2013). The legal contours of such a regime are slowly being explored (see, in particular, Reynolds in this volume), including in relation to the issues of uncertainty (Reynolds and Fleurke 2013), distributive justice (SRMGI 2011), liability and responsibility (Saxler, Siegfried and Proelss 2015), and the thorny problem of unilateralism (Virgoe 2009; Horton 2011). However, the potential scope, application, and locus of such a treaty—either as a stand-alone agreement or a protocol to the 1992 United Nations Framework Convention on Climate Change or any other treaty—all remain unclear (Armeni and Redgwell 2015; EuTRACE 2015).

6. Conclusion

It is one thing to call for the development of new forms of international regulation and governance capable of anticipating, assessing, minimizing, and mitigating the risks posed by emerging or novel technologies (UNEP 2012). It is quite another to achieve that goal, particularly given the structural limitations inherent in international law. While the issues are not necessarily easier to resolve in the case of other emerging technologies, the challenges in developing new international regulatory mechanisms are clearly evidenced in the case of geoengineering, where vested research interests are already locked in and positions are polarized as to whether the risk of not geoengineering outweighs the risk of doing so. From an international law perspective, (p. 516) critical questions of equity and fairness arise, particularly given that those vested interests in favour of pursuing geoengineering research are located in the few developed countries who have already contributed most to the climate change problem in the first place. If geoengineering is to be seen as anything other than a new form of imperialism, its research and development will need to be regulated by the most comprehensive, transparent, and inclusive global processes yet designed. As noted at the outset, whether international law is up to the task remains an open question.

This chapter sought to introduce the concept of international law as a regulator of emerging technologies and to explore, albeit briefly, some of its contours. It has been argued that, when it comes to technologies that possess the capacity to transform or impact upon human well-being or to transboundary or global environments, international law, despite its limitations, can, and indeed should, have a role to play in regulating their development and use. As the geoengineering example demonstrates, the pretence of international law is there. However, its promise still needs to be fulfilled.

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Notes:

(1.) A full discussion of the origins, nature, scope, and content of the rules and principles of customary international law is beyond the scope of this chapter. General texts on public international law provide useful discussion including, for example, Shaw M, *International Law* (6th) (Cambridge University Press 2008); Brownlie I, *Principles of Public International Law* (6th) (Oxford University Press 2003); and Evans M, *International Law* (4th) (Oxford University Press 2014).

(2.) As of 1 May 2017, 29 European states are party to the Convention. See Chart of signatures and ratifications of Treaty 164, available online at: http://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/164/signatures?p_auth=q2oWmMz2 (accessed 1 May 2017).

(3.) As of 1 May 2017, no instruments of acceptance have been deposited. See List of Amendments of the London Protocol, available online at: <http://www.imo.org/en/Our-Work/Environment/LCLP/Documents/List%20of%20amendments%20to%20the%20London%20Protocol.pdf> (accessed 1 May 2017).

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Torts and Technology

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Abstract and Keywords

This chapter discusses tort law and how it applies to the risks posed by emerging technology. Tort law's role here is significant. But how does tort adapt to injuries caused by technological innovations, and how should it react? With the increasing pace of technological advances, are the inherited conceptual structures of tort law sufficiently adaptable to both current and yet-unknown developments, or are novel statutory solutions required? We must also ask if tort liability is ultimately able to reconcile the competing demands of compensation, deterrence, and innovation. These questions are considered in various contexts including product liability, internet speech, and the prospect of 'driverless cars'.

Keywords: torts, technological development, product liability, actionable damage, Internet defamation, robotics

1. Introduction

TORT (or delict) is the law of civil (non-criminal) wrongs, and the remedies available to the victims of those wrongs. The focus of this chapter is the extent to which tort law may provide remedies to those injured by new technologies. In the common law (Anglo-American) tradition, torts have developed primarily through decisions of the courts. The main actions include (in rough order of historical development) trespass,¹ nuisance,² defamation, and negligence. The last has only been firmly recognized as a separate nominate tort since the twentieth century. Negligence dominates tort law because where the older torts protect particular interests (bodily integrity, land ownership, reputation, and so on) against particular kinds of infringement (such as direct physical intrusion or publication to third parties), the tort of negligence is pretty much formless. Any kind of harm seems (at least in principle) capable of triggering an action for negligence;³ the common thread is (as its name makes clear) the defendant's fault, and not the interest harmed.

How does this bear on the responsiveness of tort law to technology? The structure described gives two layers of potential liability.⁴ First, the protean tort of negligence, having no clear conceptual limits, has inherent potential to provide a remedy for any harms carelessly inflicted by *new technological means*. However, despite the imperialist tendencies

of negligence, it has not entirely replaced all other torts. (p. 523) The process of expansion reaches a limit because the older nominate torts sometimes protect interests that negligence has not recognized as actionable damage (for example, reputation, which is protected exclusively through the tort of defamation) or impose liability on a stricter basis, thus ensuring their continued attractiveness to a plaintiff who might not be able to prove (negligent) fault.⁵ Thus, the nominate torts also confront new technological harms. Often these older torts have a more detailed structure and are tailored to address the issues arising in their specific sphere of application (the array of defamation defences exemplifies the point).

Regulation is inherent in tort law. In deciding which interests should be recognized and protected, and in determining what conduct is 'wrongful' (and therefore actionable), this department of law is inevitably laying down standards for behaviour. The behaviour-guiding usefulness of tort's very general injunctions ('act carefully!') is questionable, especially since they are given concrete content in precise situations only by the *ex post facto* decisions of the court. Despite these shortcomings, with truly novel technology (that is, technology that outruns the capacity of administrators and legislatures to fashion regulatory codes), tort law may initially be the only sort of regulation on offer.

Thus, the common law of torts provides an excellent forum for considering the adaptability of judicially developed law in the face of new technologies. Several scholars have warned against the assumption that all new technologies must inevitably be regulated by new legislation (Tapper 1989; Bennett Moses 2003). Such critics cite the potential benefits of judicially developed law, as well as the downsides of regulation. Given the centuries-long tradition of judges defining wrongs and crafting remedies for the harm wrought by them, tort would seem the ideal testing ground for that theory. (To be clear, this is not an unthinking assertion that judges always provide optimal regulation; rather, that legislation is not necessarily the superior technique in every case).

This chapter considers certain examples of tort and technology. First, it considers the general capacity of tort law to recognize new wrongs, and new rights (or interests). The chapter then considers specific examples in the sphere of Internet defamation, product liability, and the development of 'driverless cars'. These examples could be multiplied many times over, whether for historical, contemporary, or future technological developments (see Further Reading for literature on genetically modified organisms). Tort law has certainly shown itself capable of adapting to injuries produced by new technologies. Judicial development of existing common-law principles has often covered the case. There are also important examples of statutory reform. But a recurrent theme—a persistent doubt—is whether the liability that results from this incremental legal development is appropriate. We must also query whether separate compensation and regulatory mechanisms should replace tort liability altogether, if liability is not to deter innovations that would benefit society as a whole.

(p. 524) **2. New Ways to Inflict Old Harms**

Tort law can—and arguably must—adapt to new means of inflicting harm. In the formative case on negligence in English (and Scottish) negligence law, Lord Macmillan stated:

The grounds of action may be as various and manifold as human errancy; and the conception of legal responsibility may develop in adaptation to altering social conditions and standards. The criterion of judgment must adjust and adapt itself to the changing circumstances of life. The categories of negligence are never closed.⁶

Although it is rather pessimistic, we must allow that technological developments usually provide new opportunities for ‘human errancy’. The legal requirement to take reasonable care (the positive corollary of liability for negligence) is equally applicable to these new opportunities as it is to existing activities. What, precisely, the law requires of the man driving a motor-car compared to a coachman driving a horse and carriage is soon determined against the universal yardstick of ‘reasonableness’, as cases involving the new technology come before the courts. Thus, liability for road accidents in twenty-first century England is, formally speaking, identical to that in the 1800s—now, as then, the driver is liable for lack of due care.

Underlying this description is an ‘adaptability hypothesis’—that the existing principles of tort law can be successfully adapted to harms caused by new technology. This cannot be assumed true in all cases, and so requires testing against the data of experience (from which predictions about future adaptability might also, cautiously, be made). A recent comparative research project provides some evidence in this respect. It considered the development of tort liability 1850–2000 in various European jurisdictions (including England). One volume in the survey specifically considered harms caused by ‘technological change’ (the development of liability for fires caused by railway locomotives, boiler explosions, and asbestos) (Martín-Casals 2010). Three further volumes also considered well-known instances of technology-driven harms in that period, including road accidents (Ernst 2010), defective products (Whittaker 2010), and industrial pollution (Gordley 2010).

None of these categories raise issues radically different from those faced by early-modern tort lawyers. Road accidents are as common as spreading fires or polluting fumes (a malodorous pigsty,⁷ or noxious brick kiln). Explosions have been an occasional but catastrophic feature of human life since the discovery of gunpowder.⁸ It is true that while asbestos (and its fire-retardant properties) have been known since ancient times, its toxicity seems to have been appreciated only in the 1920s (with litigation peaking in the final quarter of the twentieth century). But the legal issues are familiar (even if some of the old chestnuts have proved tough to crack). An acute difficulty for a mesothelioma victim exposed to asbestos by numerous negligent (p. 525) defendants is proving which of them was responsible for the ‘fatal fibre’. The same issue has arisen in the low-tech context of plaintiffs being unable to show which of several negligent game hunters had caused their

injuries by a stray shot.⁹ Indeed, it was discussed by Roman jurists in the second and third centuries AD.¹⁰ Those wishing to claim damages for anxiety, or for the chance of developing a serious disease in future, founded on (asymptomatic) asbestos-caused pleural plaques have faced familiar obstacles to such claims (and the maxim *de minimis non curat lex*).¹¹

The European research project's synoptic volume points out that despite undoubted continuities between (for example) road accidents or pollution before and after 1850, there were important differences as well (Bell and Ibbetson 2012), not least in scale, and therefore the degree of societal concern. In earlier agricultural societies, when the activities of artisans had caused pollution (fumes from the potter, smells from the tallow chandler) the problems had been localized. This is in contrast with the 'altogether different' ... 'scale, intensity and potential persistence of noxious industries of an industrial era' (Bell and Ibbetson 2012: 138). The effect was exacerbated by rapid urbanization around the same polluting industries. And while road accidents greatly increased in number in the twentieth century, it seems that the total number of deaths in transportation accidents was actually higher *per capita* in Britain in the 1860s than the 1960s (Bell and Ibbetson 2012: 112–114).¹² Technology intruded in another way: even if the number of injuries was not a radical change from the horse-drawn era, 'the character of the injuries became more significant, particularly after 1950 when medicines enabled more victims to survive' (Bell and Ibbetson 2012: 34).

Bell and Ibbetson conclude that there was a high degree of functional convergence in the way that tort liability developed across the various countries surveyed (but that this proceeded by divergent means at the level of doctrine, 'the law in the books'). As far as formal legal doctrine is concerned, systems plough their own furrows, and thus diverge at the doctrinal level. Scholars and courts work with the materials they have, within a particular legal tradition; there is a high degree of path dependence. Their concern is not purely in adapting law to social changes but also 'trying to achieve an intellectually satisfying body of rules and principles' (Bell and Ibbetson 2012: 163). The categories of legal thought matter (Mandel 2016).

Interestingly, Bell and Ibbetson (2012: 171) comment that, while legislators might in theory act free of such constraints, in practice legislative change has also 'commonly, however, [been] very slow and often proceeds incrementally'. The exception is when a particular event or moral panic creates political pressure to which the legislature needs to provide a rapid response (Bell and Ibbetson 2012: 164). Viewed in broad historical perspective, it is therefore undeniable that tort liability can and does adapt to changing social circumstances brought about by (among other things) technological innovation. Wider intellectual and political changes, such as attitudes towards risk and moves to compensate injured workmen (Bartrip and Burman 1983), have also been influential. But the process is by no means linear. (p. 526) Law is basically inertial (it must be, if it is to provide any kind of social stability). Changing it requires multi-causal pressure on, and by, a variety of actors (including legislators, courts, lawyers, litigants, and legal scholars). The habits of thought prevalent within a given legal tradition, along with the inherited doctrinal cate-

gories in the relevant areas of law, provide real constraints on the degree and rapidity of change; even legislation tends frequently to be incremental rather than making full use of the *tabula rasa*.

For the debate between the apostles of legislative intervention and defenders of judicial development, the comparative-historical evidence seems equivocal. Courts are not as timid, or constrained, as some have asserted or assumed. Nor, conversely, have legislators seemed quite as unconstrained as they undoubtedly are in theory. What is the correct approach? Who *should* take the primary responsibility for adapting tort law to novel activities? Some would argue that only legislatures enjoy the democratic legitimacy necessary to resolve controversies surrounding new technology. They can determine whether it should be prohibited outright; regulated and licensed; permitted provided payment is made for all harms caused, or on the usual fault basis; or any combination of these approaches. But legislatures may prefer to wait to see how a new technology develops, being aware of the dangers of laying down rigid rules prematurely. Thus, a failure to legislate may itself be a conscious democratic choice, a legislative approval of a common-law response to the innovation, which is no less democratic than any other delegation of legislative authority to an expert body (Bennett Moses 2003).

On the other hand, there are limits to how far judges can go in developing the common law. Courts do not see every failure to legislate as a deliberate delegation of legislative power to them, and rightly so. Inaction often stems from the low political priority afforded to tort reform against the backdrop of limited legislative time. Thus, a truly novel problem may disappear into Judge Henry Friendly's (1963) well-known gap between 'judges who can't and legislators who won't'. It is all too easy for both court and legislature to cede responsibility to the other.

Against this, courts have no choice but to decide the cases brought before them, and the motivation to 'do justice' is strong. The highest profile series of 'technology tort' cases in England in the past twenty years has involved asbestos-related diseases.¹³ In some instances, the courts have fashioned remedies for the victims through controversial doctrinal innovations. Notably, the House of Lords held in *Fairchild v Glenhaven Funeral Services* that where a number of negligent defendants might have caused the claimant's mesothelioma (cancer), but proof of which actually did so was impossible to determine, they were all liable for the harm.¹⁴ In a sequel, *Barker v Corus*, the House of Lords held that such defendants were each liable only for a share of the damages in proportion to their asbestos exposure, rather than the normal rule of joint tortfeasors each being liable in full (*in solidum*).¹⁵ But *Barker v Corus* was politically controversial (it meant, in practice, incomplete compensation for many victims, since it is difficult to trace, sue, and (p. 527) recover from *all* those who have exposed them to asbestos). *Barker* was therefore reversed by the UK Parliament with retrospective effect, for mesothelioma cases, in section 3 of the Compensation Act 2006.

The English courts acknowledge the breadth of the liability that has developed by this 'quixotic path'.¹⁶ They have also experienced difficulty in confining the special 'enclave'

of liability that *Fairchild* created. At bottom, the courts could not do what they apparently wanted to do, which was to lay down an exceptional rule that applied only to mesothelioma caused by asbestos exposure. The common law develops by analogy, and rejects case-specific rationales from which no analogy can ever be drawn (Morgan 2011). Extraordinarily, one of the law lords who delivered speeches supporting the decisions in both *Fairchild* and *Barker* now accepts that the seminal decision was a judicial mistake (Hoffmann 2013). The temptation to innovate had been hard to resist because the House of Lords had assumed that if it sent the mesothelioma claimants away without a claim, a great injustice would go unremedied. However, the judges had mispredicted Parliament's likely response. The alacrity with which the decision in *Barker* was reversed shows that if the *Fairchild* claims had been dismissed in accordance with ordinary causal principles (which would have been a far worse result for mesothelioma victims than *Barker*), remedial legislation would very likely have followed. The right balance between legislative and judicial development of tort law remains a sensitive and contested matter.

3. New Kinds of Harm

Technological developments, especially in the medical sphere, frequently make it possible to confer benefits (or prevent harms) which simply would not have been feasible in earlier times. This is surely to the undoubted benefit of humankind in many cases.¹⁷ But what if the technology fails to work, inflicting harm that has never previously been considered (let alone recognized) by law (Bennett Moses 2005)? For example, when it becomes possible to screen unborn babies for congenital disabilities, does a child have a claim for being born disabled if a doctor negligently fails to detect the problem (on the basis that the pregnancy would otherwise have been aborted)?¹⁸ In an era of reliable sterilization operations, is the recipient of a negligent, unsuccessful vasectomy entitled to compensation for the cost of rearing the undesired child who results?¹⁹ When it becomes possible to preserve gametes or create human embryos outside the human body, does damage to them constitute (or is it sufficiently analogous to): (a) personal injury,²⁰ or (b) property damage,²¹ so as to be actionable in tort? If not, should a new, *sui generis* interest be recognized?²² Where a mix-up in the course of IVF treatment results in the baby having (p. 528) a different skin colour from its parents, is there a type of damage that the law will compensate?²³

Such questions will clearly be more difficult to resolve by incremental development of existing categories. They tend to raise fundamental questions of a highly charged ethical kind, where courts may feel they lack legitimacy to resolve them by creating new kinds of damage. However, the common law is undoubtedly capable of expansion to meet new cases, and has done so. While the older 'nominate' torts protect particular interests, such as the right to immediate possession of property, with a resulting importance for classification of 'harm', there is no equivalent *numerus clausus* in negligence. It is pluripotent. But that does not mean that every new kind of harm is 'actionable' in negligence. There are

interests that the tort declines to protect. Even when the defendant is at fault, ‘the world is full of harm for which the law furnishes no remedy’ (*damnum absque injuria*).²⁴

It follows that the categories of ‘actionable damage’ are crucial for determining the limits of the tort of negligence. Despite this, the concept has received curiously little attention from English scholars (cf Nolan 2007; 2013). The core seems clear enough—physical damage to the person or property.²⁵ This has been cautiously extended to psychiatric illness and purely economic loss. But in the ‘wrongful birth’ cases, English law has recognized a compensable interest in parental autonomy (the right to control the size of one’s family).²⁶ This seems to offer great potential across the sphere of reproductive torts (cf Kleinfeld 2005). However, the UK cases on gamete damage have concentrated on fitting them into the well-recognized categories of ‘property damage’ or ‘personal injury’.²⁷ There is, therefore, a mixed record of creativity in this area. It should be noted that while the UK Parliament enacted a pioneering regulatory regime for reproductive technology,²⁸ it did not create any liabilities for clinics and researchers. The courts have been reluctant to hold that regulatory obligations are actionable (through the tort of breach of statutory duty), absencing clear parliamentary intention to that effect.²⁹

While useful for exposition, there is, of course, no sharp line between new *means* and new *types* of technological harms. If a malefactor hacks the plaintiff’s computer with the result that it regularly crashes, is that ‘property damage’ (which the law routinely compensates), or intangible harm (‘pure economic loss’)? There are clear forensic advantages to presenting the claim in the first form, and courts may be strongly inclined to accept it for heuristic reasons (Mandel 2016). If the existing legal categories cannot accommodate the new situation, courts may recognize a new tort ‘analogous’ to them. The putative tort of ‘cyber-trespass’ provides a good example.³⁰ But its decline and fall in the US context, and the extremely broad liability that it would create in England (since trespass is ‘actionable per se’—without proof of damage—to vindicate the property right in question), shows the danger of unthinkingly expanding categories. Hedley (2014) concludes that legislation (and indeed technological developments) have provided superior solutions to such problems as ‘spam’ email.

(p. 529) 4. Statutory Torts

Legislation obviously plays a vital role in regulating new technology. The legislator has a wide range of options.³¹ It can proceed in ways not open to judicial development. Legislation may institute radically new principles of regulation, in contrast to the incremental development of the common law. Constitutionally, laws that require expenditure of government money, or which create new criminal offences, are the exclusive province of legislation. Outright prohibition of new technology is unlikely to result from common-law techniques.³² However, one arrow in the legislator’s quiver finds many analogies in the common law, namely (of course) the imposition of liability for harm caused. But ‘statutory torts’ may have very different theoretical foundations.

A particularly important difference relates to the 'precautionary principle': 'Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures'.³³ Precisely what this requires from legislators has been much debated, and the legitimacy of the precautionary principle itself questioned (Fisher 2007; Brownsword and Goodwin 2012: ch 6). But few would discard it altogether as a precept of technological regulation. However, it is not available at common law. Tort plaintiffs have to prove their case on the balance of probabilities (including that the defendant's conduct *caused* their loss). If they do not (even when they *cannot* because of 'lack of full scientific certainty') then 'the loss must lie where it falls' (on the victim); 'the prevailing view is that [the state's] cumbrous and expensive machinery ought not to be set in motion unless some clear benefit is to be derived from disturbing the status quo. State interference is an evil, where it cannot be shown to be a good' (Holmes 1881: 95, 96). Judges have recognized that this creates a potentially insuperable obstacle to victims, particularly those with diseases allegedly caused by toxic exposure. There has been a prominent English attempt to circumvent this 'rock of uncertainty' in the asbestos cases;³⁴ courts have subsequently warned that to broaden the exception would 'turn our law upside down and dramatically increase the scope for what hitherto have been rejected as purely speculative compensation claims'.³⁵ There is no prospect of the precautionary principle taking root at common law, given the burden of proof.

Legislation may create liability that is stricter, or otherwise more extensive, than general tort principle would allow. For example, the Cyber-safety Act 2013 (Nova Scotia), having expressly created a 'tort' of 'cyberbullying' (s 21), makes the parents of non-adult tortfeasors jointly liable unless they 'made reasonable efforts to prevent or discourage' the conduct (s 22(3)-(4)). This is a duty to take positive steps to prevent deliberate harm done by a third party. The common law is usually reluctant to impose such duties; parents are not generally liable for the torts of their children. (p. 530) Yet parents' role in ensuring responsible internet use by children was thought so important that their failure in this respect should generate exceptional liability.³⁶

Liability can form one part of a wider regulatory regime. An example is radioactive materials where, in addition to government licensing and inspection, the Nuclear Installations Act 1965, ss 7 and 12 (UK) expressly creates liability. Notably, it is of an absolute character that courts have again been very reluctant to impose at common law. Lord Goff observed that:

as a general rule, it is more appropriate for strict liability in respect of operations of high risk to be imposed by Parliament, than by the courts. If such liability is imposed by statute, the relevant activities can be identified, and those concerned can know where they stand. Furthermore, statute can where appropriate lay down precise criteria establishing the incidence and scope of such liability.³⁷

However, such legislation has little significance outside the particular sphere that it was enacted to regulate. Lord Goff's opinion demonstrates the point. Speaking through him,

the House of Lords was unwilling to extend the common-law principle of liability for dangerous escapes; in particular, the court was not prepared to use legislation as the basis for a general tortious principle of strict liability. This follows from the characteristic common law attitude to statutes, which are seen to represent an isolated exercise of the sovereign will (Munday 1983). Judges apply it loyally in its sphere of application, but otherwise legislation does not affect the principles of common law. The refusal to apply legislation by analogy, or to synthesize general principle of law from it, has been criticized (Beatson 2001), but it remains a core jurisprudential tenet for English lawyers (at least).

5. Tort and the Internet: New Actions, New Defences

We should not forget that technology can be used to harm others deliberately. Again, this is hardly a new problem. In their celebrated article calling for protection of privacy, Warren and Brandeis (1890: 195) explained that ‘recent inventions’ (along with the growing prurience of the press) made this legal development essential:

Instantaneous photographs and newspaper enterprise have invaded the sacred precincts of private and domestic life; and numerous mechanical devices threaten to make good the prediction that ‘what is whispered in the closet shall be proclaimed from the house-tops.’

The electronic media age has only exacerbated such problems. Internet publication of a smart-phone photograph is instantaneous, global, and indelible. The ‘speed, (p. 531) range and durability of privacy intrusions’ has significantly increased (Brownsword and Goodwin 2012: 236). There are also new possibilities to harass, bully, and defame (Schultz 2014). The recent development of a new remedy for publication of private information in England has flowed from the Human Rights Act 1998 (UK), only coincidentally alongside these technological developments. However, some specific developments have clearly been driven by technological concerns: the ‘right to be forgotten’ is a (controversial) response to privacy in the Google era.³⁸

Pushing in the opposite direction are fears that the benefits of the Internet age—freedom of information and expression—will be harmed if liability attaches too easily to the new media.³⁹ Libel is, of course, a long-established tort. The strictness of liability for defamatory statements in England has long been criticized for its chilling effect on freedom of speech. Certain new arguments have emerged—or old arguments been given new urgency—in claims involving Internet publication. Liability has been reformed accordingly. Two examples are discussed here.

First, the rule (with considerable importance for a tort with a one-year limitation period) that each new publication of a particular defamatory statement constitutes a fresh cause of action. It was laid down in 1849 in a case which could scarcely be less redolent of the Internet age:⁴⁰ Charles II, the exiled Duke of Brunswick, sent his manservant to a news-

paper office to purchase a back issue of the paper (printed 17 years earlier) containing an article defamatory of His Highness. The Court of Queen's Bench held that selling the copy had been a new publication, and the limitation period ran from the sale (rather than the original date of the newspaper's publication). In 2001, *The Times* newspaper was sued for libel in respect of articles which it had first published over a year previously, but which remained accessible on its website. The Court of Appeal applied the *Duke of Brunswick* rule and held that each time the website was accessed there had been a fresh publication, and so the libel action had not commenced outside the limitation period.⁴¹

The defendant newspaper argued here that the *Duke of Brunswick* rule should be modified in the light of modern conditions: it ought not to apply when material initially published in hard copy was subsequently made available on the Internet. The rule rendered the limitation period 'nugatory' in that situation, defeating the purpose behind a short time limit. Moreover:

If it is accepted that there is a social utility in the technological advances which enable newspapers to provide an Internet archive of back numbers which the general public can access immediately and without difficulty or expense, instead of having to buy a back number (if available) or visit a library which maintains a collection of newspaper back numbers, then the law as it had developed to suit traditional hard copy publication is now inimical to modern conditions ...⁴²

Buttressing their submissions with reference to Article 10 ECHR (incorporated into English law by the Human Rights Act), the defendants argued that the rule 'was bound to have an effect on the preparedness of the media to maintain such (p. 532) websites, and thus to limit freedom of expression'.⁴³ But the Court of Appeal was unmoved. Lord Phillips MR viewed the maintenance of newspaper archives ('stale news') as 'a comparatively insignificant aspect of freedom of expression', especially when responsible archival practice could easily remove the defamatory sting.⁴⁴ *The Times* complained to the European Court of Human Rights in Strasbourg, which dismissed the case. The venerable English rule did not violate Article 10. While the press performs a vital 'public watchdog' role, newspapers have a more stringent responsibility to ensure the accuracy of historical information than perishable news material.⁴⁵

Nevertheless, the rule continued to cause concern for internet publications (Law Commission 2002: Part III; House of Commons Culture, Media and Sport Committee 2010: [216]–[231]). The Government agreed that the *Duke of Brunswick* rule was not 'suitable for the modern internet age' (Ministry of Justice 2011: [72]). It has duly been abolished by Section 8 of the Defamation Act 2013 (UK). There is now (for limitation purposes) a single publication on the first occasion, which is not subsequently refreshed unless the statement is repeated in a 'materially different ... manner'. The provision has been criticized for failing to appreciate that the perpetual availability of Internet archives also increases reputational harm; thus, judges will constantly be faced with applications to extend the one-year limitation period on the grounds of prejudice to plaintiffs (taking into account

their countervailing right to reputation under Article 8, ECHR) (Mullis and Scott 2014: 102–104).⁴⁶

The 2013 Act has also enacted rules to deal with a second problem facing internet publishers, such as websites hosting blogs and Internet service providers. Such ‘hosts’ may be ‘publishers’ of individual blogs or message board posts (although they have generally neither written nor conceived the content).⁴⁷ When the primary publisher (the author of a post) is anonymous and hard to trace, it is attractive (and common) to bring a claim against the hosting service. The expansive common law definition of a ‘publisher’ has long threatened troublingly wide liability for parties peripherally involved in the production and distribution of old-fashioned paper media: namely printers and newsagents.⁴⁸ The Defamation Act 1996 (UK) (s 1) provides a defence for secondary publishers, provided they did not know or have reasonable cause to believe that they were assisting publication of a libel, and took reasonable care to avoid such involvement. But, as the case of *Godfrey v Demon Internet* showed,⁴⁹ once an Internet host has been informed about (supposedly) defamatory content on one of its websites, it can no longer rely on this defence if it took no action. It could obviously no longer show itself unaware of the libel, nor (since it failed to exercise its power to remove it) that it had acted reasonably. While such defendants might in theory have investigated the merits of the complaint (inquiring whether the post was actually defamatory, privileged, fair comment, or true), in practice their likely reaction in the light of *Godfrey* was immediate removal of the content that had been complained about.⁵⁰ It would be prohibitively expensive to do otherwise (Law Commission 2002: 2.43; Perry and Zarsky 2014: 239–250).

(p. 533) Self-censorship at the first allegation of libel was the result.⁵¹ This obviously has harmful implications for free speech through such increasingly important Internet platforms (Law Commission 2002: Part II; Ministry of Justice 2011: [108]–[119]), to the extent that ISPs ‘are seen as tactical targets for those wishing to prevent the dissemination of material on the Internet’ (Law Commission 2002: 2.65). However, the Law Commission had doubts about following the US model of full ISP immunity.⁵² This might leave people who suffered real harm with no effective remedy (2002: 2.49–2.54).⁵³

The Defamation Act 2013 (UK) takes a more nuanced approach. First, courts lack jurisdiction to hear a claim against a secondary publisher unless ‘satisfied that it is not reasonably practicable for an action to be brought against the author, editor or publisher’ (s 10(1)). This provision extends beyond the Internet context, although it has particular importance there. A specific defence is provided for ‘operators of websites’ which ‘show that [they were] not the operator who posted the statement on the website’ (s 5(2)). However, the defence will be defeated if the claimant shows that he cannot identify the person who posted the statement, that he made a notice of complaint to the website operator, and that the operator did not respond to the complaint as required by the legislation (although the operator is only obliged to identify the poster with his consent, or by order of the court) (s 5(3); Defamation (Operators of Websites) Regulations 2013). This ‘residual indirect’ liability has been praised as the most efficient model available (Perry and Zarsky 2014). It avoids the chilling effect of liability on the secondary publisher, but also the un-

satisfactory results of holding the statement's originator solely and exclusively liable (with likely underdeterrence when speakers are anonymous and difficult to trace). However, it has been suggested that respect for defamed individuals' human rights might require more extensive liability on ISPs than English law now imposes (Cox 2014).⁵⁴ The balance of interests is far from easy to perform, and many would agree that legislative solutions are preferable.

6. Product Liability

As seen, most legislation creating liability for technological developments does so on a limited, issue-by-issue basis. A major exception is the European Union-wide product liability regime. This stems from European Council Directive 85/374/EEC concerning liability for defective products. The Directive's stated aim was to compensate consumer injuries caused by defective products, irrespective of proof of fault on the part of the producer.⁵⁵ While some leading product liability cases are on the low-tech side,⁵⁶ it has enormous importance for technological developments. (p. 534) The EU was spurred to follow the US model of product liability by the Thalidomide fetal injuries scandal. Thus, one might assume that whatever else the 1985 Directive was intended to achieve, it should ensure compensation for those injured by unanticipated side-effects from new drugs (and other novel products). Yet whether it does, or should, achieve that remains controversial.⁵⁷ Debate centres around the definition of a 'defect' and the so-called 'development risks defence'.

Under the EU regime a 'defective' product is one that falls below the standard of safety that consumers are entitled to expect. This is not simply a factual question (what *do* consumers expect?) but contains an evaluative question for the court. When a new product is marketed, are consumers entitled to expect that it is *absolutely* safe? Or are they entitled to expect only that producers have incorporated reasonable safety features in designing the product (and reasonably tested its safety)? Some have argued that in cases involving an inherent feature of the product (a 'design defect' rather than a rogue product that comes off the production line in a dangerous state), such practicalities will inevitably have to be considered (Stapleton 1994). For example, what would an absolutely safe car look like? If its construction were robust enough to withstand any possible accident, would it not be so heavy as to greatly impair its utility (for example, speed)?⁵⁸ But then would not the safest kind of car be one which moved very slowly?⁵⁹ To avoid such *reductioes ad absurdum* it might seem inevitable that some notion of 'reasonable safety' be implied.⁶⁰ However, the leading English case has rejected this reasoning, on the grounds that it would reintroduce fault liability.⁶¹ That would be incompatible with the Directive's rationale of strict liability for the benefit of injured consumers.⁶²

At the insistence of the British Government (which expressed concern about strict liability's effect on innovation), the 1985 Directive included the option of a 'development risks' defence to liability—that is, when 'the state of scientific and technical knowledge at the time when [the producer] put the product into circulation was not such as to enable

the existence of the defect to be discovered' (Article 7(e)). Nearly all member states have incorporated this defence in their national laws. However, it has been narrowly construed. First, an accident which was unforeseeable (because nothing like it had ever happened before)—so that there is no negligence—does not fall within the defence where no special 'scientific or technical knowledge' was necessary to prevent it, as opposed to the imaginative application of existing technology.⁶³ This leads to the 'bizarre' conclusion that because the cushioning properties of balloons have been known for centuries, 'the state of scientific and technical knowledge' has apparently allowed installation of safety airbags in cars long before airbags—or indeed cars—were invented (Stapleton 1999: 59).⁶⁴ A second narrow interpretation stems from the leading *National Blood Authority* case. As Hepatitis C was a known problem at the time the blood was supplied, the defence was held inapplicable. The fact that there was (until 1991) no screening process, so that it was unknowable whether a particular bag of blood was infected, was irrelevant. Stapleton has attacked this interpretation too, for emasculating the (p. 535) defence and ignoring its legislative purpose. 'The political reality is that the [UK] Thatcher Government used its EU legislative veto [in 1985] to insist on protection for a producer who had done all it realistically could and should have done to make the product safe in all circumstances' (Stapleton 2002: 1247).

In any event, product liability has been interpreted stringently against producers. Such broad liability has been attacked by epidemiologist Sir Peter Lachmann, for its damaging effect on the development of new drugs in particular. Lachmann comments that the lasting legacy of Thalidomide, 'probably the greatest ever pharmaceutical disaster' has been:

an extraordinary reduction in the public tolerance of risk in regard to all prescribed pharmaceuticals. So much so that it became customary to believe that any prescribed drug should be absolutely safe. This is an impossible aspiration as there can be no doubt that any compound with any pharmacological effect can produce undesirable as well as desirable reactions (2012: 1180).

The belief has also increased litigation against drug manufacturers. The unintended consequence has been to make development of new drugs 'ruinously expensive' (it can take a decade and a billion dollars to bring one new drug to market), and thus feasible only for very large corporations. (Also, it is only economic to make such investments for relatively common illnesses where prospective sales will allow the cost to be recovered during the patent term.) The result is a much smaller number of much more expensive new drugs.

While Lachmann blames much of this on an over-cautious regulatory regime (especially the requirement of extensive—and expensive—'Phase 3' human trialling), he argues that strict product liability has made the situation even worse. For research scientists, risk-benefit analysis is 'entirely central to all decision making in medicine' (and it is therefore 'completely mad' for the law to exclude it). If it is socially imperative to compensate the victims of unforeseeable and unpreventable reactions, Lachmann suggests this should be done through general taxation instead (as in the UK's Vaccine Damage Payments Act 1979). The public as a whole, which benefits from pharmaceutical innovation, would then

bear the cost; the threat to innovation from holding manufacturers strictly liable (the present approach) would be avoided.

This raises another important point. Compensation of injuries can take place through tax-funded social security or privately-funded insurance, as well as through tort liability. Tort's unique feature is to link the particular victim with the person responsible for his injuries. This has theoretical importance (the 'bipolar' nexus of Aristotelian corrective justice). It also explains tort's deterrent effect: the threat of having to pay damages gives an incentive not to behave negligently (or with strict liability, the requirement to internalize all costs inflicted on consumers by one's product gives an automatic incentive to take all cost-justified precautions against such injuries).⁶⁵ This deterrent effect is lost in an insurance scheme (social or private).⁶⁶

(p. 536) However, it must be emphasized that this element of deterrence—across tort law, and not limited to product liability—is highly controversial. Some argue that tort has little deterrent effect; conversely some (such as Lachmann) argue that it *over*-deters and may therefore be socially harmful (cf Cross 2011). Of course, this ultimately reduces to an empirical question.⁶⁷ It is fair to say that no definitive empirical studies have been undertaken—it is doubtful whether 'definitive' answers to the debate are even possible. Surveys of the extant empirical work (Schwartz 1994; Dewees, Duff, and Trebilcock 1996) suggest that there is some deterrent effect attributable to tort liability, but it does not approach the degree of fine-tuned incentives assumed in the most ambitious regulatory accounts of tort law from the law and economics movement.⁶⁸

The proper balance between state regulation and common law tort liability is squarely raised by the US 'pre-emption' controversy: whether the approval of a product by a government regulator (such as the US Food and Drug Administration (FDA)) can be used as a tort defence (Goldberg 2013: ch 7). In part this turns on the balance between federal and state laws in the US Constitution, but the wider regulatory question arises, too. Tort's critics argue that specialized agencies are better placed to deal with technical subject matter, and to perform the complex cost-benefit analyses necessary for drug (or other product) approval. Tort liability amounts to sporadic tinkering *ex post facto*, rather than 'a broad and sophisticated brokering of social costs and benefits' (Lyndon 1995). However, tort's defenders point out that agency regulation is not perfect either (for all its obvious strengths). In particular, regulatory approval is given at an early stage but knowledge increases over time as hazards manifest themselves. Because tort allows individuals to invoke the legal process as and when injuries occur, it can be seen to *complement* agency regulation. Tort liability is determined in the rich context of an actual injury, rather than (like regulation) in the abstract, in advance. The common law is 'repetitive', its case method allowing for the 'gradual consideration of problems as knowledge develops'. This compares favourably with agencies, whose time scale for information-gathering is much shorter. Lyndon (1995: 157, 165) concludes that: 'Tort law or something like it is a necessary response to technology ... In particular, tort law's ability to operate independently of

the regulatory agenda and to consider individual cases make it a useful supplement to regulation.’ Tort’s great regulatory advantage is its ‘learning and feedback mechanism’.

In *Wyeth v Levine*, the US Supreme Court held that a product liability damages claim was not pre-empted by FDA approval.⁶⁹ Speaking for the Court, Stevens J saw no reason to doubt the FDA’s previous (‘traditional’) position that tort law complemented its activities:

The FDA has limited resources to monitor the 11,000 drugs on the market, and manufacturers have superior access to information about their drugs, especially in the postmarketing phase as new risks emerge. State tort suits uncover unknown drug hazards and provide incentives for drug manufacturers to disclose safety risks promptly. They also serve a distinct (p. 537) compensatory function that may motivate injured persons to come forward with information ... [Tort claims make clear] that manufacturers, not the FDA, bear primary responsibility for their drug labeling at all times. Thus, the FDA long maintained that state law offers an additional, and important, layer of consumer protection that complements FDA regulation.⁷⁰

However, two years later in *PLIVA Inc v Mensing*, the Supreme Court reached a different conclusion about *generic* drugs (turning on differences in the statutory regime for their approval).⁷¹ Here agency approval *did* pre-empt the plaintiff’s tort claim. The decision inaugurates two-tier liability (Goldberg 2012: 153–158). In dissent, Sotomayor J said the distinction drawn makes little sense, ‘strips generic-drug consumers of compensation’, and ‘creates a gap in the parallel federal-state regulatory scheme in a way that could have troubling consequences for drug safety’ (by undermining the benefits of tort identified in *Wyeth v Levine*).⁷²

Evidently, the balance between agency licensing and tort liability in the regulation of new products will remain controversial for years to come.⁷³ Indeed, perpetual debate is inevitable since each technique has its own advantages and disadvantages. Some points are clear-cut. Legislative action is necessary for outright prohibition of a new technology or, conversely, to invest it with absolute immunity. It hardly needs noting that those responses are particularly controversial. In the end, the debates must be resolved through the political process, informed as much as possible by robust empirical data on the positive and negative effects of each style of regulation.

7. The Future: Tort and Driverless Cars

We conclude with a consideration of an imminent technological development that has caught the public imagination: the robotic ‘driverless car’. With road accidents occupying the single biggest amount of a tort judge’s time, automation poses salient questions for tort lawyers as well. From the industry perspective, liability is arguably the innovative manufacturer’s greatest concern. The clashing interests raise in acute form the classic dilemma for tort and technology: how to reconcile reduction in the number of accidents (deterrence) and compensation of the injured with the encouragement of socially benefi-

cial innovation? Not surprisingly there have been calls both for stricter liability (to serve the former goals), and for immunities (to foster innovation). But in the absence of any radical legislative reform, the existing principles of tort will apply—if only *faute de mieux*. Are these adequate to the task?

(p. 538) Over the past century drivers have been held to ever-more stringent standards to widen the availability of compensation for road-accident victims. Driver liability has either become formally strict (as in many European jurisdictions) or, in systems (like England) where fault is still theoretically required, the courts' exacting approach has greatly eroded the difference in practice (Bell and Ibbetson 2012: 118–119, 155). However, as the human driver's active role declines,⁷⁴ it may be that even the sternest definitions of fault will no longer encompass the 'driver's' residual responsibility. (Against this, it is observed that a driver merely supervising the car's automated system is more likely to become distracted; and indeed, the present capabilities involved in driving may atrophy through disuse (Robolaw 2014: 58, 208).) Automation is mostly a beneficial development. It is hoped that technology can largely eliminate road accidents caused by driver error (hence estimates in the UK press that drivers' insurance premiums will halve in the five years from 2015). However, some crashes will still occur, owing to failures in the hardware, software, communications, or other technology comprising the 'driverless car'. The elimination of driver error produces a new source of errors.⁷⁵ Thus, the cost of accidents is likely to shift from drivers' liability to manufacturers' liability for defective products (and so eventually back to drivers again, through higher prices).

What safety standard will consumers be 'entitled to expect'? A report for the European Commission concludes that, since society is unlikely to welcome a 'rearward step in safety', driverless cars will be thought defective unless as safe as a human-driven car (that is, statistically safer than human drivers in total, or safer than the best human driver) (Robolaw 2014: 57). The report contends that in addition to the heightened liability, manufacturers will be concerned by the considerable media attention that is bound to follow all early driverless car accidents (and the consequential reputational damage). While it would be rational for society to introduce driverless cars as soon as they become safer than human drivers, this may well not happen. The predicted stultification highlights the chilling effect of liability (Robolaw 2014: 59–60).

This gloomy prognosis for manufacturers is not universally accepted. Hubbard (2014: 1851–1852) argues that there may be 'virtually insurmountable proof problems' in bringing actions against manufacturers because of the complexity of driverless cars. In particular, their interconnection with other complex machines (such as intelligent road infrastructure and other vehicles), and the prospect for 'artificially intelligent' machines to adapt and learn. It is 'quaint oversimplification' to suppose that such robots will simply do as their programmers instructed them to do; the traditional principles of liability 'are not compatible with increasingly unpredictable machines, because nobody has enough control over [their] action' (Robolaw 2014: 23). It would be very difficult to show that a 'defect' in a self-learning, autonomous system had been present when it left the

manufacturer's hands—unless installing the capacity for independent decision making were itself a defect (Cerka et al. 2015: 386).

(p. 539) The development of artificial intelligence (the frontier of robotics—well in advance of the semi-autonomous car) poses fundamental questions for lawyers, and indeed for philosophers. Could an intelligent robot enjoy legal personality (and so incur liability itself)? The deep problems here have rather less resonance for tort lawyers. By contrast with that other ubiquitous 'legal', non-natural person, the corporation, intelligent robots are unlikely to have assets to satisfy judgment. Those seeking a remedy for the likely victims of robotic damage have eschewed the metaphysics of personality for the familiar tactic of reasoning by analogy from existing legal categories. It has been argued that the owner of a robot should be strictly liable for harm it inflicts by analogy with wild animals, children, employees (vicarious liability), slaves in Roman law, and liability for dangerous things (Hubbard 2014: 1862–1865; Cerka et al. 2015: 384–386). No doubt certain parallels can be drawn here, but should they be? Lawyers find it comforting to believe that reasoning by analogy is simply a matter of 'common sense'. In fact, it is impossible without a belief (implicit or otherwise) in the rationale for the original category and therefore its extensibility to the new situation (see Mandell 2016). Instead of this obfuscatory common-law technique, it might well be preferable for regulators to make the relevant choices of public policy openly, after suitable democratic discussion of 'which robotics applications to allow and which to stimulate, which applications to discourage and which to prohibit' (Robolaw 2014: 208).

Given the possibility of very extensive manufacturer liability, some have called for immunities to protect innovation. Calo (2011) advocates manufacturer immunity for programmable 'open' robotics (that is, immunity regarding the use to which the owner actually sets the robot),⁷⁶ by analogy with the US statutory immunity for gun manufacturers which are not liable for the harms their weapons do in others' hands. Without this, Calo suggests, innovation in the (more promising) 'open' robotics will shift away from the US with its 'crippling' tort liability, relegating it 'behind other countries with a higher bar to litigation'.

This is an overt call for an industrial subsidy that some (controversially) identify as the implicit basis for shifts in tort liability during the Industrial Revolution (Horwitz 1977). Naturally, the call has not gone unchallenged. Hubbard (2014: 1869) criticizes the opponents of liability for relying on 'anecdotes'. He also suggests (somewhat anecdotally!) that the increasingly robotic nature of contemporary vehicles (already 'to a considerable extent "computers on wheels"') has not obviously been deterred by extensive US litigation about, for example, Antilock Braking Systems (ABS) (Hubbard 2014: 1840). It has been noted above that this kind of (purportedly) empirical dispute is invariably hampered by lack of reliable data.

Hubbard (2014) also enters a fairness-based criticism. Why should the victims of robotic cars (or other similar technologies) subsidize those who manufacture and use them? The Robolaw report (2014) accepts that victims of physical harm from robotics will need to be

compensated, despite its concerns about liability (p. 540) chilling innovation. It suggests that tort law is not necessarily the right mechanism. Some insurance-based system may be the superior way to compensate (and spread) losses. The deterrent effect of tort liability can be replaced by public regulations.

This underlines the universal point that tort liability is by no means an inevitable feature of regulating new technology: its accident-reducing and injury-redressing functions can each be performed by other means, which may (or may not) prove less discouraging to innovation. The common law of torts can, and will, adapt itself to new technologies as they arise. Whether it should be permitted to do so, or be replaced by other mechanisms for compensation and deterrence, is a key question for regulators and legislatures.

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Notes:

(1.) To the person (including false imprisonment), to land, and to goods.

(2.) Interference with the use and enjoyment of land.

(3.) Ibbetson 2003: 488 (as in the 'action on the case', the historical antecedent to negligence, where 'right from the start there were no inherent boundaries as to what constituted a recoverable loss').

(4.) Nolan 2013: Corresponding both to European delictual systems based on a list of protected interests (eg Germany § 823 BGB) *and* those based on general liability for fault (e.g. France § 1382 Code Civil).

(5.) Consider *Wilson v Pringle* [1987] 1 QB 237 (battery); *Rylands v Fletcher* (1868) LR 3 HL 330 (flooding reservoir).

(6.) *Donoghue v Stevenson* [1932] AC 562, 619.

(7.) *Aldred's Case* (1610) 9 Co Rep 57.

(8.) The Parthenon, when being used by the Turks as a powder magazine, was reduced to rubble by a Venetian bomb in September 1687.

(9.) E.g. *Summers v Tice* 199 P 2d 1 (1948) (California); *Cook v Lewis* [1951] SCR 830 (Canada).

(10.) Digest D 9 2 51 Julian 86 *digesta* and D 9 2 11 2 Ulpian 18 *ad edictum* (discussed by Lord Rodger of Earlsferry in the leading English case, *Fairchild v Glenhaven Funeral Services Ltd* [2002] UKHL 22, [2003] 1 AC 32, [157]–[160]).

(11.) *Rothwell v Chemical & Insulating Co Ltd (sub nom Johnston v NEI International Combustion Ltd)* [2007] UKHL 39, [2008] AC 281.

(12.) Apparently owing to the hazardous nature of passenger boats in the nineteenth century.

(13.) This has been much less marked in other European jurisdictions—where tort has played a ‘subsidiary’ role, if any, compared to the ‘considerable stresses’ placed on tort doctrine in England. This is explicable by the provision of other compensation mechanisms in those countries (e.g. French statutory scheme of 2002). Bell and Ibbetson 2012: 166.

(14.) *Fairchild* (n 10).

(15.) *Barker v Corus (UK) plc* [2006] UKHL 20, [2006] 2 AC 572.

(16.) E.g. *Sienkiewicz v Greif (UK) Ltd* [2011] UKSC 10, [2011] 2 AC 229 [174] (Lord Brown: ‘unsatisfactory’); also [167] (Baroness Hale: ‘*Fairchild* kicked open the hornets’ nest’).

(17.) *Cf Lim Poh Choo v Camden and Islington Area Health Authority* [1979] QB 196, 215–216 (Lord Denning MR, suggesting it would be better for a brain-damaged patient to have died than been ‘snatched back from death [and] brought back to a life which is not worth living’). The Court of Appeal declined to award damages for ‘loss of the amenities of life’ during the plaintiff’s projected 37 years of unconscious, artificially-supported life); cf [1980] AC 174 (House of Lords) (‘objective loss’ approach too well-established).

(18.) *McKay v Essex Area Health Authority* [1982] QB 1166 (such an interest would offend the sanctity of life and be impossible to quantify).

(19.) *McFarlane v Tayside Health Board* [2000] 2 AC 59 (child-rearing costs unrecoverable).

(20.) BGH 9 November 1993, NJW 1994, 127 (Germany).

(21.) *Yearworth v North Bristol NHS Trust* [2009] EWCA Civ 37, [2010] QB 1 (frozen sperm) (England).

(22.) *Holdich v Lothian Health Board* 2014 SLT 495 (frozen sperm) (Scotland).

(23.) *A v A Health and Social Services Trust* [2011] NICA 28, [2012] NI 77 (dismissing the parents’ claim).

(24.) *JD v East Berkshire Community Health NHS Trust* [2005] UKHL 23, [2005] 2 AC 373 [100] (Lord Rodger).

(25.) The boundaries even here are far from certain: C Witting, ‘Physical damage in negligence’ [2002] CLJ 189; Nolan 2013: 270–280.

(26.) *Rees v Darlington Memorial Hospital NHS Trust* [2003] UKHL 52, [2004] 1 AC 309.

(27.) *Yearworth* (n 21); cf *Holdich* (n 22).

(28.) Following an exemplary consultation exercise and striking public debate: MJ Mulkay, *The embryo research debate: Science and the politics of reproduction* (CUP 1997).

(29.) *Holdich* (n 22) [25]–[28].

(30.) *CompuServe Inc v Cyber Promotions Inc* (1997) 962 F Supp (SD Ohio) 1015 (discussed Mandel 2016).

(31.) One being deliberate abstention from action, to leave regulation to common law principles such as tort.

(32.) NB that courts will typically grant injunctions to restrain continuing torts (an ongoing nuisance) or to prevent their repetition (e.g. republication of a defamatory statement), or even to prevent them occurring in the first place (the *quia timet* injunction). See generally John Murphy, ‘Rethinking injunctions in tort law’ (2007) 27 OJLS 509.

(33.) United Nations Conference on Environment and Development, ‘Rio Declaration on Environment and Development’ (14 June 1992) UN Doc A/CONF.151/26 (Vol. I), 31 ILM 874 (1992), Principle 15.

(34.) *Fairchild* (n 10) [7] (Lord Bingham).

(35.) *Sienkiewicz v Greif* (n 16) [186] (Lord Brown).

(36.) Nova Scotia Task Force, ‘Respectful and Responsible Relationships: There’s No App for That’ (Report on Bullying and Cyberbullying, 29 February 2012) 31–32.

(37.) *Cambridge Water Co v Eastern Counties Leather Plc* [1994] 2 AC 264, 305. The Nuclear Installations Act 1965 has been described as a ‘clear example’ of such legislation: *Blue Circle Industries Plc v Ministry of Defence* [1999] Ch 289, 312 (Chadwick LJ).

(38.) E.g. *Google Spain v Gonzalez* [2014] QB 1022 (CJEU); Commission, ‘Proposal for a regulation of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation)’ COM (2012) 011, art 17, art 77. Cf criticism by House of Lords European Union Committee, *EU Data Protection Law: a ‘right to be forgotten’?* (HL 2014–15, 40–I).

(39.) *Google Spain* *ibid*, Opinion of AG Jääskinen, paras 131–134.

(40.) *Duke of Brunswick v Harmer* (1849) 14 QB 185.

(41.) *Loutchansky v Times Newspapers Ltd* [2001] EWCA Civ 1805, [2002] QB 783.

(42.) *Ibid* [62] (quoting counsel’s written argument).

(43.) *Ibid* [71].

(44.) *Ibid* [74].

(45.) *Times Newspapers Ltd v United Kingdom* [2009] EMLR 14, [45].

(46.) Limitation Act 1980 (UK), s 32A.

(47.) *Tamiz v Google Inc* [2013] EWCA Civ 68, [2013] 1 WLR 2151; cf *Bunt v Tilley* [2006] EWHC 407 (QB), [2007] 1 WLR 1243 (ISP not publisher). Cf further *Delfi AS v Estonia* [2013] ECHR 941 (broad liability of comment-hosting website for interfering with defamed individual's right to private life under Article 8, ECHR).

(48.) E.g. *Emmens v Pottle* (1885) LR 16 QBD 354.

(49.) [2001] QB 201.

(50.) Rather than risk 'defending lengthy libel proceedings, on the basis of (potentially worthless) assurances or indemnities from the primary publishers': Law Commission 2002: 2.4.

(51.) Despite suggestions that this would lead to claims by (censored) authors for breach of contract against the host ISP, and give (free-speech protected) US ISPs a major competitive advantage: Law Commission 2002: 2.32–2.33.

(52.) Communications Decency Act 1996 (US), s 230(c)(1).

(53.) Cf *Zeran v America Online Inc* 129 F 3d 327 (4th Cir 1997).

(54.) Discussing *Delfi v Estonia* (n 47).

(55.) Cf Stapleton (2002) 1247 (Directive 'a political "fudge" that tried to square the circle of disagreement between Member States by use of ambiguous terms and a cryptic text').

(56.) *Escola v Coca-Cola Bottling Co* 150 P 2d 436 (1944) (exploding bottle); *Abouzaid v Mothercare* (CA, unreported, 2000) (recoiling elastic strap); *Richardson v LRC Products Ltd* (2000) 59 BMLR 185 (splitting condom); *Bogle v McDonald's Restaurants Ltd* [2002] EWHC 490 (QB) (hot coffee).

(57.) For debates on whether the Thalidomide victims could have surmounted the development risks defence, see Goldberg 2013: 193–194.

(58.) *Bogle* n 56: consumers entitled to demand hot coffee (notwithstanding the inherent burn hazard) rather than tepid, safe coffee.

(59.) Cf *Daborn v Bath Tramways Motor Co* [1946] 2 All ER 333, 336 (Asquith LJ): 'if all the trains in this country were restricted to a speed of 5 miles an hour, there would be fewer accidents, but our national life would be intolerably slowed down'.

(60.) E.g. *Navarro v Fuji Heavy Industries Ltd*, 117 F 3d 1027, 1029 (7th Cir 1997) (Posner J).

(61.) *A v National Blood Authority* [2001] 3 All ER 289.

(62.) Cf Stapleton (2002) 1244 ('no coherent and consistent statutory purpose'), 1249–1250.

(63.) *Abouzaid* (n 56) (no liability in negligence; but the recoil properties of elasticated straps were well known, so no Art 7(e) defence).

(64.) Stapleton argues that 'scientific knowledge' should therefore include the creative steps necessary for its practical application.

(65.) Plus, a more dangerous product will (*ceteris paribus*) therefore be more expensive and consumers will prefer to purchase 'cheaper (because safer) products': Stapleton 1986: 396.

(66.) For ways in which insurance may enhance (far from negating) personal responsibility cf Rob Merkin and Jenny Steele, *Insurance and the Law of Obligations* (OUP 2013) 30–31.

(67.) For a technology-specific study: Benjamin H Barton, 'Tort reform, innovation, and playground design' (2006) 58 *Florida LR* 265.

(68.) Naturally, parallel empirical questions could be asked, and doubts raised, about the enforcement (and ultimate deterrent impact) of overtly regulatory laws (criminal and otherwise).

(69.) 555 US 555 (2009).

(70.) Ibid 578–579.

(71.) 131 S Ct 2567 (2011).

(72.) See similarly *Mutual Pharmaceutical Co v Bartlett* 133 S Ct 2466 (2013) and Sotomayor J's dissent.

(73.) Cf Goldberg 2012: 158–165 (discussing debate on introduction of regulatory compliance defence in EU).

(74.) Initially to one of supervizing the computerized car; eventually disappearing altogether in the fully automated vehicle.

(75.) Moral philosophers have been engaged to advise programmers about the split-second decisions that 'driverless cars' ought to make when faced with an inevitable accident—e.g. should the computer sacrifice the car (and its human occupants) in order to save a greater number of other road-users? (Compare the well-known ethical dilemma, the 'Trolley Problem'.) Knight W, 'How to Help Self-Driving Cars Make Ethical Decisions' 29 July 2015, MIT Technology Review.

(76.) Calo contrasts a 'closed' robot with 'a set function, [that] runs only proprietary software, and cannot be physically altered by the consumer'.

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Tax Law and Technological Change

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Abstract and Keywords

Writings on tax law and technology change often investigate three discrete but related questions: (1) how does tax law react to technology change; (2) how does tax law provoke technology change; and (3) how does tax law seek to preserve traditional interests (such as revenue collection) in light of technology change. In addition, observers sometimes raise concerns that the interaction of technology change and tax law can have a substantive impact on individuals, communities and/or national interests that may differ from the technology's intended use (for example, automatic tax collection mechanisms may harm taxpayer privacy). The chapter reviews these writings and distils guiding principles for optimal tax law and policy in light of technology change.

Keywords: tax, regulations, technology, Internet, e-commerce, international tax, US state sales tax, substantive theory, instrumental theory

1. Introduction

THIS chapter reviews the main themes addressed by writings on tax law and technology change. This literature, which began in earnest with earlier discussions on research and development tax incentives and continues today with respect to the taxation of digital goods and services, scrutinizes how tax law accommodates and provokes technology change, as well as how tax laws distort market activities by preferring certain technologies over others. In particular, writings often focus on how tax laws and policies can best protect traditional interests (such as revenues derived from taxing cross-border transactions) given ongoing technological change. Another purpose of this chapter is to distil guiding principles from these writings as well as the author's own perspectives. The discussion reflects the broader scrutiny of optimal law and policies at the intersection between law and technology (Cockfield 2004; Mandel 2007; Moses 2007; Tranter 2007; Brownsword and Yeung 2008).

The chapter is organized as follows. Section 2 provides an example of how US state and local sales taxes have strived to accommodate technology change that promotes out-of-state sales. The example is used to introduce the three discrete but related questions surrounding the complex interplay between tax law and technology: (1) how does tax law react to technology change; (2) how does tax law provoke (p. 547) technology change; and (3) how does tax law seek to preserve traditional interests in light of technology change. Section 3 reviews tax law and technology topics. It begins with a discussion of the taxation of international e-commerce then gives an overview of research and development tax incentives, and cross-border tax information exchange.

Section 4 discusses guiding principles explored by tax law and technology writers to promote optimal law and policies. First, flexible political institutions that respect political imperatives are needed to generate effective rule-making processes to confront the tax law and policy challenges posed by technology change. Second, empirical analysis helps assess whether technology change is thwarting the ability of tax laws and policies to attain policy goals. Third, tax laws and policies should apply in a neutral manner to broad areas of substantive economic activities, regardless of the enabling technology. Fourth, a more critical examination of how technology can help enforce tax liabilities is needed. The final section concludes that tax law and technology discussions reflect broader examinations of how law accommodates outside shocks such as technology change.

2. Questions at the Intersection of Tax Law and Technology

Writings that explore the broad interplay between law and technology at times examine: how law reacts to, and accommodates, technology change (under 'law is technology' perspectives); how law shapes technology change to attain policy objective (or 'technology is law', which is really just Lessig's 'code is law' writ large); and consequential analysis to determine how tax law can preserve traditional interests in light of technology change (McLure 1997; Lessig 1999; Cockfield 2004: 399–409). This section elaborates on this approach by raising these questions in the context of a discussion of US state and local sales tax laws confronting technology change.

As explored below in greater detail, technology change can challenge the traditional interests that tax law seeks to protect. For instance, an increase in out-of-state sales to consumers (via the telephone for mail order sales or the Internet for e-commerce sales) makes it harder for local governments to enforce their tax laws, leading to revenue losses (Hellerstein 1997). This section reviews the struggle of certain US courts to protect state taxation powers while ensuring that overly enthusiastic taxation does not unduly inhibit interstate commerce. These sales tax decisions represent an interesting case study on the relationship between law and technology.

Currently, forty-five US states and over 7,000 local (municipal) governments have sales tax legislation. These state and local governments generally depend on (p. 548) business intermediaries to charge and collect sales taxes; for example, tax laws typically force retailers to charge sales taxes on purchases and remit the taxes to the state or local government. The alternative would be to force consumers to self-assess the amount of tax owed on each transaction (called a 'use tax') then send this amount to the relevant tax authority, but this approach is not efficient or feasible, mainly because consumers generally do not comply with this collection obligation.

Beginning in the 1940s, state governments became increasingly concerned as technology change—the more widespread usage of televisions and telephones—encouraged out-of-state mail order sales. As a result, these governments passed legislation to try to force out-of-state businesses to collect their sales taxes and it was necessary for the US Supreme Court to set out the scope of tax jurisdiction for state and local tax authorities as a result of constitutional concerns surrounding the possible interference with interstate commerce (Mason 2011: 1004–1005).

In a series of decisions beginning with *National Bellas Hess v Department of Revenue* (1967) 386 US 753, the US Supreme Court articulated and refined a 'substantial nexus' test that prevents state and local governments from imposing their sales taxes on economic activity unless this activity emanates from a physical presence within the taxing state's borders (Cockfield 2002a). Accordingly, mail order companies that do not maintain sales offices or sales forces within target states generally cannot be forced to collect sales taxes by state or local governments. For this reason, consumers can often purchase, on a sales tax-free basis, mail order goods like clothes because the mail order companies are typically based in states that do not have any sales taxes (Swain 2010). In the post-Second World War era, the loss of tax revenues to the state of consumption created a cause for concern, but was perhaps not overly worrisome, as the losses were not perceived to be too significant.

Nevertheless, as the US Supreme Court clearly understood in a later decision, *Quill Corp v North Dakota* (1992), the physical presence test served as an incentive for greater resort to cross-border mail order as consumers could generally enjoy sales tax-free purchases: '[i]ndeed, it is not unlikely that the mail-order industry's dramatic growth over the last quarter century is due in part to the bright-line exemption from state taxation created [by the Court's holding in] *Bellas Hess*'. Despite this concern, and evidence that revenue losses to state governments were increasing under the physical presence rule, the majority of the Court followed its own precedent. Justice White's partial dissent in *Quill*, however, preferred a more flexible test that would have scrutinized the activities of the out-of-state seller to see whether imposing collection obligations would be a barrier to interstate commerce. In contrast to the physical presence requirement, the more flexible approach would arguably have done a better job at respecting state interests while taking into account constitutional concerns surrounding interference with interstate commerce. The

majority and dissent perspectives raised questions concerning how tax laws should best address technological change.

(p. 549) Technology thinkers are sometimes divided into two groups: those who rely on so-called instrumental theories or perspectives on technology, and those who follow substantive theories about technology (Feenberg 2002). The majority of the Court in *Bellas Hess* and *Quill* followed an instrumental vision of technology change. Generally speaking, instrumental theorists tend to treat technology as a neutral tool without examining its broader social, cultural, and political impacts. The instrumentalists are often identified with strains of thought that respect individual autonomy (or agency) in matters of technology, in part because technology itself is perceived to be neutral in its impact on human affairs, and in part because of the emphasis on human willpower to decide whether to adopt technologies (van Wyk 2002). For the instrumentalists, human beings can and do direct the use of technology, and the fears of technological tyranny overcoming individual autonomy are unfounded. Many of these conceptions of technology rest on the optimistic premise that technology change produces largely beneficent results for individuals and their communities.

In contrast, Justice White's dissent in *Bellas Hess* seemed to regard more critically how the physical presence test would harm state tax revenues and how technology change combined with the Court's interpretation of tax law was altering the structure of certain markets. White's approach is more closely related to substantive theories of technology that emphasize the ways in which technological systems (or 'structure') can have a substantive impact on individual and community interests that may differ from the technologies' intended impact. Substantive theorists sometimes stress how technological structure can overcome human willpower or even institutional action (Winner 1980). By 'structure', it is not meant that machines control us, but rather that technological developments can subtly (or unsubtly) undermine important interests that the law has traditionally protected. Both instrumental and substantive perspectives of technology can inform theories of the relationship between law and technology (Cockfield and Pridmore 2007).

In response to the above US Supreme Court decisions and facing increasing revenue losses, state governments began in 1999 to take important cooperative strides in an effort to stave off revenue losses associated with out-of-state sales via an institutional arrangement known as the Streamlined Sales Tax Project. These efforts have led to the most ambitious effort to date to unify the different state and local sales and use tax bases, in an attempt to simplify compliance obligations for firms with out-of-state sales: at the time of writing, twenty-four of the forty-four participating state governments have passed conforming tax laws. Although these reforms are still a work in progress and the extent of their ultimate success is unclear, the new cooperative institutional arrangements arguably represent an effective response to the policy challenges of technology change (Hellerstein 2007). In addition, state governments are exploring how tax laws can mould technological developments via (p. 550) 'technology is law' solutions to influence individ-

ual and group compliance behaviour (for a discussion of online tax collection systems for US state sales taxes, see section 4.4).

Ultimately, the Internet and all other ostensibly ‘amoral’ technologies form part of the complex social matrix that shapes or determines individual and community behaviours and interests (Hughes 1994). Taxation, on the other hand, is closely tied to notions of justice and democratic ideals, at least in many countries. The tension, frequently explored by tax law scholars, then, is between amoral efficiency-enhancing technology change and tax laws’ pursuit of distinct socio-economic objectives and traditional tax policy goals such as horizontal and vertical equity (see also the discussions in sections 4.1.1 and 4.4).

3. Tax Law and Technology Topics

This section reviews tax law perspectives on three topics at the intersection of tax law and technology change: (1) the taxation of cross-border e-commerce; (2) tax law incentives for research and development; and (3) cross-border tax information exchanges. The discussion aims to tease out how tax law writers explore the complex interrelationship between tax law and technology. For example, writers explore how the taxation of cross-border e-commerce challenges the ability of national governments to protect their traditional ability to impose income tax and collect revenues from out-of-state online sales. With respect to research and development tax incentives, different perspectives review the ability of tax law to incentivize economic activities that pursue innovation and technology change. Observers also explore how governments can more directly pursue ‘technology is law’ approaches by harnessing new online technologies to share taxpayer data under cross-border tax information exchanges.

3.1 Taxation of Cross-border Electronic Commerce

Once the Internet became a viable commercial medium, the topic of the taxation of electronic commerce (e-commerce) grew into what is likely the most extensive literature that examines the relationship between tax law and technology. While the previous section touched on US state and local sales (consumption) tax issues and remote sales via e-commerce, this section mainly scrutinizes international income tax developments related to e-commerce.

(p. 551) Beginning in the mid-1990s, academics, governments, and others examined tax challenges presented by global e-commerce (US Dept of Treasury 1996; Cockfield 1999; Doernberg and Hinnekens 1999; Basu 2007). In particular, Tillinghast in a 1996 article struck a tone that would be followed by others: do traditional international tax laws and policies suffice to confront the challenges presented by cross-border e-commerce (Tillinghast 1996)? This scrutiny continues with the Organisation for Economic Co-operation and Development (OECD) and its base erosion and profit shifting (BEPS) project that seeks to inhibit aggressive international tax planning for, among other things, cross-border e-commerce (OECD 2013: 74–76; Cockfield 2014).

Commentators began debating these issues and ultimately proposed a number of possible reforms. They reviewed how global e-commerce could lead to, among other things, an erosion of source-based income taxation, more businesses based in tax havens, and greater shifting of intangible assets (digital goods and services, intellectual properties, brand, goodwill, and so on) to low tax jurisdictions. In these writings, there was a general consensus that global e-commerce challenged traditional international tax laws and policies although there was disagreement on the extent of these difficulties and hence the appropriate policy response.

In order to address possible revenue losses and other tax policy challenges presented by global e-commerce, commentators proposed reform efforts including: (a) low, medium, or high withholding tax rates for e-commerce payments (Avi-Yonah 1997; Doernberg 1998); (b) qualitative economic presence tests (i.e. facts and circumstances tests) to enable source countries to tax e-commerce payments despite the absence of a traditional physical presence within the source country (Hinneken 1998); (c) quantitative economic presence tests (e.g. permit source countries to tax above threshold sales, such as \$1 million in sales) (Doernberg and Hinneken 1999; Cockfield 2003); (d) global formulary apportionment with destination sales as one of the factors to encourage source country taxation (Li 2003); and (e) a global transaction tax for cross-border e-commerce transactions (Soete and Karp 1997; Azam 2013).

For the most part, however, governments chose to pursue a more moderate reform path. Beginning with the first OECD global e-commerce meeting in Turku, Finland in 1997 and followed up with another ministerial meeting in Ottawa, Canada in 1998, tax authorities generally did not advocate departures from traditional laws and policies (OECD 1998a; Li 2003). A review of national responses to e-commerce tax challenges reveals that, insofar as national governments have reacted at all to these challenges, they have done so with caution, as long as there was little evidence that traditional values (e.g. the collection of revenues from cross-border transactions) were at serious risk (Cockfield and others 2013: chs 4 and 5). A possible explanation for this cautious approach lay in the increasing view that the taxation of cross-border e-commerce was not leading to undue revenue losses for high tax countries (Sprague and Hersey 2003).

(p. 552) One of the most interesting consequences of the intense debate over the implications of cross-border e-commerce for tax regimes was the emergence of enhanced cooperation via non-binding political institutions at the international level as well as at the US subnational environment (see section 2). As part of this enhanced international tax cooperation, the OECD initiated a series of 'firsts' to confront global e-commerce tax challenges (Cockfield 2014: 115–118, 193–233). Under the auspices of, or in collaboration with, the OECD, the following developments occurred for the first time (Cockfield 2006): (a) countries engaged in multilateral discussions that led to agreement on tax principles to guide the subsequent formulation of international tax rules; (b) the OECD joined with members of industry to guide the development of new tax rules; (c) the OECD analysed policy options in an extensive way with tax experts drawn from national tax authorities, industry, and academia; (d) non-OECD countries were permitted to be part of ongoing de-

liberations; and (e) OECD member states engaged in extensive discussions with respect to cross-border Value-Added Tax/Goods and Services Tax (VAT/GST) issues.

These new cooperative institutions and processes—such as the OECD VAT/GST Guidelines—now address issues apart from, or in integration with, the taxation of global digital commerce, which is increasingly subjected to the broader rules that govern all cross-border trade in services and intangibles (see section 4.3). The policy responses demonstrate the importance of effective institutional reform processes to confront tax challenges promoted by technology change and which threaten traditional interests such as revenue collection (see section 4.1).

In an early article on tax and e-commerce, Abrams and Doernberg presciently noted that, '[p]erhaps the most significant implication of the growth of electronic commerce for tax policy may be that technology rather than policy will determine the tax rules of the [twenty-first] century' (Abrams and Doernberg 1997). Interestingly, it was technology change, and not traditional policy concerns, that provoked this unprecedented global and US sub-national tax cooperation.

3.2 Research and Development

In their pursuit of economic growth, governments provide tax incentives (that is, a reduction in tax liabilities) to businesses that pursue innovation strategies. These governments hope that reduced taxes will incentivize businesses to spend more resources on developing technologies that improve productivity. Businesses may also relocate to the new jurisdiction to take advantage of the tax breaks, increasing employment. In this way, tax laws seek to provoke technology change and related policy goals.

An extensive literature has also examined the interaction between tax laws and research and development (R&D) (Graetz and Doud 2013). This literature on R&D (p. 553) tax incentives is informed by more economic analysis than any other area surrounding tax law and technology change. This section considers two points addressed by the legal literature: (a) whether R&D tax law incentives promote beneficial domestic economic outcomes; and (b) whether these incentives trigger unhelpful international tax competition that harms the welfare of most countries.

R&D tax incentives are typically rationalized on the basis that they encourage investment in R&D activities that would not otherwise take place in the absence of the incentives. In Israel, for instance, it was found that for every dollar worth of R&D subsidy given, there was a 41-cent increase in company-financed R&D (Lach 2000). Moreover, in Canada, a study suggests that firms receiving R&D grants are more innovative than firms only receiving R&D tax credits (Berube and Mohnen 2009). Economists generally accept that R&D generates positive spill-over effects for an economy beyond the hoped-for increase in profits for the particular firms that engage in these activities: the spill-over effects include attracting and maintaining a skilled workforce, improving the natural environment, and raising overall worker productivity (as technology change encourages the production of goods and services with fewer resources). These efforts help companies already locat-

ed within a jurisdiction, as R&D grants often lead to increased productivity at the firm and industry level, while simultaneously increasing further investment, as tax rates play a role in determining where a company will invest (Pantaleo, Poschmann, and Wilkie 2013).

In the 1970s, many governments began to formally subsidize R&D activities through their tax laws. These laws generally offer relief for the activities via tax credits, refunds and/or enhanced deductions (Dachis, Robson, and Chesterley 2014). In addition, tax laws at-times provide relief for income attributable to intellectual property generated by the R&D activities. Tax credits (that is, a dollar-for-dollar deduction against tax liabilities) appear to be the most widely used mechanism: for instance, the United States, Canada, and the United Kingdom all provide taxpayers with tax credits for their R&D activities (Atkinson 2007). As of 2008, more than twenty-one OECD countries offered R&D tax incentives (Mohnen and Lokshin 2009). In addition, tax laws can be designed to influence investment in, and the operation of, high-technology start-up companies (Bankman 1994).

Despite the political acceptance of such tax laws, it remains unclear whether the R&D incentives promote long-term domestic economic benefits (Ientile and Mairesse 2009). The economic literature that examines this matter provides several different perspectives (Cerulli 2010). First, the tax laws work to promote overall heightened R&D activities that in turn encourage economic growth and productivity: the revenue loss associated with the incentives under this view is made up for the revenue gains associated with taxing the enhanced economic activities. For instance, in a US study, it was found that for every dollar lost in tax revenue, an additional dollar was spent on R&D (Hall 1995). Second, the tax laws do not encourage more of the sought-after activities, but rather incentivize taxpayers to shift the types (p. 554) of their investment for tax reasons and not for real economic rationales, which ultimately generates revenue losses without any corresponding beneficial outcomes. This perspective also maintains that countries are effectively 'shooting themselves in the foot' because the tax incentives simply result in revenue losses as taxpayers receive subsidies for activities they would have undertaken in the absence of the incentive. Third, tax laws provide mixed outcomes that appear to promote helpful R&D activities in some instances, but also promote 'gaming' by taxpayers that leads to greater revenue losses (Klette, Moen, and Griliches 2000).

While the evidence is mixed, governments generally remain enthusiastic about using their tax laws to promote R&D. As many governments focus on promoting knowledge-oriented service economies that generate intellectual property income, they are increasingly competing to attract R&D activities through their tax laws. More recently, governments are increasingly providing relief to, or a complete exemption of, taxation on the income generated by intellectual property. For example, the United Kingdom introduced a so-called 'patent box' regime in 2012, in part to encourage multinational firms to locate their R&D activities within this country. Under this approach, the United Kingdom will not tax royalty income generated via licensing agreements involving patents. The patent box is also aimed at encouraging companies to retain and commercialize existing patents. Variations

of the patent box can also be seen in Ireland, the Netherlands, and China (Pantaleo, Poschmann, and Wilkie 2013).

From a global perspective, observers worry that all of these incentives (whether via tax law subsidies for operations or resulting income) is leading to a so-called ‘race to the bottom’ as governments feel the need to offer increasingly generous subsidies that ultimately lead to zero taxation of intellectual property income and corresponding revenue losses (Leviner 2014). Although R&D subsidies confer some independent benefits such as increased innovation, the larger impact of R&D investment is through offering better incentives for companies to relocate. The more countries that incentivize R&D, the greater the race to the bottom may become. If a country fails to match the incentives offered by competing countries, it will likely see a decline in R&D. Under one view, as the United States has fallen from being the leader in R&D tax subsidies, there has been an increase in American companies shifting their R&D overseas due to cheaper costs (Atkinson 2007).

Moreover, taxpayers may simply shift the ostensible location of their intellectual property without deploying any assets or workers in the subsidizing country. For example, multinational firms at times deploy ‘entity isolation’ strategies whereby they set up corporations (or other business entities) within the targeted country to hold all of the intellectual property assets (e.g. patents, trademarks, and copyrights) so that all cross-border royalties will remain lightly taxed or untaxed (Cockfield 2002b; Sanchirico 2014). At the time of writing, these concerns are being addressed via the previously mentioned OECD base erosion and profit shifting (BEPS) (p. 555) programme that seeks to inhibit the ability of multinational firms to shift income to lower tax countries through aggressive international tax planning (OECD 2013).

While the empirical evidence is mixed, governments continue to pursue ‘technology is law’ strategies that seek to use tax laws to provoke businesses to pursue activities that lead to technology change. Yet a broader scrutiny of the issues (following the substantive theory of technology noted in section 2) reveals that the strategies may be leading to a ‘race to the bottom’ where all countries will be worse off due to revenue losses associated with R&D tax incentives.

3.3 Cross-border Tax Information Exchanges

Technological developments have made it more efficient and less costly for governments and the private sector to collect, use, and disclose personal information such as financial and tax information (Cockfield 2003). With the click or two of a mouse, records can now be called up from government databases, aggregated, copied, and transferred to another government agency located anywhere in the world as long as it has access to the Internet. For the first time, many countries and subnational polities (e.g. states and provinces) can engage in cross-border tax information exchange with relative ease. Governments exchange bulk taxpayer information mainly to ensure that resident taxpayers are reporting their global income for tax purposes (Dean 2008). By doing so, these governments are trying to protect their traditional interests in light of technology change. In this case, they

seek to ensure that resident taxpayers comply with their tax law obligation to pay tax on their non-resident sources of income.

The push toward enhanced cross-border tax exchanges first gained traction in the early 1990s when governments began to take advantage of information technology developments to develop and promote the digitization of tax records, including tax returns, and the storage of these records in networked databases to enhance administrative efficiency and promote online filing of annual returns for individual taxpayers (Bird and Zolt 2008; Buckler 2012). In particular, the ‘automatic exchange’ of cross-border tax information (enabled by, for example, the Council of Europe/OECD Convention on mutual assistance or the European Union Savings Directive) was facilitated by digital technologies. Governments now exchange bulk taxpayer information to discern whether resident taxpayers are disclosing and paying tax on international investments (Keen and Ligthart 2006).

Academics and policymakers have examined the ways that enhanced tax information exchange has been facilitated by information technology developments, along with digitized tax information, the use of the networked databases and automated tax collection systems (Hutchison 1996; Jenkins 1996). As governments gain confidence with their information technologies to collect, use, and disclose tax (p. 556) information, they appear to be seeking heightened connections with the technology services, including networked databases, offered by other governments. Here we see governments reacting to a potentially beneficial form of technology change, which could make it easier for them to collect cross-border revenues.

The OECD has promoted enhanced tax information exchange to fight the perceived abusive use of tax havens as part of its ‘harmful tax competition’ project that began in 1996 (Ambrosanio and Caroppo 2005; Brabec 2007). In 1998, the OECD published a report indicating that ‘the lack of effective exchange of information’ was one of the key obstacles to combatting harmful tax practices (OECD 1998b). In 2000, the OECD published an initial ‘blacklist’ of thirty-five tax haven countries that did not, among other things, permit effective tax information exchange. In 2002, the OECD developed a non-binding model tax information exchange agreement (TIEA) to encourage transparency and to set standards for the exchange of this information. These TIEAs, it was thought, could discourage taxpayers from trying to evade taxes through illegal non-disclosure of offshore income. In addition, it was hoped that TIEAs would inhibit the international money laundering, the financing of global terrorism, and aggressive tax avoidance strategies.

The most controversial unilateral development began in 2010 when the US government introduced new legislation to access tax information on US citizens (and other ‘US persons’) living abroad to combat offshore tax evasion (Christians and Cockfield 2014). Under US tax law, all US citizens, no matter where they reside, are taxed on their worldwide income and must file a US tax return each year and pay any US taxes due. To help identify offshore tax evaders, the new laws attempt to force foreign banks and other financial institutions to provide financial information concerning US citizens living abroad (the regime is known as the Foreign Account Tax Compliance Act (FATCA)). Foreign financial

institutions are expected to collect this personal financial information and transmit it directly to the Internal Revenue Service.

The OECD and US developments have been scrutinized by observers who generally support enhanced cross-border information exchange, but who worry about issues such as harm to taxpayer privacy (see section 4.4). Another fruitful area of current exploration examines how cross-border 'big data' along with data analytics can promote helpful policy outcomes: through 'technology is law' approaches, governments pass tax laws that harness developments in information technologies to seek heightened online exchanges of bulk taxpayer data to promote compliance objectives. For tax authorities, big data and data analytics have the potential to inhibit tax evasion, international money laundering, the financing of global terrorism and aggressive international tax planning (Cockfield 2016). With respect to aggressive international tax planning, a reform effort through the previously-mentioned 2013 OECD BEPS project strives to develop country-by-country reporting whereby multinational firms would need to disclose to foreign tax authorities all tax payments and other financial data in every country where they pay taxes (p. 557) (OECD 2013; Cockfield and Macarthur 2015). This big data could provide superior information to tax authorities to help them determine whether to audit taxpayers' international activities.

4. Developing Guiding Principles

This final section distills guiding principles from writings concerning optimal tax law and policy in light of technology change (Mandel 2007; Moses 2007; Cockfield and others 2013: 490–509). It discusses how effective institutional arrangements need to be deployed that respect political sovereignty concerns and are able to effectively respond to changing technology environments; how empirical approaches help to determine whether technology change is subverting traditional interests protected by tax law; how neutral tax treatment is needed for broad areas of substantive economic activities, regardless of enabling technologies; and how a greater use of technology to enforce tax laws is needed. These views generally follow broadly accepted tax policy goals (such as the pursuit of fairness and efficiency) in areas apart from technology change.

4.1 Deploy Effective Institutional Arrangements

Government tax reform processes determine in part how tax law reacts to technology change. Institutional design hence dictates whether these processes will encourage the preservation of traditional interests (such as revenue collection and horizontal/vertical equity) in light of technology change.

4.1.1 Respecting Tax Sovereignty

Political tax reform institutions need to remain sensitive to how reforms may intrude on tax sovereignty concerns. Institutions and institutional arrangements relating to taxation are important determinants of economic growth for nation states (North 1990). While

there remains an ongoing debate surrounding the need for binding global tax institutions, observers generally note that movement in this direction remains unlikely for the foreseeable future (Bird 1988; Avi-Yonah 2000: 1670–1674; Sawyer 2004). Most nations wish to maintain laws and policies tailored to their national interests without interference from a formal world tax organization or other overly intrusive binding measures: tax sovereignty concerns remain one of the prime drivers of international tax policy (Cockfield 1998; Azam 2013). (p. 558) Governments jealously guard their fiscal sovereignty so that their tax systems can pursue distinct socio-economic agendas such as wealth redistribution.

For instance, observers have studied how the OECD approach of encouraging discussion, study, and non-binding reform efforts for international e-commerce resembles the phenomenon of ‘soft law’ (Ring 2009: 555; Christians 2007; Ault 2009). Soft laws (or soft institutions) are more informal processes employed to achieve consensus by providing a forum for actors to negotiate non-binding rules and principles, instead of binding conventions. These processes can address technology challenges without imposing undue restrictions on national sovereignty.

From this perspective, the OECD appears to provide an appropriate forum for addressing technology change because it accommodates the interests of the most advanced industrial economies and their taxpayers without imposing any rules that would bind the tax policy of its member countries (see section 3.1). The OECD’s e-commerce initiatives deployed processes designed to address the needs of important economic actors (e.g. multinational firms) by reducing tax barriers to cross-border trade and investment while at the same time meeting and respecting the political needs of nation states. The OECD e-commerce tax initiatives also encouraged cooperation by providing significant opportunities for input without imposing any intrusive restrictions on the tax policy of member countries.

The combination of providing enhanced opportunities to voice concerns along with the use of soft institutions likely assisted with the development of effective guidance that was acceptable to the OECD member states (Bentley 2003). Similarly, within the United States a cooperative effort among state and local governments called the Streamlined Sales Tax Project, which arose in response to e-commerce tax challenges, appears to have encouraged positive policy outcomes (see section 2).

4.1.2 Need for Adaptive Efficiency

In addition to respecting tax sovereignty, tax reform processes need to be designed to promote effective and timely responses to changing understandings concerning the technological environment. Through appropriate institutional design, these reform processes will be better able to preserve traditional interests when they are threatened by technology change. Technology change can occur on a rapid basis (this is certainly the case with respect to Internet developments) and legal institutions, including legislators, courts, and international organizations, need to be able to respond effectively and in a timely fashion. Under one view, economic developments depend largely on ‘adaptive efficiency’, which has been defined as a society’s or group of societies’ effectiveness in creating institutions

that are productive, stable, fair, and broadly accepted and flexible enough to be changed or replaced in response to political and economic feedback (North 1990).

Consider reforms directed at the taxation of international e-commerce: through the use of informal mechanisms, the OECD mediated and managed the expectations (p. 559) of its member states in an attempt to generate politically acceptable international tax policy. The OECD developed new cooperative processes that broadened deliberation to industry representatives and academics, created expert Technology Advisory Groups to delve deeply into technology changes issues, and reached out to non-OECD members such as China, India, the Russian Federation, and South Africa to encourage 'buy in' of any proposed solutions. The main reform process (from 1997 to 2003) was carried out in a timely fashion, resulting in changes to the Commentaries to the OECD model tax treaty (Cockfield 2006).

The OECD's e-commerce guidance initiative appears to have deployed political institutions (or 'institutional arrangements' under the jargon of transaction cost perspectives) that meet the requirements for adaptive efficiency by fulfilling, to a lesser or greater extent, the eight steps proposed by Williamson: (1) the occasion to adapt needs to be disclosed, after which (2) alternative adaptations are identified, (3) the ramifications for each are worked out, (4) the best adaptation is decided, (5) the chosen adaptation is communicated and accepted by the agency, (6) the adaptation is implemented, (7) follow-up assessments are made, and (8) adaptive, sequential adjustments are thereafter made (Williamson 1999: 333).

4.2 Surveys and Empirical Research as Reality Checks

Our next guiding principle is a fairly obvious one: empirical studies can assist in determining if technology change is harming traditional interests. Consider the challenge facing governments concerning the dramatic increase in cross-border e-commerce activities. Revenue losses associated with international e-commerce transactions are difficult to estimate as there are currently no empirical studies that attempt to measure these losses (OECD 2013: 74–75). Tax authorities have noted the continuing rise of certain 'grey market' business activity, such as gambling and pornographic websites located in offshore tax havens, which may be leading to revenue losses (US Treasury Department 1996). Aggressive and non-traditional tax reforms advocated by some tax observers were not warranted in light of the absence of empirical research to sustain their claims (see section 3.1). A fuller exploration through empirical legal studies or some other methodology could help policy makers make a more informed decision with respect to their tax laws and policies governing cross-border e-commerce (Mcgee and van Brederode 2012: 11, 50).

The lack of empirical evidence concerning revenue losses at the international level, however, can be contrasted with the situation in the US subnational context where several studies have shown that US state and local governments are suffering revenue losses in the billions of dollars as a result of increased remote consumer sales attributable to mail order and Internet transactions involving tangible goods (although the estimated revenue

losses still remain a small percentage of overall (p. 560) sales tax revenues generated by traditional commerce) (Bruce, Fox, and Luna 2009; Alm and Melnik 2010). As mentioned, twenty-four US state governments thus far have taken the unprecedented step to harmonize their sales and use tax bases to encourage voluntary compliance by firms with out-of-state sales (see section 2). Without similar evidence at the international level, tax authorities and legislative bodies may be understandably reluctant to focus their attention on an area that may not be contributing to significant revenue losses.

4.3 Applying Neutral Tax Treatment

We have seen instances in this chapter of governments facing the decision to deploy new or traditional tax laws and policies to confront technology change. If they do take any action, tax laws should be designed to apply broadly to substantively similar economic activities, no matter what technologies are at play. In other words, and as discussed in a US Treasury Paper, a broad formulation of tax rules is needed to confront ongoing and uncertain technology change: ‘[t]he solutions that emerge should be sufficiently general and flexible in order to deal with developments in technology and ways of doing business that are currently unforeseen’ (US Department of Treasury 1996). The purpose behind deploying neutral tax treatment is to inhibit the potential for tax law to distort economic decision-making (a traditional efficiency goal) as well as to ensure that two similarly-situated taxpayers are taxed the same way (a traditional horizontal equity goal). Hence the proposed approach ensures that tax law seeks to preserve traditional interests in light of technology change. Examples of this approach include US Treasury Department regulations that classify computer program transactions by looking to substantive economic activities (Treasury Reg Section 1.861-18); OECD income classification rules for cross-border digital transactions (OECD 2010: paras 17.1 to 17.4 of the Commentary to Article 12); and Israeli tax authority pronouncements concerning electronic and traditional sales (Rosenberg 2009). All of these efforts strive to treat functionally equivalent transactions the same way. A counter-example is the OECD reform that developed a specific rule to address a particular technology change (via the ‘server/permanent establishment’ rule within the Commentaries to the OECD model tax treaty) that focuses on software functions to determine tax jurisdiction. Not only does the rule fail to protect traditional interests (eg revenue collection by the source state), it exacerbates problems by encouraging aggressive international tax planning (Cockfield 1999).

Relatedly, neutral tax treatment carries the lowest risk of discouraging technology innovation and diffusion. Legal rules can both provoke and discourage technology change (Stoneman 2002; Bernstein 2007). In the United States, for example, in the mid-1990s, cries that new taxes would ‘crush the Internet’ led Congress to pass the (p. 561) Internet Tax Freedom Act, which prohibited the imposition by state and local governments of taxes on Internet access or ‘discriminatory’ Internet taxes (Hellerstein 1999). One goal of the legislation was to ensure that state and local governments would not rely on insubstantial in-state connections of out-of-state Internet-related businesses to impose tax collection obligations on such businesses. This prohibition may have been unnecessary in light of the existing US constitutional prohibition forbidding states from forcing out-of-

state vendors to collect sales taxes (see section 2). The passage of the Internet Tax Freedom Act was nevertheless important as a signal that federal legislators wanted to 'protect' the Internet from new or discriminatory state taxes.

As discussed in section 3.1, at the international level the OECD and its member states have generally chosen to pursue a moderate reform path that contemplated the usage of traditional tax laws and policies. This approach has been adopted in part due to fears that new taxes would discourage the development of the Internet or inhibit entrepreneurial efforts. At least in its initial stages, a significant share of global e-commerce was conducted by small- and medium-sized companies. Indeed, low start-up costs encouraged many Internet companies to 'go global' with their e-commerce sales. But these companies often may not have the resources or know-how to comply with new tax laws or tax laws of every foreign country where their customers reside. Accordingly, more radical reform paths, including the possible adoption of a 'bit tax' that would be applied on every cross-border transmission of data, were properly rejected (Soete and Karp 1997).

Neutral tax treatment between the 'real' and 'virtual' world is also needed to protect non-economic interests in some cases. A relatively novel aspect of Internet technologies is that it is a particularly important forum not just for business, but also for forms of non-commercial expression. Cyberspace consists of evolving and interacting forums for different kinds of commercial and non-commercial interaction such as social networks; cyberspace can hence be analogized with a 'digital biosphere' (Cockfield 2002a). Tax authorities should tread warily within these new forums in light of these concerns (Camp 2007). Myriad tax rules from hundreds of governments could inhibit the development of these new forums as well as traditional (Western liberal) values, such as the desire for private and anonymous communications (see section 4.4).

4.4 Using Technology to Enforce Tax Laws

Technologies, including the Internet's hardware and software technologies, can be critically examined to see how they can help enforce tax laws. By regulating the technologies via 'technology is law' approaches, governments can determine what individuals can and cannot do and thus indirectly influence the policy outcome (p. 562) (Lessig 1999) (see section 2). For instance, governments can pass tax laws that require the use of an online tax collection technology to promote taxpayer compliance. Note that changes in collection technologies generally do not implicate traditional tax principles and laws: the potential reforms to accommodate technology change surround techniques of collection, and not generally the level of principles and obligations (although, as noted below, changes in tax collection technologies can also challenge traditional values such as taxpayer privacy).

As mentioned, governments are adopting technologies to enable online tax return filing along with tax data analytics to identify 'red flags' for audits (see section 3.3). Nevertheless, national governments thus far have been reluctant to fully embrace new digital technologies to promote tax information exchange and to meet other challenges presented by enhanced regional and global economic integration. As noted by Hellerstein, these gov-

ernments have failed to link their technological ability to enforce their tax laws with the reach of their tax laws, which often includes profits or sales emanating outside of their borders (Hellerstein 2003; Swain 2010).

Recent international policy reform efforts have focused on standardizing the technologies and mechanisms to more effectively exchange cross-border tax information (OECD 2014). Cross-border tax exchange could also be facilitated by the development of a comprehensive tax information-sharing network that uses the Internet as its technology platform. Such a network could involve some or all of the following components (Cockfield 2001: 1238–1256): (a) a secure extranet extended to all participating tax authorities whereby they could transfer tax information on an automatic basis; (b) a secure intranet extended only between each tax authority and its domestic financial intermediaries so that the tax authority can access needed financial information; (c) the automatic imposition of withholding taxes on certain payments; and (d) an online clearinghouse to assist with the automatic assessment, collection, and remittance of cross-border VAT/GST payments.

The reforms of the participating US state governments through the Streamlined Sales Tax Project provide a more concrete example of reforms of efforts to employ Internet technologies in the cross-border tax collection process (see section 2). These efforts are facilitated by Internet technologies that are used to assist with tax compliance and enforcement. Among other things, US state governments are reviewing a system whereby certified third-party intermediaries, which will ordinarily be online tax compliance companies, act as a seller's agent to perform all the seller's sales and use tax functions. To reduce compliance costs, an online registration system with a single point of registration has been proposed. Any business that uses this Streamlined-certified software will be protected from audit liability for the sales processed through that software.

From a broader social and political perspective (as pursued by substantive theorists of technology), however, the use of such techniques of collection raises significant taxpayer privacy concerns (see section 2). Digital taxpayer information is permanent, easily exchanged or cross-indexed with other government (p. 563) databases or transferred across borders where laxer legal protections for privacy may prevail (Dean 2008; Schwartz 2008; Christians and Cockfield 2014). Policy responses include: (a) reformed privacy laws to govern private sector information collection practices (e.g. the European Union's Data Protection Directive 1995); (b) reformed privacy laws that govern public sector information collection practices (e.g. Canada's federal Privacy Act); (c) government agency privacy guidelines to govern the design, implementation, and operationalization of new security initiatives that access taxpayer information (e.g. the Office of the Privacy Commissioner of Canada's 2010 Matter of Trust guidelines) (Office of the Privacy Commissioner of Canada 2010); (d) technological reforms such as audit trails that create records of government searches of tax databases (Cockfield 2007); and (e) multilateral cooperative efforts such as, potentially, a global taxpayer bill of rights (Cockfield 2010).

5. Concluding Comments

Reflecting on the literature, tax laws generally play a reactive role in light of technology change (falling within the ‘law is technology’ framework noted in section 2). Under this approach, tax laws and policies are amended when technology change appears to threaten traditional interests such as the collection of revenues. Governments often deploy traditional tax laws and principles to govern new commercial activities promoted by technology change. By doing so, they help promote legal and commercial stability by making it easier for a tax lawyer to predict how the law will be applied to a particular taxpayer’s activities and transactions.

Tax laws at times also seek to promote technology change, or at least the location of innovation activities, primarily by offering tax incentives for research and development. Under this ‘technology is law’ approach, tax laws seek to provoke technology change to promote a desired policy outcome such as encouraging investment and employment in technology industries. In rarer circumstances, tax laws try to more directly shape technologies such as mandating new software protocols for assessing and collecting tax liabilities (e.g. automatic online collection systems).

Moreover, academics study how the complex interplay between tax law and technology at times influences market distortions when taxpayers’ activities or transactions are offered more favourable tax treatment compared to other taxpayers. As discussed in section 2, US sales tax law encourages out-of-state sales due to the prohibition against states extending their tax laws over remote mail order or online vendors.

(p. 564) A few tentative guiding principles can be distilled from tax law and technology writings; the perspectives are generally consistent with traditional tax policy goals such as the promotion of efficiency and equity. Politically credible and adaptively efficient domestic and international political institutions are best suited to develop consensus to promote effective reform efforts in light of technology change. Moreover, empirical studies can assist in determining whether this change is undermining traditional interests protected by tax laws.

Tax laws themselves should be applied in a neutral manner with respect to broad areas of functionally equivalent economic activities, regardless of underlying technologies. Finally, governments should more critically explore how technologies can help enforce tax laws. For instance, automatic tax collection systems can encourage greater compliance and lead to enhanced tax revenues. Correspondingly, governments need to remain sensitive to the social and political impact of technology on individuals and communities to protect against, among other things, the threat to taxpayer privacy presented by these collection systems.

From a broader perspective, tax law and technology writings show how law integrates potentially disruptive outside shocks like technology change to preserve traditional interests. In particular, the application of traditional tax law principles links different technological eras (the agricultural era, the industrial era, the information era, and so on) to-

gether when legal frameworks recognize the historic continuities underlying these eras. By examining these processes, academic perspectives can help promote optimal tax law and policies in an environment of ongoing technology change.

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Regulating in the Face of Sociotechnical Change

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Abstract and Keywords

This chapter looks broadly at how lawyers and regulators should understand the relationship between regulation and changing technologies. It argues that instead of asking how we might 'regulate technology' or 'regulate new technology', we should focus on the question of how we might institutionally manage the adjustment of law and regulation in light of ongoing sociotechnical change. In particular, it argues that 'technology' is neither a special rationale for nor a special object of regulation, but rather that it is changes in the sociotechnical landscape that generate a need to constantly re-evaluate regulatory regimes. It concludes with high-level principles that follow from this reframing for regulatory design, choice of regulatory institution, regulatory timing, and regulatory responsiveness.

Keywords: regulation, sociotechnical change, technological change, newness, technological neutrality, Collingridge dilemma

1. Introduction

WITH technology colonizing not only the planet but also human bodies and minds, questions concerning the control and influence of law and regulation over the sociotechnical landscape in which we live are debated frequently. Within legal scholarship, most such consideration is piecemeal, evaluating how best to influence or limit particular practices thought to cause harm or generate risk. This typically involves an analysis of a small range of current or potential acts associated with particular technological developments, the potential benefits or harms associated with those acts, the impact of existing law and regulation, as well as proposals for new laws or regulation. Most discussion of new technology by lawyers and regulators is specific in this sense. Such scholarship and analysis is important; questions concerning the design of laws and regulation require an understanding of the specific context.

However, there is also a role for more general scholarship that seeks to understand the relationship between law, regulation, and technology across doctrinal and technological contexts. Indeed, the title to this volume suggests that there is something that might be said generally about the ‘law and regulation of technology’. The two types of scholarship are not independent—much of the scholarship (p. 574) that engages with specific questions relies on explicit or implicit assumptions about the more general situation. For example, there are assumptions around the virtue of technological neutrality and the poor pacing of law and regulation (compared to the ‘tortoise’) measured against the rapid pace of innovation (compared to the ‘hare’) (Bennett Moses 2011). The goal of this chapter is to understand what can (and cannot) be said at this more general level about law, regulation, and technology.

There is a broad agreement in the literature that new technologies create challenges for law and regulation (for example, Brownsword 2008 describing ‘the challenge of regulatory connection’; Marchant, Allenby, and Herkert 2011 describing the ‘pacing problem’). This chapter will argue that most of those difficulties stem not from ‘anything technological’ (Heidegger 1977) but rather from the fact that the sociotechnical context in which laws and regulation operate evolves as a result of a stream of new technologically enabled capabilities. In other words, the challenges in this field do not arise because harm or risk is proportional to the extent that activities are ‘technological’ or because technological industries are inherently more susceptible to market failure, but rather because newly enhanced technological capabilities raise new questions that need to be addressed. Moreover, the rate of technological change is such that challenges arise frequently. The primary question is thus not ‘What regulation is justified by a particular technology?’ (section 3) or ‘How should a particular technology be regulated?’ (section 4) but rather ‘What is the appropriate legal or regulatory response to this new technological possibility?’ At a broader level, we need to ask not how to ‘regulate technology’ (as in Brownsword and Yeung 2008), but rather how existing legal and regulatory frameworks ought to change as a result of rapid changes in the things being created, the activities that are possible and performed, and the sociotechnical networks that are assembled. Technology is rarely the only ‘thing’ that is regulated and the presence of technology or even new technology alone does not justify a call for new regulation. Rather, regulation (whatever its target and purpose) must adapt to the changing sociotechnical context in which it operates. Changing the frame from ‘regulating technology’ or ‘regulating new technology’ to ‘adjusting law and regulation for sociotechnical change’ enables a better understanding of the relationship between law, regulation, and technology. It allows for the replacement of the principle of technological neutrality with a more nuanced appreciation of the extent to which technological specificity is appropriate. It facilitates a better understanding of the reason why law and regulation seem to lag behind technology, with less reliance on simple metaphors and fables. In other words, it ensures that those considering how law and regulation ought to be deployed in particular technological contexts can rely on more fine-tuned assumptions about the relationship between law and technology. The conclusions are not formulas (such as a principle of technological neutrality) that can be automatically applied. Rather, they are factors which need to be considered to-

gether (p. 575) with a wide variety of other advice concerning good governance and the specific requirements (political and normative) of particular contexts (Black 2012). However, they form a useful starting point for an improved understanding of how law and regulation can relate to the challenges posed by rapid technological innovation, thus guiding policymaking in a variety of more specific contexts.

2. Terminology

It is important when thinking about law, regulation, and technology to maintain clarity on what is meant by these core terms. None of the three terms are univocal—each has a range of essentially contested meanings, with scholars proposing particular definitions often expressing the view that their proposal is better at revealing the relevant phenomenon than another. Definitions shift further when notions of law/regulation and technology are combined. While ‘law’ and ‘regulation’ are recognized as a form of ‘technology’ (for example, Baldwin, Cave, and Lodge 2010) and technology as a type of ‘regulation’ or ‘law’ (Lessig 1999), only rarely is the potential circularity of attempting to ‘regulate technology’ as a means of constraining ‘technology’ noted (but see Tranter 2007).

The increased popularity of the term ‘regulation’ compared to ‘law’ reflects an enhanced awareness of the variety of sources and forms of power in modern society. The term ‘law’ is sometimes seen as focusing too heavily on ‘hard law’, formal rules promulgated by recognized political institutions or their formally appointed delegates. This suggests the need for a broader term (for example, Rip 2010). However, just as there are diverse tracts purporting to define the term ‘law’, the term ‘regulation’ is associated with diverse definitions (Jordana and Levi-Faur 2004: 3–5; Baldwin et al., 2012: 2–3). These range from the simplistic political idea of regulation as a burden on free markets (Prosser 2010: 1), to more nuanced definitions. Yeung (see Chapter 34 in this vol, section 2) explains some of the history and tensions in defining ‘regulation’. There is the evolution in Black’s definitions, which include ‘the sustained and focused attempt to alter the behaviour of others according to standards or goals with the intention of producing a broadly identified outcome or outcomes, which may involve mechanisms of standard-setting, information-gathering and behaviour modification’ (Black 2005: 11) and ‘the organized attempt to manage risk or behaviour in order to achieve a publicly stated objective or set of objectives’ (Black 2014: 2). There are convincing arguments to alter slightly the definition in Black (2014), as suggested by Yeung (see Chapter 34 in this vol, section 4), to ‘organised attempts to manage risks or behaviour in order to address a collective problem or concern’. All of these definitions deliberately go beyond traditional (p. 576) ‘command and control’ rules, and include facilitative or enabling measures as well as ‘nudges’ (Thaler and Sunstein 2012) while excluding non-deliberate influential forces (such as the weather).

Another important term to define, which has an equally complex definitional history, is ‘technology’. The focus of much literature on technology regulation is on the present and projected futures of a list of fields, such as nano-info-bio¹-robo-neuro-technology (for ex-

ample, Allenby 2011). Such technological fields are often breathlessly described as rapidly developing, revolutionary, and enabling—together representing a tsunami that challenges not only legal rules but also systems of regulation and governance. This paper does not play the dangerous game of articulating a finite list of important technological fields that are likely to influence the future, likely to enable further technological innovation, or likely to pose the challenges to law and regulation as any such list would change over time (Nye 2004; Murphy 2009b). Thus, technology is taken to include all the above fields, as well as older fields, and to encompass ‘any tool or technique, any product or process, any physical equipment or method of doing or making, by which human capability is extended’ (Schön 1967: 1).

Another concept that will become important in this chapter is the idea of newness or change. Given the above definition of technology, a new technology makes new things and actions possible, while older technologies enable what has been possible for some time. There are no hard lines here—new technologies may arise out of old ones, varying traditional approaches in ways that alter capability. One may find newness, for instance, in employing older medications for new purposes. Because these changes are not *purely* centred on artefacts, but include practices, the term ‘sociotechnical change’ will be used.

3. Technology or Its Effects as a Rationale for Regulation

This section will explore the possibility that the fact that ‘technology’ is involved creates or enhances a public interest rationale for regulation. In doing so, it ignores the potential simultaneous private interest in regulation as well as the way that different rationales for regulation may interact in debates. The goal here is not to understand the political dimensions of arguments concerning the need for regulation, but rather to ask whether the presence of ‘technology’ ought to matter in justifying regulation from a public policy perspective. In the popular mind, ‘technology’ *does* matter, as it is often suggested that regulation is justified because of technologies’ (p. 577) effects, being harms, risks, or side effects associated with technology, or because technology, as a category, requires democratic governance.

A useful starting point for exploring *rationales* offered for regulating in general are the categories offered by Prosser, being (1) regulation for economic efficiency and market choice, (2) regulation to protect rights, (3) regulation for social solidarity, and (4) regulation as deliberation (Prosser 2010: 18). This is not the only way of categorizing rationales (cf Sunstein 1990: 47–73), but different categorizations generally cut across each other.

This section will argue that, while technology qua technology is unimportant in justifying regulation, the tendency of technology to evolve is crucial in justifying legal and regulatory change. In other words, the primary issue for regulators is not the need to ‘regulate technology’ but the need to ensure that laws and regulatory regimes are well adapted to the sociotechnical landscape in which they operate, which changes over time. As techno-

logical practices shift, new harms, risks, market failures and architectures are brought into actual or potential being. At the same time, existing social norms, rules, and regulatory forces are often mis-targeted when judged against what is now possible. This requires changes to existing laws or regulatory regimes or the creation of new ones. Regulators need to respond to new technologies, not because they are technological per se, but because they are *new* and law and regulation need to be changed to align with the new sociotechnical landscape, including new negative features (harms, risks, market failures, inequality, etc.) it presents.

3.1 Rationale 1: Technology as a Site for Market Failure

In jurisdictions with a market-based economy, economic regulation is generally justified by reference to market failure. The kinds of market failures that are referred to in this context include natural monopolies, windfall profits, externalities (including impact on future generations), information inadequacies, continuity, and availability of service, anti-competitive behaviour, moral hazard, unequal bargaining power, scarcity, rationalization, and coordination (for example, Baldwin, Cave, and Lodge 2012). Like rationales for regulation more generally, market failures can be classified under different headings; for example, one might group those failures that relate to provision of public goods together.

While most of the categories of market failure do not relate specifically to technology or technological industries, one site of market failure that is often 'technological' is the problem of coordination, a kind of public good. In particular, regulation may be desirable in formulating technical standards to enable interoperability between devices. For example, state regulation may be employed to standardize electric plugs or digital television transmission. However, while technical standards are a (p. 578) classic type of regulation for coordination, the need for coordination is not limited to technological contexts. A desire for coordination may motivate collective marketing arrangements (Baldwin, Cave, and Lodge 2012), and interoperability may be required not only among things but also among networks of people and things (as where car design aligns with directions to humans to drive on one side of the road). Thus even in the context of coordination, often associated with technology, there are many standards and coordination mechanisms that go beyond technical objects, and even some where the need for coordination is unrelated to technology.

Another market failure commonly associated with technology is information inadequacies linked to the non-transparency and incomprehensibility of some technologies. Again, problems such as complexity are not necessarily linked to technology and, even where they are linked to technology, the need for information may not concern the technology itself. For example, legal requirements to publish statistics on *in vitro* fertilization outcomes in the United States do not relate to the complexity of the technological process but rather to the need for consumers to have information that the market may not otherwise provide on a comparable basis.² Thus the primary justification for regulation here re-

mains the existence of information asymmetries, including but not limited to issues around non-transparency or complexity of technology.

Ultimately, market failure as a rationale for regulation need not concern technology, and can be explained in any given context without reference to the fact that technology is involved. Of course, market failure can occur in technological industries and some market failures commonly involve technology (particularly coordination and information inadequacies), but the presence of ‘technology’ is only incidental to the justification for regulation. Technology is not a separate category of market failure.

On the other hand, changes in the sociotechnical landscape can have an important impact on the operation of markets, and hence the existence of market failures. Regulation designed to correct market failures must always be designed for a particular context; as technologies and technological industries evolve, that context shifts.

3.2 Rationale 2: Regulation to Protect Rights in the Face of Technology and Its Effects

Prosser’s second reason to regulate is to protect the rights of individuals to certain levels of protection, including in relation to health, social care, privacy, and the environment (Prosser 2010: 13–15; see also Sunstein 1990). In this context, technology is often presented as causing harm or generating risk in a way that infringes on the rights that, collectively, society considers that individuals ought to have (p. 579) (Murphy 2009a; Prosser 2010: 13–17). However, as explained in this part, the fact that ‘technology’ is involved is peripheral to the justification for regulation—harm and risk are measured in a similar way whether or not caused by ‘technology’.

It is easy to see why ‘technology’ is presented as generating harm or risk. Many large scale disasters such as nuclear explosions, disruption of the Earth’s ecological balance, or changes to the nature of humanity itself involve ‘technology’ (Jonas 1979; Sunstein 1990; Marsden 2015). Given technology’s potential for irreversible destruction or harm (which need not be physical), there is a need to prevent, through regulation, the performance of particular technological practices or the creation or possession of particular technological artefacts. Prohibitions on human reproductive cloning and international treaty regimes controlling production of particular types of weapons are justified with reference to the harms that could otherwise be generated by these technologies.³ In addition to these large scale harms, technology has the potential to cause more mundane harms, for example by generating localized air or noise pollution. Again, regulation is employed to prohibit or restrict the manufacture of particular substances or objects with reference to location, volume or qualification. Thus technology’s capacity to cause a variety of different types of harm or infringement of rights can create a reason to regulate.

The argument here is thus not that regulation cannot be justified where technology threatens rights, but rather than we might equally want to regulate in the presence of harmful behaviour that is non-technological. The test for regulation is the potential for harm not the presence of ‘technology’. To see this, consider the kinds of harms and risks

associated with other acts or things that are not necessarily technological, including individual physical violence, viral infections, and methane emissions from cattle that contribute to climate change (Johnson and Johnson 1995). Because technology is not the only cause of harm, does not always cause harm and can (as in the case of vaccination) reduce harm, regulation to avoid harm ought not to be justified by the presence of ‘technology’. Technologically and non-technologically derived harms can both be potential rationales for regulation to prevent harm and thus protect rights. The same points made with respect to ‘harm’ also apply to ‘risk’, another concept often invoked in discussions of ‘technology regulation’. In some cases, a possible negative consequence of conduct may be associated with a probability less than one (in which case it is a risk) or an unknown probability (in which case it is an uncertainty or known unknown) (Knight 1921). In capturing potential, as well as inevitable, harms or infringement of rights, the language of ‘risk’ is employed, despite some of its limitations (see generally Tribe 1973; Shrader-Frechette 1992; Rothstein, Huber, and Gaskell 2006; Nuffield Council on Bioethics 2012). As a justification for regulation, risk governance suggests that regulatory responses to risk ought to be proportionate to the harm factor of a particular risk, being a multiple of the probability and degree of a potential negative impact (Rothstein, Huber, and Gaskell 2006: 97). The risk rationale for regulation is linked to technology whenever technology generates risk. For example, Fisher (p. 580) uses the phrase ‘technological risk’ in her discussion of the institutional regulatory role of public administration (Fisher 2007). Technology is also linked to risk in Prof. Ortwin Renn’s video on the International Risk Governance Council website, which states that ‘risk governance’ is about ‘the way that societies make collective decisions about technologies, about activities, that have uncertain consequences’ (Renn 2015). However, the actual link between risk and technology is similar to the link between harm and technology. As was the case there, technology and its effects are not exclusively associated with risk. Both technology and ‘natural’ activities are associated with risks to human health and safety, and their alleviation. Most of the time it is unhelpful to categorize risks based on their technological, social, or natural origins, as the example of climate change demonstrates (Baldwin, Cave, and Lodge 2012: 85).

One alternative angle would be to move away from objective measures of harm and risk, and examine subjective states such as anxiety. In a society of technophobes, there may be strong justification in dealing with technology through regulation. However, while ‘technology’ as a category may be feared by some, it is generally uncertainty surrounding the impact of new technology that may lead to heightened anxiety (Einstein 2014). Indeed, uncertainty around subjective and objective estimates of risk, and thus inflated subjective assessments of risk, are likely for new untested activities, whether or not these involve technology.

Older technologies, like natural phenomena, whose risk profile is static will often already be the subject of regulation. In some contexts, science may discover new harms associated with static phenomena, and new regulation will be enacted. But in most cases, existing regulatory regimes will require mere monitoring and enforcement, rather than a shift in regulatory approach or new regulation. The management of static harms is independent

of their status as technologically derived, relating primarily to evaluation of the effectiveness of existing regulatory regimes.

However, as the sociotechnical landscape shifts, so too will the sources of harm, and the types, risks, and extent of harms. It is the dynamism of technology, its bringing new possibilities within the realm of (affordable) choice that typically implicates values and stimulates a regulatory response (see also Mesthene 1970). Existing laws and regulatory regimes make assumptions about the sociotechnical context in which they will operate. A new technology that raises a new harm, or a new context for harm, will often fall outside the prohibitions and restrictions contained in existing rules and outside the scope of existing regulatory regimes. Preventing or minimizing the harm or risk requires new regulatory action (e.g. Ludlow et al. 2015). The problem is thus not that technology always increases risk, but that it may lead to new activities that are associated with (new, possibly unmeasured) risks or change existing risk profiles. The problem of technology is thus, again, reduced to the problem of sociotechnical change, incorporating new effects of new practices.

(p. 581) 3.3 Rationale 3: Regulation of Technology for Social Solidarity

Prosser's third regulatory rationale is the promotion of social solidarity (Prosser 2010: 15–17). This rationale is closely allied with Hunter's concept of regulation for 'justice' (Hunter 2013), and concerns regulatory motives around collective desires and aspirations, including social inclusion. It intersects with Vedder's (2013) 'soft' implications of technology as regulatory rationales. As terms like 'digital divide' illustrate, technology can be the site for concerns around social exclusion with negative lasting impacts (Hunter 2013). Regulation is sometimes called to enhance access to particular technologies, or instance via government subsidies or restrictions on discriminatory pricing. However, once again, technology is not special here—one might wish to regulate to correct any uneven distribution with ongoing effects for social solidarity, not merely those that relate to technology. The digital divide is not more important than other poverty-related, but non-technological, divides, for example in education or health. Indeed a focus on technology-based divides can often obscure larger problems, as where education policies focus on narrow programmes (such as subsidized laptops) to the exclusion of other resources.

3.4 Rationale 4: Democratic Governance of Technology

A fourth rationale offered for regulating technology is the importance of exercising collective will over the shape of the technological landscape. This relates to Prosser's fourth rationale for regulation, regulation as deliberation. The idea is that, given its wide impacts and malleability, technology ought to be a topic for democratic debate, enhancing the responsiveness of technological design to diverse perspectives.

The malleability of technology, particularly at an early phase in its development, has been demonstrated through case studies (e.g. Bijker 1995). At an early stage of its develop-

ment, a new product or process is open to a range of interpretations. Over time, the form and expectations around a technology become less ambiguous, and the product or process reaches a point of stabilization or closure. The path of technological development is thus susceptible to intentional or unintentional influences, including state funding decisions (Sarewitz 1996; Nuffield Council on Bioethics 2012).

A range of scholars have noted the potentially significant impacts, both positive and negative, of different technologies (for example, Friedman 1999). One of the more well known, Winner, argued that technology has ‘politics’, with design choices becoming part of the framework for public order (Winner 1986: 19–39). In the legal context, Lessig has made similar claims about the importance of design choices in (p. 582) relation to the Internet (Lessig 1999). Actions are inherently limited by physical and virtual technological architecture.

In light of the impact and malleability of technology, there is a strong case that technological decisions ought to be subject to similar political discipline as other important decisions. For example, Feenberg (1999) argues that there ought to be greater democratic governance over technology in order to ensure that it meets basic human needs and goals and enables a more democratic and egalitarian society. The importance of democratic governance over technological development has been recognized in a range of contexts. For example, the United Kingdom Royal Commission on Environmental Pollution (2008) referred to the need to move from governance of risk to governance of, in the sense of democratic control over, innovation. The Nuffield Council on Bioethics (2012), also in the United Kingdom, argued for a ‘public ethics’ approach to biotechnology governance to be fostered through a ‘public discourse ethics’ involving appropriate use of public engagement exercises that provide ‘plural and conditional advice’. From Danish consensus conferences to the Australia’s Science and Technology Engagement Pathways (STEP) framework,⁴ various jurisdictions have either committed to or experimented with direct dialogue between policymakers, designers, and publics around technology.

However, as in the case of the first three rationales, ‘technology’ is not as special as first appears. The philosophy of Winner and Feenberg addresses technology largely in response to earlier literature that had treated technology as either autonomous or neutral, and therefore beyond the realm or priority of democratic control (Barry 2001: 7–8). The argument for democratic governance of technology is primarily about including technology among the spheres that can and ought to be subject to such governance. It does not make the case for limiting democratic governance to technology, or focusing exclusively on technology. For example, the Nuffield Council argued that emerging biotechnologies require particular focus:

[B]ecause it is precisely in this area that the normal democratic political process is most at risk of being undermined by deference to partial technical discourses and ‘science based’ policy that may obscure the realities of social choice between alternative scientific and technological pathways. (2012: 91)

The issue was thus extending normal democratic political process to a field in which it is sometimes bypassed.

In a sense, all governance is technology governance since, according to the broadest definitions of 'technology', the term includes everything that one might wish to govern, from human action and language to systems of regulation. But, however technology is defined, no definition seems to render the category itself more in need of democratic governance than whatever might be omitted.

Again, change in the sociotechnical landscape is more crucial than the fact that technology is involved per se. As new forms of conduct become possible, there is a choice which ought to be susceptible to democratic decision-making. The choice (p. 583) is whether the conduct should be encouraged, permitted, regulated, prohibited, or in some cases enabled. This will sometimes be dealt with through pre-existing law or regulation; in other situations, the default permission will be acceptable. However, there is always the possibility of, and occasional need for, active democratic oversight. This explains the need for public engagement and democratic decision-making at the technological frontier better than the inherent properties of the category 'technology' itself.

3.5 Conclusion: Technology per se is Irrelevant in Justifying Regulation

Technology covers a range of things and practices, with important political, social, and economic implications. In some contexts, it is not appropriate to allow technological development and design to follow its own course independent of regulation or democratic oversight. Because technological pathways are not inevitable, it is appropriate in a democracy to allow concerns about harm or other community objectives to influence technological trajectories (for example, Winner 1993).

However, while particular technologies (and their associated impacts) are relevant in justifying regulation, the fact that technology per se is involved is not. Regulation can be justified by reference to market failure, harm (to collectively desired rights), risk, justice, social solidarity, or a desire for democratic control, but it cannot be justified by reference to the fact that technology is involved. Rather it is technological *change* that provokes discussions about regulatory *change*. While technology itself is not a reason to regulate, the fact that new technology has made new things or practices possible *can be* a reason to introduce new regulation. Some new technologies are capable of causing new or heightened harms or risks or creating a different context in which harm can occur. Potential benefits may be contingent on use or coordination. In many cases, there will be no or insufficient rules or regulatory influences which relate to the new practices or things, simply due to their newness. The desirability of particular interventions (taking account of the harms and risks of the interventions themselves) will be a question for debate in the specific circumstances. What is at stake in this debate is not technology or human ingenuity, but newness and the choices (to permit, enable, encourage, discourage or prohibit) that are opened up.

The challenges that regulators face as a result of technology are primarily the result of the fact that technologies are constantly changing and evolving. This is the ‘pacing problem’ or ‘challenge of regulatory connection’ (Brownsword 2008; Marchant, Allenby, and Herkert 2011). Technological change raises two main issues for regulators—how best to manage new harms, risks, and areas of concern, and how to manage the poor targeting, uncertainty, and obsolescence in rules and regulatory (p. 584) regimes revealed as a result of technological change (Bennett Moses 2007). Further, the desire for public engagement around practices is more poignant when those practices are new and more easily shaped. Thus, unlike ‘technology’ per se, sociotechnical change does deserve the special attention of regulators.

4. Technology as a Regulatory Target

Having addressed the question of whether ‘technology’ can function as a rationale for regulation, the next question is whether it can be conceived of as a target of regulation. In other words, does it make sense to analyse regulation that ‘prescribes the application of a certain technology of production or process (and not others) as a form of control’ (Levi-Faur 2011: 10). Having addressed this question in an earlier article (Bennett Moses 2013b), this issue will be reprised only briefly here.

Even where the goal of regulation is to ensure that particular technological artefacts have particular features, the means used to achieve that goal may be less direct. Regulation may seek to influence the design of technological artefacts directly, or it may focus on the practices around those artefacts or their designers or users. For instance, one might enhance safety by specifying requirements for bridges, requiring those building bridges to conduct a series of tests prior to construction or mandating particular courses in accredited civil engineering programs, as well as through a variety of other mechanisms. In most cases, the aim is to influence people in ways that will (it is hoped) influence the shape of the technological artefacts themselves. If regulation seeks to influence a combination of people, things, and relationships, it is not clear which combinations of these are ‘technological’. If technology is defined broadly, so that all networks of humans and manufactured things are technological, then all regulation has technology as its object. If it is defined narrowly, confined to the regulation of things, one risks ignoring more appropriate regulatory means to achieve one’s ends.

There are three further reasons why discussions of ‘technology regulation’ are problematic. First, there is no inherent commonality among the diverse fields in which ‘technology’ is regulated, except to the extent that similar challenges are faced when technology changes. Second, treating technology as the object of regulation can lead to undesirable technology specificity in the formulation of rules or regulatory regimes. If regulators ask how to regulate a specific technology, the result will be a regulatory regime targeting that particular technology. This can be inefficient because of the focus on a subset of a broader problem and the tendency towards obsolescence. As has been stated with respect to nanotechnology, ‘[t]he (p. 585) elusive concept of “nanotechnology risk” and the way that

the term “nanotechnology” is currently being used may indeed turn efforts to “regulate nanotechnologies” into a ghost chase with potentially absurd consequences’ (Jaspers 2010: 273). Finally, the notion that technology is regulated by ‘technology regulation’ ignores the fact that regulation can influence technologies prior to their invention, innovation, or diffusion. The ‘regulation’ thus sometimes precedes the ‘technology’.

In practice, technology is only treated as an object of regulation—it is only visible—when the technology is new. The regulation of guns and automobiles is rarely discussed by those concerned with ‘technology regulation’. As described earlier, new technology does often require new regulation (whether or not directed at technological artefacts or processes directly). However, such new regulation need not treat the particular technological object or practice as its object.

5. General Principles for Regulating in the Face of Sociotechnical Change

Sections 3 and 4 sought to explain why the debate about law, regulation, and technology should change its frame from ‘regulating technology’ to addressing the challenges of designing regulatory regimes in the face of recent or ongoing sociotechnical change. This section explains how this requires a reframing of general principles of regulatory design, regulatory institutions, regulatory timing, and regulatory responsiveness that can be applied in specific contexts.

5.1 Regulatory Design: Technological Specificity

Technological neutrality has long been a mantra within policy circles,⁵ but it is insufficiently precise. In particular, it has a wide array of potential meanings which often conflict (Koops 2006; Reed 2007). For current purposes, a law or regulatory regime is described as technology specific to the extent that its scope of application is limited to a particular technological context. This represents a scale, rather than absolutes. A regulatory regime targeting nano-materials is highly technologically specific. A regime that regulated industrial chemicals would be less technologically specific. A regime that prescribed maximum levels of risk by reference to a general metric (e.g. x probability of loss of more than y human lives), independent of source (p. 586) or context, would be technologically neutral. This remains so even if such a rule prevented particular technological practices.

Viewed in this way, pure technological neutrality may not be the best means of achieving some regulatory goals. Many regulations designed to achieve interoperability between devices (and thus coordination) need to be framed in a very technology-specific way to be effective. Further, as explained in section 3, while the presence of technology is not a reason to regulate, some harms are associated with particular technological artefacts and practices. Where this is the case, the best means *may* be to treat the relevant technology as the regulatory target. For example, many jurisdictions have created an offence of in-

tentionally creating a human embryo by a process other than the fertilization of a human egg by human sperm. This mandates a particular procedure, which can be achieved in a laboratory or naturally, while prohibiting alternative procedures even if they achieve the same end, namely creation of a human embryo. Assuming the harm to be remedied is associated with the prohibited practices (for example, because human reproductive cloning violates human dignity), a technology-specific law (such as that enacted) may be the best way to achieve one's goal.

While technology specificity is sometimes useful, in other cases technological neutrality can ensure that a regulatory regime deals with an underlying problem, rather than the means through which it arises. For instance, where an offensive act (such as harassment) can be accomplished with a variety of different technologies, structuring different offences in terms of the 'misuse' of particular technologies risks duplication or obsolescence as the means through which crimes are accomplished change (Brenner 2007). Where the goal is technologically neutral, as in the case of reducing harassment, the technological context ought to be less relevant. Of course, most regulatory regimes involve a combination of technology-specific and technology-neutral goals and provisions.

Bringing these threads together, regulatory regimes should be technology-neutral to the extent that the regulatory rationale is similarly neutral. For instance, where harms or risks are associated exclusively with particular manufactured things or technological practices, it may be appropriate to focus a regulatory regime on those things and practices. Where similar harms and risks can arise as a result of diverse things or practices, then designing a rule or regime around only some of those things or practices is poorly targeted. The question is more complex when a particular thing or practice is the primary source of risk now, but where that fact is contingent. In many cases, new technology highlights a regulatory gap of which it becomes a mere example as subsequent technologies generate the same problems. In that case, a technologically specific rule or regime could well become ineffective in the future. While difficult to predict in advance, it is important to reflect on the 'true' regulatory rationale and the extent to which it is, and will continue to be, tied to a specific technology. Where it is possible to abstract away from (p. 587) technological specifics, one can design regulation to focus on outcomes rather than means and thus broaden its scope (Coglianese and Mendelson 2010). However, it is also important to acknowledge the limits of our predictive capacity, and thus the potential for a mirage of a technologically specific rationale that turns out to be too narrowly conceived. It is also important to bear in mind the desirability of a technological specific rule where it is important to limit the scope of that rule to circumstances in the contemplation of legislators due to negative consequences of over-reach (Ohm 2010).

Another general factor to consider, in addition to the desirability of aligning the scope of rationales with the scope of regulation, is the importance of clarity/interpretability and ease of application. No single feature (such as proper targeting or congruency with regulatory goals) operates alone in optimizing the design of regulation (Diver 1983). A regulatory requirement that cars must employ a particular device (such as seatbelts or automatic braking systems) is both clear to car manufacturers and inexpensive to check, but is

not necessarily congruent with the policy objective of enhancing safety. On the other hand, a regulatory requirement that cars must meet particular performance standards enables more technological means of compliance (Breyer 1982), at least in theory,⁶ but is more expensive to check, thus less accessible (Hemenway 1980). A perfectly technologically neutral requirement, that cars be designed so as to protect occupants in a crash, while congruent, is both non-transparent and inaccessible, thus difficult to enforce. Therefore, even where a goal is technologically neutral, it may be best achieved by employing rules with some explicit or implicit technological assumptions. And, whatever one attempts *ex ante*, it is important to remember that '[i]t is impossible, even in principle, to write an appropriate, objective, and specific rule for every imaginable situation' (Stumpff Morrison 2013: 650).

The question of the appropriate level of technological specificity is not an easy one. It can only be evaluated in a specific context, by reference to known regulatory goals, the existing sociotechnical context and the imagined future.

5.2 Regulatory Institutions: Regulating at the Appropriate Level

Recognizing the diversity of institutions with the capacity to regulate, either existing or potential, it is possible to align different levels of technological specificity within a regulatory regime at different levels. Institutions such as parliaments, which respond slowly and are less likely to be aware of technological developments, should develop relatively technology neutral legislation, while maintaining sufficient democratic oversight. The point is not that legislation can always be perfectly technologically neutral (if that were even possible) but rather that relative (p. 588) institutional rigidity is one reason that ought to push law making by some institutions towards the technology-neutral end of the scale.

Where technological specificity is important to provide clarity for those subject to regulation and enable more efficient regulatory monitoring, these can be delegated to other regulators, such as state agencies, professional bodies, industry groups, or individual firms. Depending on the specific context, such groups are likely to be both more aware of technological change and better able to respond promptly in amending rules, requirements and incentives. The degree of parliamentary oversight deemed desirable will vary by jurisdiction, and ought to take into account the specific context (including the desirability of greater democratic accountability in some contexts, the reliability of different regulators, and the responsibility of different industries and professional groups). The general rule should always give way to specific needs and concerns in specific contexts—the point here is not to displace specific analysis but rather to clarify how, as a general matter, regulatory regimes can be made more robust to technological change while acknowledging some advantages of technological specificity.⁷

5.3 Regulatory Timing: Managing Uncertainty

Most commentators agree that the timing of regulatory responses to new technologies is generally poor, coming to too late. The fable of the hare and the tortoise is frequently in-

voked (Bennett Moses 2011), often without reflecting on the irony that it was the tortoise who won the race. Understanding the impact of sociotechnical change on legal and regulatory regimes explains this perception, rendering it to some extent inevitable. The problem is not that lawyers and regulators are more stupid or less creative than the brilliant and innovative engineers, but rather that all regulatory regimes inevitably make sociotechnical assumptions that may become obsolete, and nothing can be fixed instantly. The result is that regulation is typically stabilizing and discouraging of innovation (Heyvaert 2011). The general recommendations made in sections 5.1 and 5.2 may alleviate the difficulty, but cannot completely eliminate it.

The question of timing is often discussed as if technology is itself the object of regulation. Consider, for example, the Collingridge dilemma (Collingridge 1980). This suggests that regulators must choose between early regulation, where there are many unknowns about technological trajectory, its risks and benefits, and late regulation, when technological frames are less flexible (Collingridge 1980). However, this dilemma does not apply where generally operable existing laws (for example, contract, negligence, and consumer protection laws) are able to deal with risks associated with new products. It is only where existing rules or regimes make sociotechnical assumptions that are no longer true, or where new rules or regimes are (p. 589) justified, that there is a risk of falling behind. Even there, there is often no reason to delay rectification, except for priorities associated with political agenda-setting. Thus the regulation of industrial chemicals can be amended promptly so as to ensure that nano-versions of existing substances are treated as new for the purposes of existing testing requirements. This is not the often called for nano-specific regulation (the desirability of which is questionable), but it ensures at least that nano-materials undergo similar testing to other industrial chemicals.

In fact, the Collingridge dilemma is really only applicable to a decision to introduce new regulation whose rationale and target are both closely tied to a new technology. In that case, early regulation takes advantage of the lower costs of influencing a still-flexible set of sociotechnical practices (Huber 1983). Over time, technological frames and conventions become fixed in both technological practice and legal and regulatory assumptions (Flichy 2007), making it difficult and costly, albeit not impossible (Knie 1992), to change regulation and thus alter the course of sociotechnical practice, particularly where the technology diffuses exponentially after reaching a critical mass of users (Bernstein 2006). On the other hand, designing regulation whose rationale and target are closely tied to a new technology is an exercise fraught with uncertainty. At early stages of development, both technological trajectories and estimations of benefit, harm and risk are uncertain due to limited experience. Thus new technologies are closely associated with uncertainty instead of calculable, quantifiable risks (Paddock 2010). Early assumptions made in justifying regulation may well prove erroneous. The difficulty is compounded because there is not only limited practical experience with the new technology, hence scientific and technical uncertainty, but also limited regulatory experience. Even where risks are ultimately calculable, they may require new risk assessment tools to perform the calculation (leaving risks uncertain while these are developed). Regulation introduced early risks over- or under- regulation, given the speculative nature of risk assessment for untried technolo-

gies (Green 1990). Democratic mechanisms, such as public engagement, are limited as they require small groups with an opportunity to learn about technological potential and risk, both of which are largely unknown.

To manage the Collingridge dilemma in circumstances where it does apply, one needs to take a position on how to manage uncertainty. There are a variety of principles that can be invoked in enabling early regulation in the face of uncertainty, and significant normative dispute around them. The most well-known of these is the precautionary principle (see generally Harding and Fisher 1999). There are arguments for and against particular principles,⁸ but it is clear that *some principle* is needed, ideally based on democratically expressed preferences in terms of social values and risk tolerance within a particular jurisdiction. Whatever principle is adopted ought to be relatively stable, and hence technologically neutral, so that it can be called on quickly for all new technologies. It can, however, differentiate between the nature of the value implicated (e.g. importance, quantifiability) and category of risk (for example, health versus crime).

(p. 590) The existence of such a principle does not exhaust the question of regulatory timing. A precautionary approach will affect regulatory attitudes and approaches, so that the regulatory regime tends towards over-regulation in the context of uncertainty. Other approaches suggest an opposite bias. But whichever is chosen, the initial regulatory regime will make assumptions about impact, harm, and risk some of which are likely to be proven false over time. Public engagement and ethical reflection around a particular technology may influence regulators in different ways over time. Constant adjustment is thus still required. Hence suggestions that early regulation, where it is introduced, be designed to be temporary and flexible (Wu 2011; Cortez 2014). Alternatively, regulation might be designed to be relatively general and technology neutral, so that it only applies if particular risks come to fruition, either in relation to the technology of initial concern or subsequently. For example, one might discourage or prohibit a broad class of conduct unless particular safety features are proven. In this way, uncertainty can even be leveraged so as to obtain agreement between those believing a particular technology is safe and those who believe it is not (Mandel 2013).

The question of the optimal timing of regulatory responses to sociotechnical change is more complex than the simple tortoise and hare metaphor would suggest. In some cases, there is no reason for delay. In others, delay can be avoided but only by implementing a regime that itself tends towards obsolescence. Ultimately, a mandate for regulation that responds promptly to sociotechnical change requires careful management rather than simplistic references to fable.

5.4 Regulatory Responsiveness: Monitoring

One of the difficulties with law and regulation is its relative stability. Once a legal rule or a regulatory program exists, it remains stable until there is some impetus for change. There is a degree of ‘model myopia’ where assumptions made in the design of a regulatory program become entrenched (Black and Baldwin 2010). Once the sociotechnical land-

scape shifts, there may be good reasons to make adjustments but these will only happen if brought to the attention of those with the power to make the changes.

Because of this problem, there are a number of proposals for the creation of a specialist agency tasked with monitoring the technological horizon and recommending adjustments to law and regulation (for example, Gammel, Lösch, and Nordmann 2010). These can take a variety of forms. In some jurisdictions, existing law reform or technology assessment agencies have, as part of their mission, a role in recommending legal, regulatory, or policy changes that take account of new technological developments (Bennett Moses 2011, 2013). There are also proposals for creation of a specialist agency, either with a general mission⁹ or a role confined (p. 591) to a specific technological field.¹⁰ The former has the advantage of including within its activities new technological fields at early stage, drawing on expertise and experience across a diverse range of technological fields (Bowman 2013: 166). There are also important questions around the role of such an agency in facilitating and taking account of public engagement. While this chapter does not purport to specify how such an agency should be designed, it does strongly endorse the need for one.

6. Conclusion

There are many things that can (and have) been said about designing good regulatory regimes. A discussion of regulating in the context of technological change need not repeat such general counsels or debate their priority and importance. Instead, this chapter asks what additional things regulators need to be aware of when considering new technologies or regulating in a field known to be prone to ongoing technological change.

The recommendations made here in relation to regulatory design, institutions, timing, and monitoring cannot be mindlessly applied in a particular context. In some cases, general advice about how to manage sociotechnical change in designing and implementing a regulatory regime must give way to the necessities of particular circumstances, including political considerations (Black 2012). However, it is hoped that an enhanced understanding of how law and regulation interact with a changing sociotechnical landscape will provide a better understanding of the advantages and limitations of different approaches. Thus even those disinterested in the more theoretical points made here can come to be more sceptical of prescriptions such as ‘technological neutrality’ and oversimplified mandates around regulatory timing.

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Notes:

(1.) Often including synthetic biology.

(2.) See, for example, Fertility Clinic Success Rate and Certification Act 1992, PL No 102-493, 106 Stat 3146 (US).

(3.) See, for example *Prohibition of Human Cloning for Reproduction Act 2002* (Aust Cth); Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction (10 April 1972) 1015 UNTS 163 (entered into force 26 March 1975).

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(5.) See for example, US Government, *Framework for Global Electronic Commerce* (July 1997) <<http://clinton4.nara.gov/WH/New/Commerce/>> accessed 14 October 2015 ('rules should be technology-neutral'); Organisation for Economic Co-operation and Development, 'Council Recommendation on Principles for Internet Policy Making' (13 December 2011). <<http://www.oecd.org/internet/ieconomy/49258588.pdf>> accessed 14 October 2015 ('Maintaining technology neutrality and appropriate quality for all Internet services is also important ...'); Framework Directive 2002/21/EC of 7 March 2002 on a common regulatory framework for electronic communications networks and services [2002] OJ L108/33 (citing the requirement to take into account the desirability of making regulation 'technologically neutral'). See also Agreement on Trade-Related Aspects of Intellectual Property Rights (Marrakesh, Morocco, 15 April 1994), Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, The Legal Texts: The Results of the Uruguay Round of Multilateral Negotiations 321 (1999) 1869 UNTS 299, 33 ILM 1197, Article 27 (requiring that patents be available and rights enjoyable without discrimination as to 'the field of technology').

(6.) Performance standards can also tend towards technological obsolescence themselves (thus losing congruency) given that the choice of standard is often based on assumptions about what is technically possible.

(7.) It thus goes some way towards meeting the need for 'adaptive management systems that can respond quickly and effectively as new information becomes available' proposed by the Royal Commission on Environmental Pollution in the United Kingdom (2008).

(8.) For an argument against precaution, see Wildavsky (1988); Sunstein (2005). See also Beyleveld and Brownsword (2012) (proposing a principle that is similar to, but different from, the standard precautionary principle).

(9.) Similar proposals include that of Marchant and Wallach (2013) for 'coordination committees', being public/private consortia that serve a coordinating function for governance of emerging technologies.

(10.) See also Kuzma (2013: 196–197) (proposing the creation of three groups to oversee governance of GMOs—an interagency group, a diverse stakeholder group and a group coordinating wider public engagement); Calo (2014) (arguing for a new federal agency in the US to *inter alia* advise on robotics law and policy).

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Hacking Metaphors in the Anticipatory Governance of Emerging Technology: The Case of Regulating Robots



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Abstract and Keywords

Metaphors are essential tools for helping us to interpret new technologies, integrate them into our daily lives and govern them appropriately. Metaphors link the unfamiliar to the familiar. However, metaphors are often partial and unstable, especially in their application to emerging technologies, such as robots—robots are here, but we have yet to decide on the many roles that robots will occupy in society. Metaphors also tend to promote certain values over others. Applying a particular metaphor to a technology thus casts that technology in a political role. In this chapter, we promote metaphor hacking, a playful and practical methodology for identifying and analysing potential metaphors that might be applied in the governance of technology. We argue that metaphor hacking allows us to anticipate some of the governance and ethical issues that could emerge around a technology owing to the metaphors we choose for describing them.

Keywords: technology metaphors, design, robotics, robot ethics, driverless cars, robotics policy, robotics law, analogical reasoning

1. Introduction

ROBOTS have arrived, and more are on the way. Robots are emerging from the cages of factory floors, interacting with manufacturing and warehouse workers, converging on lower airspaces to deliver goods and gather information, replacing home appliances and electronics to create connected, ‘smart’ domestic environments and travelling to places beyond human capacity to open up new frontiers of discovery. Robots, big and small, have been integrated into healthcare, transportation, information gathering, production, and entertainment. In public and private spaces, they are changing the settings and dynamics in which they operate.

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(p. 598) There is no concise, uncontested definition of what a ‘robot’ is. They may best be understood through the sense-think-act paradigm, which distinguishes robots as any technology that gathers data about the environment through one or more sensors, processes the information in a relatively autonomous fashion, and acts on the physical world (Bekey 2012). Though this definition generally excludes software and computers from the robot family (despite their ability to sense and interact with the world through user interfaces), the line between any artificial intelligence (AI) and robots is blurred in part because many of the ethical and governance issues arising in the context of robotics also arise in the context of AI (Kerr 2004; Calo 2012).

We are still in the beginning of the robotic revolution, which has been predicted to occur in various ways and to proceed at various paces. Microsoft founder Bill Gates (2007) stated, ‘[A]s I look at the trends that are now starting to converge, I can envision a future in which robotic devices will become a nearly ubiquitous part of our day-to-day lives.’ Rodney Brooks (2003) explained that the robotics revolution is at its ‘nascent stage, set to burst over us in the early part of the twenty-first century. Mankind’s centuries-long quest to build artificial creatures is bearing fruit.’ The Obama administration’s National Robotics Initiative ‘is accelerating innovations that will expand the horizons of human capacity and potentially add over \$100 billion to the American economy over the next decade’ (Larson 2013). The European Commission partnership with the robotics community, represented as euRobotics aisbl, claims, ‘robotics technology will become dominant in the coming decade. It will influence every aspect of work and home’ (euRobotics AISBL 2013).

There are currently no regulatory regimes specifically designed for robots. Rather, robots fall within the general laws of civil and criminal liability (Karnow 2015). Robots are considered tools that humans use, and those humans may or may not be held accountable for using a robot, except where there are specific legislative provisions in place like the Federal Aviation Administration’s temporary ban on the commercial use of drones, or the handful of states that have passed specific laws to address driverless cars. The disruptive nature of robotics challenges legal and ethical foundations that maintain and guide social order (Calo 2015; Millar and Kerr 2016). These predictions of regulatory disruption lead to anticipatory governance questions like ‘What should we be doing to usher in and shape the oncoming robotic revolution to best serve the environment and humanity?’, ‘How should designers, users, and policymakers think about robots?’, and ‘Is there a need for new ethics, policies, and laws unique to robotics?’. Anticipatory governance is a relatively new approach to social issues connected with technological change; it recognizes the futility of regulating according to a precise predicted future. Instead anticipatory governance embraces the possibility of multiple futures and seeks to build institutional capacity to understand and develop choices, contexts, and reflexivity (Sarewitz 2011).

Metaphors matter to each of these questions, and so one can use them in anticipatory governance. Technological metaphors are integral to the creative inception, (p. 599) user-based design, deployment, and potential uses of robots. As we further integrate robotics into various aspects of society, the metaphors for making sense of and categorizing robots

will be questioned and contested as their political outcomes are revealed. The design and application of robots will contribute to the way we understand and use robots in light of existing technologies and expectations, while law and policy will use metaphors and analogical reasoning to regulate robots in light of existing rules and doctrine. Anticipating the metaphors designers and users might employ will help guide policy, but is steeped in uncertainty. This chapter critically interrogates the role that metaphors play in the governance of emerging technologies, and considers how technological metaphors can be chosen to drive governance that accomplishes normative goals.

2. The Instability of Metaphors in Robotics Law, Policy, and Ethics

In her wildly successful IndieGoGo fundraising video, MIT roboticist Cynthia Breazeal claims that her latest social robotics creation—Jibo—is ‘not just an aluminium shell; nor is he just a three-axis motor system; he’s not even just a connected device; he’s [pause] one of the family’ (2014). Metaphors like ‘family member’ play a fundamental role in framing our understanding and interpretation of technology. In choosing to describe Jibo as a family member, Breazeal simultaneously anthropomorphizes Jibo, making ‘him’ seem human-like, and places him in the centre of the family, an intimate social unit. She constructs the metaphor by presenting a montage of scenes featuring Jibo interacting with a family during birthday parties and holiday gatherings, one-on-one helping the family matriarch while in the kitchen (the heart of the home) and even as storyteller during the youngest daughter’s bedtime. Jibo is presented as a reliable, thoughtful, trusted, and active family member.

Breazeal’s video is clearly a pitch aimed at raising capital for Jibo, Inc, an expensive technology project. But to consider it merely a pitch would be a mistake. The success of the video underscores the power of metaphors to frame the meaning of a technology for various audiences. News stories covering the fundraising campaign further entrenched Jibo’s public preproduction image by echoing Jibo’s family member metaphor, one article going so far as to suggest Jibo as a kind of cure for loneliness (Baker 2014; Clark 2014; Subbaraman 2015). Jibo exceeded its fundraising goals within a week, ultimately raising over \$2m in less than a month (Annear 2014). Whether or not Breazeal and her team have oversold a technology remains to be seen—Jibo may or may not succeed in fulfilling users’ expectations as a family member. (p. 600) Regardless, the Jibo case exemplifies how metaphors can play an important role in framing the way the media and consumers come to understand and interpret a technology. It follows that metaphors can also frame how designers, engineers, the law, and policymakers understand and interpret technology (Richards and Smart 2015).

Whether or not Jibo is best described as a family member is, to an important degree, an unsettled question that will depend largely on who is choosing to describe it, and what their values and interests are. One could select another metaphor for Jibo. Though a successful metaphor will undoubtedly highlight salient aspects and features of a technology,

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the picture depicted by any metaphor is often partial, and often emphasizes particular values held by those offering it up (Guston 2013). Thus, the metaphor a person uses to describe a technology will depend on her goals, interests, values, politics, and even professional background. In this sense metaphors are contextually situated, contested and unstable.

Several competing and overlapping metaphors are emerging in the literature on robotics law, policy, and ethics, which help to underscore their contextual nature, contestedness, and instability.

Richards and Smart (2015) argue that for the foreseeable future, robots should be understood as mere 'tools', no different to hammers or web browsers. As tools, robots are meant to be understood as neutral objects that always, and only, behave according to the deterministic programming that animates them. Adopting the tool metaphor can be a challenge, they argue, because of common competing metaphors that invite us to think of robots as anything but mere tools. In movies and other popular media robots are quite often depicted as having unique personalities, free will, emotionally expressive faces, arms, legs and other human-like qualities and forms in order to provide an emotional hook that draws the viewer into the story. And it seems all too easy to succeed in drawing us in. Robots are often successfully depicted as friends, lovers, pets, villains, jokers, slaves, servants, underdogs, terrorists, and countless other human or animal-like characters. Research has shown that humans tend to treat robots (and other technology) as if they have human or animal-like qualities—we anthropomorphize robots—even in cases where the robot's behaviour is extremely unsophisticated (Duffy 2003). Even designers and engineers, who 'ought to know better', are found to be quite susceptible to anthropomorphizing tendencies (Proudfoot 2011). Despite the many challenges posed by our psychology, Richards and Smart (2015) insist that when we anthropomorphize a robot we are guilty of adopting an inaccurate metaphor, a mistake they call the android fallacy. One commits the android fallacy whenever they make assumptions about a robot's capabilities based on its appearance. The android fallacy usually involves assuming a robot is more human-like than it is. According to Richards and Smart, committing the android fallacy in the context of law and policymaking can be 'inappropriate' and even 'dangerous' (2015). The android fallacy, they say, 'will lead us into making false assumptions about the capabilities of robots, and to think (p. 601) of them as something more than the machines that they are' (Richards and Smart 2015, 24). Thus, in order to get the law right we must adopt the 'tool' metaphor and 'avoid the android fallacy at all costs' (Richards and Smart 2015, 24). We must govern according to the robot's function, not its form.

Richards and Smart would likely balk at the suggestion that Jibo is best understood as a family member. For them, to apply that metaphor to Jibo would be a straightforward example of the android fallacy, with problematic legislation and policy certain to follow. However, despite their insistence that any metaphor other than 'tool' would amount to a misunderstanding of technology, the 'tool' metaphor is but one of many choices one can adopt in the context of robotics.

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Breazeal, for example, has expressed frustration with those who refer to social robots as slaves or mere tools (Baker 2014). Though her IndieGoGo video focuses on the family member metaphor, she argues that a well-designed social robot is best thought of as a 'partner'. Tools, being designed with individual users and specific tasks in mind, 'force you to leave the moment', whereas a partner like 'Jibo ... will allow you to access all [your] information and technology while you stay in the moment—while you stay in your life' (Baker 2014). In contrast to Richards and Smart's legal perspective, Breazeal's design perspective insists on the partner metaphor while imagining complex groups of users and rich social contexts within which the robot will be actively situated. Describing Kismet, one of her first social robotics creations, Breazeal says

Kismet had a lot of charm. When you create something like a social robot, you can experience it on all these different levels. You can think about it from the science standpoint and the engineering standpoint, but you can experience it as a social other. And they're not in conflict. When Kismet would turn and look at you with its eyes, you felt like someone was at home. It was like, I feel like I'm talking to someone who is actually interpreting and responding and interacting with me in this connected way. I don't feel like it's a dead ghost of a shell. I actually feel the presence of Kismet.

(Baker 2014)

The differences between these two perspectives demonstrate how different values and worldviews anchor each competing metaphor. From the perspectives of a lawyer and an engineer, the partner metaphor seems to fail for its inability to anticipate legal and regulatory quagmires that would complicate the law. According to a social robotics engineer, the tool metaphor fails for its inability to acknowledge and anticipate good and meaningful user experiences. Worse, it denies the social bond that can be instantiated between a human and a robot. Each perspective, and its accompanying choice of metaphor, captures a different aspect of the same technology, emphasizing the values that aid in achieving some normative goal.

The tool metaphor is not the only one suited to a legal perspective. Richards and Smart argue that the deterministic nature of computer programs gives us good reason to adopt the tool metaphor: deterministic programs seem to allow us to predict a robot's behaviour in advance and explain it after the fact. However, many current (p. 602) and next-generation robots are being designed in such a way that their behaviour is unpredictable (Millar and Kerr 2016). Their unpredictability stems in part from the fact that they are designed to operate in open environments, which means the set of inputs feeding the deterministic programs are constantly shifting. Though they are predictable in principle, that is, in cases where all of the inputs and the current state of the program are known, the reality is that knowing that information in advance of the robots acting is not practically feasible. Moreover, unpredictability by design is becoming more and more common because it enables robots to operate in real-world environments with little constraint—unpredictability by design helps to make robots more autonomous.

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Unpredictability can directly challenge the tool metaphor in a legal context, especially when a robot is designed to be unpredictable and social. Consistent with Breazeal's description of Kismet, our interactions with social robots tend to lead us to think of them more like individual agents than tools. In fact, humans seem to be psychologically wired in such a way that a robot's social emergent behaviour makes it very difficult for us to think of social robots as mere tools (Duffy 2003; Proudfoot 2011; Calo 2015; Darling 2015). According to Calo (2015: 119), 'the effect is so systematic that a team of prominent psychologists and engineers has argued for a new ontological category for robots somewhere between object and agent'. Placing the social robot in an ontological category of its own would challenge a legal system that has, to date, tended to treat objects (robots included) as mere tools (Calo 2015; Richards and Smart 2015). Human psychology, therefore, threatens to 'upset [the individual-tool] dichotomy and the [legal] doctrines it underpins' (Calo 2015: 133).

Metaphors can also be used as deliberate framing devices, where the intent is to nudge a person to think of a robot in a particular way when interacting with it. For example, it might be beneficial to promote a strong tool metaphor when deploying mine clearing military robots, in order to prevent soldiers from becoming attached to those robots. Soldiers who have developed personal attachments to their robots have been known to risk their lives to 'save' the robots when those robots take damage and become 'injured' (Darling 2015). On the other hand, it might be beneficial to promote metaphors that encourage social bonding and trust in applications that rely on those social features for their success, in companion robots, for example (Darling 2015). The benefits of framing social robots as 'companions' extend beyond mere ease of use. As Darling notes, social robots are being designed to 'provide companionship, teaching, therapy, or motivation that has been shown to work most effectively when [the robots] are perceived as social agents' rather than mere tools (Darling 2015: 6).

Though some believe we err any time we commit the android fallacy, our choice of metaphor is decidedly flexible. Rather than limit our choice of metaphor based on narrow technical considerations, our decision to use a particular metaphor should depend on the particular robot being described, as well as normative outcomes and goals we wish to realize by using that robot. Importantly, there may be many (p. 603) societal benefits stemming from robotics that we stand to gain or lose depending on the metaphors we attach to each robot.

Policy and regulation are influenced by our choice of adopted metaphor for any particular robot. For example, one might be tempted to regulate driverless cars, such as the Google Car, much like any other car. However, in addition to requiring traditional technical solutions that will keep it safely on the road (for example an engine, steering and braking systems), driverless cars will also require software that automates complex ethical decision-making in order to navigate traffic as safely as possible (Lin 2013, 2014a, Lin 2014b; Millar 2015). As the following hypothetical scenario illustrates, this latter requirement could

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introduce new kinds of design and engineering challenges, which will in turn demand something novel from policy and regulatory bodies:

The Tunnel Problem: Steve is travelling along a single-lane mountain road in a self-driving car that is fast approaching a narrow tunnel. Just before entering the tunnel a child errantly runs into the road and trips in the centre of the lane, effectively blocking the entrance to the tunnel. The car is unable to brake in time to avoid a crash. It has but two options: hit and kill the child, or swerve into the wall on either side of the tunnel, thus killing Steve. If the decision must be made in milliseconds, the computer will have to make the call. What should the car do?

(Millar 2015)

The tunnel problem is not a traditional design or engineering problem. From an ethical perspective, there is no 'right' answer to the question it raises. Thus, though a solution requires technical elements (e.g. software, hardware), the tunnel problem is not a 'technical' problem in any traditional sense of the term. In addition, the question clearly has ethically significant implications for Steve. Is there a metaphor that is useful for helping us to frame the ethical, design, and governance issues packed into the tunnel problem? Because the car will ultimately have to be programmed to 'make' the life-or-death decision to swerve this way or that we can think of it as a 'moral proxy', poised to make that important decision on Steve's behalf (Millar 2014, 2015). Completing the metaphor, as is the case in medical ethics where we have a long history of governing proxy decision-making, it could be that governing driverless cars effectively requires us to ensure the robot proxy (driverless car) is designed in such a way that it acts in Steve's best interests (Millar 2015). This could mean designing cars to have 'ethics settings' for their users, or it could mean bolstering informed consent practices surrounding driverless cars, say through broadly publicized industry standards surrounding automated ethical decision-making (Millar 2015). Borrowing from Darling's argument, the moral proxy metaphor can preserve individual autonomy over deeply personal moral decisions. Such a policy decision would undoubtedly complicate current legal and regulatory frameworks, and could be seen by manufacturers as undesirable (Lin 2014b). Given that automakers undoubtedly will be required to design for tunnel-like scenarios, regulatory agencies will be required to take such programming into account in their positions on driverless cars. Doing so will require both automakers and regulators to adopt novel (p. 604) metaphors like 'moral proxy', among others, to describe the various sociotechnical aspects of driverless cars.

Various other metaphors have been proposed for different novel robotics applications, each of which carries with it unique legal, policy and ethical implications. IBM Watson, the supercomputer that beat the two best human competitors at Jeopardy!, has been described as an 'expert robot' (Millar and Kerr 2016). IBM Watson is designed to extract meaningful and useful information from natural language (unstructured text-based sources), and can be trained to answer detailed and nuanced questions relating to a particular field. If trained well, Watson could perform better at particular tasks than its human counterparts, at which point it could make sense to describe it as an expert. Watson

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is currently being employed in healthcare settings, to help provide the bases for diagnoses, decisions about treatment plans, and other medical decisions (Millar and Kerr 2016). Watson works by scouring academic healthcare journals, patient records, and other text-based sources to 'learn' as much as it can about particular medical specialties. Watson is doing more and more of a job that has traditionally been done by human healthcare experts. Adopting the expert metaphor in the case of Watson could someday fit, but carries significant ethical and legal implications for other (human) healthcare experts, whose decision-making authority will be challenged in light of Watson's abilities. The expert metaphor will also challenge healthcare policymakers who will need to figure out the role that Watson should play within healthcare, and develop appropriate policy to govern it (Millar and Kerr 2016).

Robots have also been described as 'children', 'animals', and 'slaves' in various other contexts. Indeed, the growing number of metaphors used to describe robots indicates that there is no single metaphor that captures the essence of a robot or any other technology. Each choice of metaphor maps onto a particular set of values and perspectives, and each carries with it a unique set of legal, policy and ethical implications. Determining which metaphor to adopt in relation to a particular robot is an important decision that deserves growing attention if we are to interpret technology in a way that allows us to realize our normative goals for that technology.

3. Innovation and the Life Cycle of Sociotechnological Metaphors

Technology evolves with the addition of new features, capabilities, applications and uses. Likewise, the metaphors used to describe it will often require adjustment, or wholesale change in response to a new sociotechnical reality. Thus, metaphors, like (p. 605) the technologies they describe, have a life cycle of their own. Understanding this life cycle allows us to develop strategies for anticipating the effect that metaphors will have on a technology so that we can shape the technology and governance frameworks to satisfy our normative goals. As we will explain, though, controlling technological metaphors to achieve particular goals is no easy task.

Science and technology innovations begin with metaphors that compare the old and familiar to the new and unfamiliar. For instance, Benjamin Franklin's electrical experiments were driven by observed similarities with lightning (Heilbron 1979). Alexander Graham Bell studied the bones in the human ear to craft the telephone (Carlson and Gorman 1992). The computer-mind metaphor has played an important and controversial role in directing artificial intelligence research and deployment (West and Travis 1991; Warwick 2011). Albert Einstein called his own creative, discovery process 'combinatory play' (Einstein 1954: 32). Innovation is, in essence, analogical reasoning:

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[T]he process whereby a network of known relations is playfully combined with a network of postulated or newly discovered relations so that the former informs the latter. Analogical thinking makes unmapped terrain a little less wild by comparing it to what has already been tamed.

(Geary 2011: 170)

An integral part of the innovation process, metaphors may take a different shape during the design and distribution process, when they emerge from designing with the user in mind. A central question asked by human-computer interaction (HCI) researchers concerned with designing usable systems is, 'how can we ensure that users acquire an appropriate mental model of a system?' (Booth 2015: 75). Popular HCI textbooks explain that 'very few will debate the value of a good metaphor for increasing the initial familiarity between user and computer application' (Dix and others 1998: 149). The success of initial user interface metaphors like 'windows', 'menu', 'scroll', 'file', and 'desktop' continues to drive design paradigms, but not without controversy. Overt metaphors built into infamous user interface failures like General Magic's 'Magic Cap' in 1994 and Microsoft's 'Bob' in 1995 (both of which employed a 'home office' metaphor complete with images of desks, phones, rolodexes, and other office equipment), made some question the utility of metaphors in design and validated criticism by those that had felt the utility of metaphors in design had been overstated (Blackwell 2006). Conceptual metaphors help users understand the functionality and capabilities of a new system in relation to what they already understand, but users do not necessarily or instantaneously latch onto all conceptual metaphors, which then can create a clunky or confusing user experience. The user-focused interactive sense-making process continues to be endorsed and studied by HCI researchers and designers (Blackwell 2006).

Various human-robotic interaction (HRI) studies have demonstrated the usefulness and potential complications of using metaphors in design. Avateering and puppeteering metaphors have been shown to help users understand and operate (p. 606) telerobots (Hoffman, Kubat, and Breazeal 2008; Koh 2014). While the joystick metaphor is incredibly intuitive for humans directly controlling robot motion, it is problematic when the robot under control can also initiate movements. In these cases, 'back seat driving' or 'walking a dog' metaphors have been shown to improve task performance (Bruemmer, Gertman, and Nielsen 2007). Employing anthropomorphism in robot design is more controversial than joysticks or puppets because it brings to the forefront debates about utility versus design and social anxieties ranging from slavery to job loss (Schneiderman 1989; Duffy 2003; Fink 2012) but, as discussed previously, carries a degree of inevitability (Krementsov and Todes 1991; Duffy 2003; Fink 2012). Even unmotivated, people have a strong tendency to anthropomorphize artificial intelligence and robotic systems in ways that can lead to unpredictability, vagueness, and strong attitudinal and behavioural responses (Duffy 2003).

There are limits and consequences in attempting to direct users' perspectives. As expressed above, metaphors in computational design often take on a 'technology as tool'

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perspective, seeking to solve problems by framing them in very particular ways (Bijker 1987; Oudshoorn and Pinch 2005). Choices in design thus politically shape use, users and social outcomes surrounding a technology in particular ways (Winner 1980; Nissenbaum 2001). Robotics research, however, has started to use metaphors like ‘swarms’ (e.g. Brambilla et al. 2013) and ‘teams’ (e.g. Breazeal 2004; Steinfeld and others 2006) to develop and deploy technologies, suggesting an approach more closely aligned with Bruno Latour’s actor-network theory (Latour 2005; Jones 2015), which recognizes the autonomy of technological objects, and politicizing design in ways that further acknowledge the powerful role of the technology in relation to human interactors.

Sooner or later technologies, if broadly adopted, are formally contested in regulatory or judicial settings, where competing metaphors play a central role. Technologies may even be designed to anticipate such formal contestations, bringing policy and law into the interpretive fold early in the innovation process. For instance, changes to media distribution in the 1990s through the 2000s saw significant metaphorical battles that altered the design of systems. The copyright industry lobbied both policymakers and the general public in an attempt to frame the debate, emphasizing that media copyrights are ‘property’ and insisting that unlicensed use of such material is a form of ‘theft’ and ‘piracy’. Scholars and activists combatted this narrative with environmental metaphors like the ‘digital commons’, ‘media recycling’, and ‘cultural conservation’ (Reyman 2010: 75), as well as ‘sharing’ and ‘gift’ economies and cultures (Lessig 2008). Anticipating the effects of metaphors in the legal context might then begin to shape the outcomes of policy debates before they erupt, or perhaps avoid them altogether.

Metaphors also impact the way contested technologies are framed in political arenas. Controlling metaphors means controlling the conversation, and eventually the outcome. For this reason, political debates often become a battle of metaphors. (p. 607) In the early days of the Internet, numerous and varied sources argued about which metaphors should guide policy. Casting the Internet as an ‘information superhighway’, for example, suggests it is both a public resource and commercial interest. The information superhighway metaphor was used extensively in the 1992 American presidential campaign. Al Gore, an outspoken advocate for Internet development when it was still mysterious to the public explained,

One helpful way is to think of the national Information Infrastructure as a network of highways—much like the interstates begun in the ’50s ... These highways will be wider than today’s technology permits ... because new uses of video and voice and computers will consist of even more information moving at even faster speeds ... They need wide roads.

(Gore 1993)

Casting the Internet as a separate ‘cyberspace’ suggests a borderless virtual community beyond the reach of national law. Activist and founder of the Electronic Frontier Foundation, John Perry Barlow, wrote in 1993

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Governments of the Industrial World, you weary giants of flesh and steel, I come from Cyberspace, the new home of Mind. On behalf of the future, I ask you of the past to leave us alone. You are not welcome among us. You have no sovereignty where we gather.

(Barlow 1996)

Probing into other technological metaphors has been performed in numerous areas of technology law. Josephine Wolff (2014) analyses the three most common metaphors in cybersecurity—‘burglary’, ‘war’, and ‘health’—to find their weaknesses. The burglary metaphor derives from concepts of physical security like fences and gates, but suggests that security flaws will be observable to defenders, making it possible to guard against all possible entry (Wolff 2014). Both the war and burglary metaphors situate as the threat human actors with agency and malintent, but the health metaphor likens threats to a pervasive disease that replicates indiscriminately (Wolf 2014). Similarly, some find weakness in lack of human involvement in cloud computing, which relies on other natural metaphors like ‘data streams’ and ‘data flows’ in which ‘people are nowhere to be found’ (Hwang and Levy 2015). Pierre de Vries (2008) challenges the spectrum-as-territory metaphor, arguing that non-spatial metaphors like ‘the internet’, ‘internet protocol addresses’, ‘domain names’, or ‘trademarks’ may be better suited to frame spectrum policy. The territory metaphor treats spectrum as a natural resource, implying a variety of other concepts like ‘abundance’, ‘scarcity’, ‘utility’, and ‘productivity’, which causes serious impediments to addressing signal interference problems (de Vries 2008). Instead, de Vries argues that ‘trademarks’ provides the most suitable metaphor, because rights and protections are achieved by registering with a government office and harmful interference can effectively be equated to unauthorized use of a mark (Vries 2008). These metaphors shape and control the political narrative and drive not only specific types of policies and outcomes but also provide creative and flexible solutions to governance issues.

(p. 608) Before and after laws and policies are put in place, much of governance is further developed and refined through the court systems, where analogical reasoning is employed to determine how a new set of facts relates to facts in existing case law. Analogical reasoning by judges involves conforming their decisions to the existing body of law by surveying past decisions, identifying the way in which these decisions are similar to, or different to, the question at hand, and deciding the present, unsettled issue through this comparative exercise (Sherwin 1999). Cass Sunstein (1993: 745) describes this analogical work in the following four steps:

- (1)** Some fact pattern A has a certain characteristic X, or characteristics X, Y, and Z;
- (2)** Fact pattern B differs from A in some respects but shares characteristics X, or characteristics X, Y, and Z;
- (3)** The law treats A in a certain way;
- (4)** Because B shares certain characteristics with A, the law should treat B the same way.

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Sunstein has defended this practice by arguing that judges who disagree on politics and theory may be able to find agreement on low-level analogies among cases allowing them to settle pressing questions without taking on controversial political or moral questions (Sunstein 1996).

Once settled on an area of law, such as contracts or criminal law, judges may exercise a narrow or broad form of analogical reasoning tying new technology to technology featured in past case law. Luke Milligan (2011) argues that judges deciding Fourth Amendment cases have focused too narrowly on the technical equivalents in prior cases, for instance, treating cell phones like pagers, address books, or simply as general containers. These cases rely heavily on the shared functions of the technologies, and Milligan proposes adding two broader aspects to this narrow analogical reasoning in Fourth Amendment cases: (1) the efficiencies gained by using a particular technological form of surveillance and (2) the ability to aggregate information based on surveillance technology employed (Milligan 2011). While technology designers may respond by designing according to or around judicial analogies that sort technology into categories of illegal or legal, liable or immune, legislators may also step in and pass laws when analogical reasoning leads to disfavoured outcomes. In the early days of the Internet, courts were asked whether online content providers (websites) were like publishers, distributors, or common carriers, all laden with different legal obligations (Johnson and Marks 1993). Two New York court cases dealt with this issue, one finding no liability for site operators whose sites contained defamatory material (*Cubby Inc v CompuServe Inc* 1991), and another holding the operator liable because it actively policed content for ‘offensiveness and “bad taste”’ (*Stratton Oakmont Inc v Prodigy Servs Co* 1995). Congress then passed Section 230 of the Communications Decency Act to ensure that site operators would not be held liable for content produced by third parties even when (p. 609) posts were curated (Communications Decency Act 1996), putting an end to questions of whether websites were publishers, distributors, or common carriers for the purposes of information-related legal claims by prohibiting them as being treated as anything but immune intermediaries.

Today debates rage over the legal relevance of the sociotechnical differences between pen registers and metadata (*ACLU v Clapper* 2013: 742; *Klayman v Obama* 2013), beepers and GPS (*US v Jones* 2012), remotely controlled military aircrafts and autonomous drones (United Nations Meeting on Lethal Autonomous Weapons Systems 2015), and the virtual and physical realms (Federal Trade Commission 2015). Technologies that have reached this stage come with an extraordinary amount of conceptual baggage that too often is neglected. It is true that early developments in innovation conceptualization and design impact political and legal metaphors that emerge as the technology matures. Therefore, we would be wise to start addressing the important and influential issue of metaphors earlier in the technological life cycle to gain what we can. The life cycle of a technological metaphor involves comparative and combinatorial sense-making at the initial stages of innovation, adjustments made for and by the use and user of the technology, political framing by regulators, and analogical reasoning in the courts. Analytical tools for assessing and crafting technological metaphors to bring about particular governance

goals over the course of this life cycle remain an important and underdeveloped aspect of both the anticipatory governance and law and technology fields.

4. Hacking Metaphors in Anticipatory Governance

Computer scientists and legal scholars agree that searching for the ‘best’ or ‘right’ metaphor when confronted with new technology is often time poorly spent. ‘Searching for that magic metaphor is one of the biggest mistakes you can make in user interface design’ (Cooper 1995: 53). As an example, legal scholars Johnson and Marks (1993) argue that such pursuits did not take advantage of, and even ignored, the malleability of the Internet in its early years. Attempts to ‘fit’ cyberspace to existing legal metaphors at the time threatened to ‘shackle’ the new medium, thus preventing cyberspace from developing in ways that best suited both designers and users (Johnson and Marks 1993: 29).

A more fruitful task, then, is to find the metaphor that helps to accomplish a particular set of normative goals. Philosopher and design scholar Donald Schön (1993) explains that metaphors can have conservative or radical impacts. Metaphors can (p. 610) be used as flexible ‘projective models’ that realize the uniqueness, uncertainty, and ambiguity of something new. Or, a metaphor can serve as a defensive mechanism wherein describing idea A in terms of idea B limits the nature of B: A’s essence remains unexamined and its limits are imparted onto idea B (Schön 1993).

Anticipatory governance at both the early stages in robotics design and in late stage court cases should involve projective models that highlight the radical function of robot metaphors in shaping our sociotechnical reality. Importantly, ethicists, policymakers, regulators, lawyers, and judges should recognize that every metaphor is a choice rather than a discovery, and that the choice of one metaphor over another necessarily preferences a very particular set of values over others. Choosing metaphors is an important task with powerful implications and, as such, the process should be thoughtful and open. In governance contexts, ‘we should apply the available metaphors in light of overarching goals and principles of justice, while also keeping in mind the implications of selecting any given metaphor’ (Schön 1993: 11).

We suggest something closer to structured play for developing and reflecting upon metaphors in the anticipatory governance of robotics and other technologies. This structured play, which we refer to as metaphor hacking, makes transparent the various links between metaphors, technology, and society. Metaphor hacking, as we propose it, is a process that involves five deliberate steps:

1. Acknowledge the initial (subjective) sense-making metaphor;
2. Challenge the singular sense-making metaphor by testing other metaphors;
3. Work through potential outcomes of competing metaphors;
4. Assess outcomes based on normative goals;

5. List limitations of achieving metaphor victory

4.1 An Example of Metaphor Hacking: Driverless Cars

Driverless cars are a coming technology, and have been widely sensationalized in the media as solutions to all of our automotive woes. However, they pose significant governance challenges ranging from questions regarding liability (of manufacturers, programmers, owners/operators, and even the cars themselves) to ethical questions regarding the social implications of the technology.

The tunnel problem, outlined above, is a good example for framing some such challenges, one that can be used to demonstrate the benefits of metaphor hacking. It is representative of a class of design problems that involve value trade-offs between passengers, pedestrians, and other drivers/passengers (Millar 2015). Other problems, involving similar value trade-offs have been discussed elsewhere (Lin 2013) that could benefit from an examination of the tunnel problem.

(p. 611) In this example, we demonstrate how two competing metaphors—the ‘chauffeur’, and the ‘moral proxy’—lead to quite different analytical outcomes when ‘tested’ using our framework. As described above, the moral proxy metaphor is motivated by a desire to preserve individual autonomy over decision-making in deeply personal ethical dilemmas. The chauffeur metaphor, on the other hand, is likely the metaphor that many people would think of as a default for the technology: it captures the role that a driverless car appears to play in the use context, insofar as the car is metaphorically driving you around while you comfortably sit back and wait to arrive at your destination. Thus, for the purpose of this example we treat the chauffeur metaphor as the ‘initial (subjective) sense-making metaphor’, while the proxy metaphor serves as a challenger.

We acknowledge up front that a fuller analysis is possible, which would result in much more detail at each stage of the process. We also acknowledge that the tunnel problem is but one of a number of governance triggers (i.e. scenarios that suggest the need for new/modified governance responses) pertaining to driverless cars that could benefit from metaphor hacking. However, due to space limitations, we provide here a sketch of a fuller undertaking in order to demonstrate the analytical benefits of metaphor hacking.

4.1.1 Acknowledge the initial (subjective) sense-making metaphor

The initial step involves recognizing one’s own sense-making of the technology. Where do you imagine you would sit in the car? Do you speak to the car politely or give short commands? How often do you check to make sure things are running smoothly?

4.1.1.1 Metaphor: ‘chauffeur’

Description:

Driverless cars are most often envisioned transforming the driver into a passenger. In other words, the driver is pictured doing no driving at all. Google’s most recent driverless

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car prototype, featured in a much-hyped online video, has no steering wheel, leading one passenger featured in the video to remark ‘you sit, relax, you don’t have to do nothing [sic]’ (Google 2014). With this picture in mind, it is reasonable to characterize the car as a robot chauffeur, driving the car from place to place as you catch up on your email, phone calls, or take a much-needed nap.

4.1.2 Challenge the singular sense-making metaphor by testing other metaphors

There are many ways of conceptualizing driverless cars. We might opt to consider them like any other car, but with increasingly more technological functions. After all, other features, including brakes and transmission, have been automated without much need for reconceptualization. A useful conceptual move to capture the (p. 612) redistribution of autonomy between driver and vehicle might be to readopt the ‘horse’ metaphor. Driverless cars could also be compared to transformations in public transportation, wherein everyday travel is reorganized in a networked fashion and leaves the traveller with little control over the actual act of driving.

Though these (and many other) metaphors should all be examined for their governance implications, we will focus mainly on the chauffeur and moral proxy metaphors for the sake of brevity.

4.1.2.1 Metaphor: ‘moral proxy’

Description:

In a class of cases where driverless cars, and their passengers, encounter critical life-threatening situations like the tunnel problem, the car must be programmed, or ‘set’, to respond in some predetermined way to the situation. Such ‘unavoidable crash scenarios’ are reasonably foreseeable and will often result in injury and even death (Lin 2013, 2014a, 2014b; Goodall 2014; Millar 2014, 2015). These scenarios often involve value trade-offs that are highly subjective and have no clear ethically ‘correct’ answer that can be unproblematically implemented. Given that the car must be programmed to make a particular decision in unavoidable crash scenarios, either by the engineers while designing it, or through the owner’s ‘settings’ while using it, the car can reasonably be seen as a moral proxy decision-maker (Millar 2015).

The narrowest way to conceptualize a driverless car is just to treat it as any old car with more technological features: this approach would require the least change to existing governance frameworks. Conceptualizing a driverless car as a chauffeur is still fairly narrow in scope, but focuses attention on changes to the control of the act of driving. Similarly, comparing driverless cars to horses involves a relatively narrow focus on the autonomy of the transportation apparatus. The moral proxy metaphor is more expansive and includes more social functions involved in driving. Thinking about driverless cars as a transformative form of public transportation is the broadest and opens up numerous lines of inquiry. Other metaphors could emerge if focusing on adding a new technology to the

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roadways or when considering the ways in which people now rely on connected services to manoeuvre through public spaces, each metaphor being slightly different in scope.

4.1.3 Work through potential outcomes of competing metaphors

4.1.3.1 Chauffeur

In most ordinary driving contexts, the chauffeur metaphor will capture the kinds of functions that driverless cars exhibit. If manufacturers are able to deliver on their promises, driverless cars will generally drive passengers around without incident.

Treating a driverless car as a chauffeur when things go wrong, however, could result in some of the worries raised by Richards and Smart (2015). Though driverless cars will appear as if they are driving you around, we would be committing the (p. 613) android fallacy in thinking of them as ‘agents’ in any moral or legal sense, especially if attempting to dole out legal/ethical responsibility. Driverless cars are not moral agents in the same sense as a human chauffeur who, like any responsible human adult, is capable of making fully rational decisions. Thus, in contexts where we need to decide how to attribute liability based on models of responsibility, the chauffeur metaphor will likely cause problems.

4.1.3.2 Moral Proxy

In a very particular subset of situations—those involving tunnel-like value trade-offs—the moral proxy metaphor could help sort out issues of responsibility. The moral proxy metaphor underscores the inherently political and ethical nature of technology design (Winner 1980; Latour 1992; Verbeek 2011; Millar 2015) and invites designers, users, and policymakers to focus on *who* should be programming/setting a driverless car to operate in a specific mode, as well as focusing on robust informed consent requirements in making those programming/settings choices explicit (Millar 2015). In doing so, the moral proxy metaphor, as a governance tool, places higher requirements on all parties involved to clearly assign responsibility in advance of using the technology, but treats those requirements as beneficial owing to the gains in clarity of responsibility. This approach has been challenged on grounds that it complicates the law (Lin 2014b), but at least one study indicates that there might be support for a more robust informed consent in the governance of certain driverless car features (Open Roboethics Initiative 2014).

4.1.4 Assess outcomes based on normative goals

At this point, one can ask: what are the normative goals? By placing the normative question late in the process, we can see the sense-making that occurs based on the design and use of the technology, as opposed to considering only ways to think about the technology to solve a particular policy problem. This can help avoid disruption to the policy process when those metaphors are not usefully understood by the broader public, different populations of users, or in later policy decisions and keep the process agile and dynamic.

4.1.4.1 Normative goals

Clearer models of responsibility for dealing with liability and users’ (moral) autonomy, and information practices that respect the privacy of users in the context of driving.

4.1.4.2 Chauffeur

Although the chauffeur metaphor may cause problems by attributing a level of autonomy to the car itself, it may be beneficial to shifting responsibility onto the car designers, if that becomes the direction policymakers want to go. However, the normative goal stated is *clearer models* of responsibility. Therefore, the chauffeur (p. 614) metaphor's departure from existing accountability models is less satisfactory than the moral proxy model.

The chauffeur metaphor may be valuable to meeting privacy goals. If users of driverless cars consider the car to be as aware and attentive as another person in the car, they may regulate their behaviour in a way that aligns with their information sharing preferences. The metaphor may fall short, though, because the driverless car may actually gather and process more or different information than another person in the car would gather and process (see, for example, Calo 2012).

4.1.4.3 Moral proxy

The moral proxy is intended to clearly delineate responsibility, but may not meet that goal depending on how users of driverless cars understand the model and perhaps misunderstand their roles while in the vehicle. The moral proxy may serve the goal of protecting privacy if standards of information are incorporated as part of the design and users are informed about the limited information gathering practices undertaken. However, the metaphor could also complicate the goal of privacy. How much information does a moral proxy need to make moral decisions? This uncertainty may lead users to overshare information and policymakers to accept such practices as necessary for moral functioning.

By playing with the outcomes in light of the normative goals, it becomes clearer what type of situated use information or testing is still necessary. This step may also raise particular issues with the normative goals themselves and reveal that the goal is still quite unclear or contested.

4.1.5 List limitations of achieving metaphor victory

4.1.5.1 Chauffeur

The chauffeur metaphor is likely the easier of the two metaphors to understand and adopt because it is natural for people to commit the android fallacy (Darling 2015) and driverless cars fit the metaphor in most normal driving contexts. This may be truer in urban areas where travellers are regularly driven by other people and more successful in the judicial arena where analogical reasoning is somewhat restrictive.

4.1.5.2 Moral proxy

This metaphor could be more difficult for people to understand/adopt because it requires understanding the legal/ethical technicalities of responsibility and liability. It also requires policymakers, lawyers, judges, ethicists, and users to understand, to some degree, the complexity of the programming challenge involved in making driverless cars.

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The other metaphors suggested have significant limitations. For instance, conceptualizing a driverless car as a horse does not account for the information available about how a driverless car operated and made certain choices in liability litigation. Additionally, how useful is a horse metaphor when few people today have ever seen (p. 615) a horse used for transportation, let alone experienced it? These are strong reasons to discard the horse metaphor.

Based on this rough analysis, we may decide that the moral proxy metaphor is more beneficial and encourage designers, marketers, and users to incorporate it. We may also decide that we need more information and that these metaphors need to be tested for actual usability and expected outcomes. It may be most important to know which metaphors should be avoided and to have thought through the many ways that others can make sense of robots.

5. Conclusions

Metaphors can both describe and shape technology. In governance contexts, metaphors can be used to frame technology in ways that attach to very specific, often competing, sets of values and norms. Thus, competing metaphors are not just different ways of thinking about a technology; each metaphor carries different ethical and political, that is, normative, consequences. We have proposed metaphor hacking as a methodology for deliberately considering the normative consequences of metaphors, both in design and governance.

Although design choices and framing are powerful tools, our ability to control the way people make sense of technology will always be limited. Ultimately people will interpret technology in ways that thwart even the most rigorous attempts at shaping technology and the social meaning applied to it. The considerations we have raised and our proposed methodology for metaphor hacking help to guide what control and influence we do have in a way that legitimizes those efforts. In the humblest cases, we hope a more deliberate process will ease necessary ethical, legal, and regulatory responses, thus smoothing our technological future. More importantly, our hope is that metaphor hacking will help with the complex task of technology governance, by laying bare the fact that good design requires us to anticipate people's responses to switches, knobs, and metaphors.

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The Legal Institutionalization of Public Participation in the EU Governance of Technology

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Abstract and Keywords

This chapter explores the tension between the expectation of ‘public participation’ in areas of high technological complexity, and sometimes limited engagement with the results of participatory exercises by decision makers. The chapter examines in particular the ways in which legal contexts (eg narrowly drawn legislative objectives, judicial preference for certain types of evidence, free trade rules) can tend to incentivize a decision explained on the basis of ‘facts’, as determined by expert processes. Broader public contributions may find it difficult to be heard in this context. This chapter argues that an expansion to the legal framework, so that a broader range of public comments can be heard by decision makers, is both desirable and, importantly, plausible—albeit extraordinarily difficult.

Keywords: public participation, expertise, REACH, EIA, GMOs, EU technology governance

1. Introduction

*LAW plays an important role in the institutionalization of public participation in the governance of new and emerging technologies. Law, however, also constrains participation, expressly and by implication restricting the range of matters that can be taken into account by decision makers and incentivizing particular approaches to explaining a decision. Focusing on EU law and governance, this chapter explores the ways in which law institutionalizes enforceable ‘rights’ to participate—or, perhaps more accurately, rights to be consulted—in the governance of new technologies, before turning to the constraints that law places on this public participation. (p. 621) The limitations of public participation exercises have been much discussed (see Irwin, Jensen, and Jones 2013), but the focus here is specifically on the ways in which the detail of the legal and policy framework within which participation is positioned restricts the scope of that participation.

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Three areas of law serve as particular examples. First, the EU law on environmental assessment arguably marks the high point of participatory environmental governance,¹ including broad, lay, 'public' participation, as well as elite 'stakeholder' participation. Environmental impact assessment (EIA) is not explicitly concerned with technology, but it applies to a wide range of projects, including large-scale technological transformation, such as wind farms. Wind energy is hardly a 'new' technology, but it is certainly contentious; EIA will also apply to more novel infrastructure such as carbon capture and storage. Second, the REACH (Registration, Evaluation, Authorisation and Restriction of Chemical Substances) chemicals regulation,² is an elaborate piece of legislation that requires, in the first instance, information on 'substances'³ manufactured in or imported to the EU to be registered with the European Chemicals Agency (ECHA). A chemical listed in the regulation as a 'substance of very high concern' (SVHC) is subject to an authorization requirement. REACH (famously)⁴ applies to old chemicals, but also to whole categories of emerging technologies, including for example nano-scale 'substances'.

These two areas raise slightly different questions about participatory governance. Infrastructure development is spatially defined, raising (contestable) presumptions about who constitutes the relevant 'public', and perennial questions about the relationship between local and EU or national interests. Chemicals are globally traded products, raising questions about EU (and international) trade law; a recurring theme in the discussion below is the centrality (and subtlety) of the EU Treaty guarantee of free movement of goods between Member States to the whole EU legal framework. By contrast with infrastructure development, the framing of chemicals regulation as 'technical' is in many cases uncontroversial, and in routine decisions it is less obvious that the 'public' is clamouring to take part. But equally, this is clearly an area in which claims to knowledge are contested, and there is potential for that contestation to break out into public debate, including claims for a social framing of the governance of chemicals.

Perhaps inevitably, given the ubiquity of the topic, the third area I discuss is the EU authorization of genetically modified organisms (GMOs).⁵ GMOs provide an opportunity to explore both the potential, but also the deep-rooted challenges, of using legal change to mitigate the institutional constraints on participation. A European Commission proposal for a 'new approach' to GMOs (discussed below) could in practice entrench the problematic fact-value divide, and continue the implicit prioritization of a view of economic progress, in which technological 'progress' is assumed to go hand in hand with social and economic 'progress' (Felt and others 2007; Stirling 2009), and far-reaching freedom of trade is assumed to be a unique foundation of prosperity. The proposal also however hints at a more creative (p. 622) and ambitious approach to thinking about the ways in which 'trade' constrains participation around emerging technologies.

This chapter makes a deceptively modest argument. While it is important to scrutinize the fora in which participation takes place, who participates, the nature of the dialogue, who listens and how, the legal framework sets the prior conditions within which publics can be heard. The three areas discussed in this chapter illustrate the ways in which general and specific legal frameworks constrain participation in decision-making, by limiting the con-

siderations that can be taken into account in a decision-making process, and used in turn to justify a decision. This chapter argues that an expansion to the legal framework, so that a broader range of public comments can be heard by decision makers, is both desirable and, importantly, plausible—albeit, as will be seen, extraordinarily difficult. The concern here is with process rather than outcome: decision makers should be able to rely on the substantive concerns voiced in public comments, but the weight of those concerns in any particular case will vary.

2. The Context for Participation

There is an enormous literature on the place of ‘public participation’ in the governance of technology. The move to participation might in part be seen as resistance to an old (but persistent) paradigm that sees the governance of technology as a matter of expertise, and assumes that any public disagreement with the experts is about public misunderstanding and irrationality (see Stilgoe, Lock, and Wilsdon 2014 describing the move from ‘deficit to dialogue’ and the limitations of public participation). Public participation is strongly linked to the widespread recognition and acceptance of the political or social nature of technological development: decisions on technological trajectories involve the distribution of risks, benefits, and costs, and contribute to the shaping of the physical and social world in which we live. Experts have no unique or free standing insight into the resolution of these issues, and their expertise alone cannot provide them with legitimacy in a democratic society. Simplifying rather, this hints immediately at the two dominant rationales for public participation, which focus respectively on substance and process, or output and input legitimacy. In terms of substance, public participation may contribute to the quality of the final decision, improving decisions by increasing the information available to decision makers, providing them with otherwise dispersed knowledge and expertise, as well as a wider range of perspectives on the problem, or more ambitiously by providing a more deliberative collective problem-solving forum (p. 623) (Steele 2001). In terms of process, public participation may have inherent or normative (democratic) value; citizens have a right to be involved in decisions that shape their world. An institution may have its own understanding of the sort of legitimacy it needs (Jarman 2011; Coen and Katsaitis 2013), for example whether it seeks primarily input or output legitimacy, and its approach to participation may vary accordingly. There is nothing necessarily wrong with this, unless it rests on an assumption that the nature of the problem to be solved is uncontroversial. Nor are the institutions themselves always going to be the best judge of their own legitimacy. More instrumentally, decision makers may have very specific legitimating roles in mind for participating publics. A participatory process may be seen as a way to achieve greater trust for an institution, or (and this may provide a partial explanation of some of the phenomena discussed below) greater acceptance of technological developments that are considered self-evidently necessary (see also Lee and others 2013). A carefully constrained participation process can be used (cynically or otherwise) to close down a decision, or to attempt to legitimize decisions already taken on other grounds (Stirling 2008).

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These participatory rationales, good and bad, and the emphasis of liberal democracies on 'public participation' towards the end of the twentieth century, are not limited to questions of technological change.⁶ There is no reason to think that a constant challenging and refining of effective and democratic governing either is or should be limited to technological development. But certain aspects of new or emerging technologies have sharpened the argument. Perhaps central is the tendency to deal with emerging technologies as if they raised purely technical questions, questions about safety for human health and the environment that would be answered in the same, universally applicable, 'objective' fashion by anybody in possession of the relevant information. This has in turn led to the heavy reliance on administrative bodies with only weak links to electoral processes, but expert in the tasks of, for example, risk assessment, or cost-benefit analysis. As the Nuffield Council on Bioethics puts it, 'The more opaque and technocratic the field of policy, and the more neglected in prevailing political discourse', the greater the strength of the arguments in favour of public participation (2012: para 5.61). Further, the very complexity that turns attention to expertise simultaneously suggests that we need contributions from diverse perspectives, providing alternative information, alternative conceptualizations of the problem and alternative possible solutions. Technology, and its newness, does not necessarily pose unique challenges for good and effective decision-making. But the presence of (emerging) technologies highlights the importance of a space for contesting both complex knowledge claims, and what is deemed to be important about a decision. The demand for public participation is further reinforced by the pervasive uncertainties around new technology: data may be absent or contested, impacts in open ecological and social systems are literally unpredictable, and we 'don't know what we don't know' yet (Wynne 1992). Opportunities to debate and challenge the social and political commitments (p. 624) around technological development, to contest knowledge, to ask why we take particular steps (implying risks and uncertainties), who benefits, who pays, what we know, and how, becomes a central part of the governance of technology.

The political and social complexity of 'technology' sits alongside pressures towards participation from a fragmentation of state authority, and associated fragmentation the state's traditional forms of democratic and legal accountability. Given the focus here on the EU, we might note that participatory approaches to decision-making have had a special resonance at this level. While European integration in its early years was a predominantly elite project, public debate on the 'democratic deficit' emerged relatively early in the life of the EEC. The character of this deficit is as contested as the meaning and nature of 'democracy' more generally.⁷ But certain features dominate the debate. At the most basic level, the people on whose behalf laws are passed and implemented are unable to reject or influence legislators or government by popular vote: the Commission and Council have significant legislative powers, but only the European Parliament is subject to elections, and the Commission is not subject to full parliamentary control. Even the democratic legitimacy of the European Parliament is contested: voting does not always revolve primarily around European policy and leadership, but at least in part along national lines; there is no solid system of European political parties; and there is a lack of perceived shared interests among the European electorate. The resistance of the gaps in the EU's

democratic accountability led, around the turn of the century, to much more thinking about more participatory forms of democracy (e.g., European Commission 2001a discussing the failed Treaty Establishing a Constitution for Europe). While there now seems to be less emphasis on democratic rationales for public participation in the EU (see Lee 2014: ch 8), the demands for participatory and collaborative governance remain considerable.

An examination of EU law can only tell us so much about the institutionalization of participation around new technologies. The boundaries of 'participation' are not clear: are the narrow opportunities for consultation discussed below really about participation? Nor do I want to dismiss the importance of 'unofficial' protest, or 'uninvited' participation (Wynne 2007), which might interact with official inclusion in interesting ways (e.g. Owens 2004, discussing how protest over time can change the context for participation), for example making use of legal rights of access to information,⁸ and access to opportunities for review. Access to information and access to justice will not be discussed here, for reasons of space rather than their importance to participation. Further, the EU is one part of a complex multilevel governance system. And in any jurisdiction, focusing on final decisions ignores the complex processes through which technologies are assessed and commitments made (Stirling 2008), although the intention here is to bring back in certain framing contexts. But while the legal institutionalization of rights to participate is a small part of the picture, it can provide essential (p. 625) detail on the ways in which participation is, and fails to be, institutionalized in the governance of technologies.

3. Legal Assurances of Participatory Governance

These challenging demands and justifications for participation are addressed in a variety of more or less ambitious and more or less formal approaches to participation in particular decision-making exercises, or around particular technological developments. One institutional manifestation of the turn to participation is in the now fairly routine inclusion of participation opportunities in EU legislation.

The EIA Directive requires the environmental effects of projects 'likely to have significant effects on the environment' to be assessed before authorization.⁹ The developer must produce a report including at least: a description of the project and its likely significant effects on the environment; proposed mitigation measures; and a 'description of the reasonable alternatives studied by the developer' together with 'an indication of the main reasons for the option chosen'.¹⁰ Specialized public authorities such as nature conservation or environmental agencies are given an 'opportunity to express their opinion'.¹¹ The 'public concerned'¹² is given 'early and effective opportunities to participate' in decision-making, and is 'entitled to express comments and opinions when all options are open'.¹³ All of the information gathered during the EIA, including the results of the consultations, 'shall be taken into account' in the decision-making procedure.¹⁴ The decision-making authority

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produces a 'reasoned conclusion', 'on the significant effects of the project on the environment'.¹⁵

REACH provides multiple opportunities for public comment. I focus here on the process by which authorization is sought for uses of 'substances of very high concern' (SVHC). SVHCs are substances meeting the criteria for classification as CMRs (carcinogenic, mutagenic, or toxic for reproduction), PBTs (persistent, bioaccumulating, and toxic) and vPvBs (very persistent and very bioaccumulating), as well as substances 'for which there is scientific evidence of probable serious effects to human health or the environment which give rise to an equivalent level of concern'.¹⁶ Potential SVHCs are first identified through a 'Candidate List'.¹⁷ The ECHA publishes the fact that a substance is being considered for inclusion on the Candidate List on its website, and invites 'all interested parties' to 'submit comments'.¹⁸ In the absence of any comments, the substance is included in the Candidate List by the ECHA, otherwise the decision is taken either by unanimous decision of the ECHA's (p. 626) Member State Committee, or if the Member States do not agree, by the European Commission.¹⁹ In this case as in many others, the Commission acts through a process known as 'comitology'. Comitology is discussed further below, but essentially, it allows the 28 EU Member States (in committee) to discuss, and approve, or reject certain administrative decisions taken by the Commission. The final list of SVHCs for which authorization is required is placed in Annex XIV.²⁰ The ECHA publishes a draft recommendation, and invites 'comments' from 'interested parties'.²¹ Its final recommendation is provided to the Commission, which (with comitology) takes the final decision on amending the contents of Annex XIV. Applications for authorization are submitted to the ECHA, and scrutinized by the ECHA's Committee for Risk Assessment and Committee for Socio-Economic Analysis. The ECHA makes 'broad information on uses' available on its website, and both committees have to 'take into account' information submitted by third parties.²² The Commission plus comitology makes the final decision on authorization.²³

Before their deliberate release or placing on the market, GMOs must be authorized at EU level.²⁴ In this case as the others, there are moments for public participation. When the European Food Safety Authority (EFSA) receives the application, it makes a summary of the dossier available to the public.²⁵ EFSA's subsequent Opinion on the application is also made public, and 'the public may make comments to the Commission'.²⁶ Final authorization decisions are taken by the Commission, with comitology.

These routine consultation provisions reflect law's generally limited engagement with the practices of participation. Law is more concerned with individual rights than with 'collective will formation' (Brownsword and Goodwin 2012: ch 10) and provides at best imperfect opportunities to shape an agenda. But publics are consistently entitled to have a say on the legal governance of technological development. And it is possible that something more ambitious could be developed within the bare legal requirements. The EIA Directive for example leaves the Member States with considerable discretion around organizing participation. While the need to embrace potentially large numbers of people suggests

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that some sort of paper or electronic consultation is highly likely, more deliberative and active approaches are possible.

There are also opportunities for external input *within* EU decision-making processes (Heyvaert 2011). The Commission can appoint up to six non-voting representatives to the ECHA Management Board, including three individuals from 'interested parties': currently a representative each from the chemicals industry and trade unions, and a law professor (ECHA 2014: 75). The European Parliament can also appoint two 'independent persons',²⁷ providing for some parliamentary oversight. In addition, the Management Board shall 'in agreement with the Commission', 'develop appropriate contacts' with 'relevant stakeholder organisations'.²⁸ The ECHA considers 'all individuals interested in or affected by' chemicals regulation to be its stakeholders (ECHA 2015), welcome at various events, including the two 'stakeholder days' held in 2013 (p. 627) (ECHA 2014: 56). But *accredited* stakeholder organizations are able to participate in committees, and other activities such as the preparation of guidance. These organizations must be non-profit making and work at an EU level, have a 'legitimate interest' in the work of the ECHA, and be representative of their field of competence (ECHA 2011b). The ECHA's risk assessment and socio-economic assessment committees have invited stakeholder organizations to send a regular observer to their meetings, which in the opinion of the ECHA 'helps guarantee the credibility and transparency of the decision-making process' (ECHA 2011a: 62).

This inclusion of outsiders within the central institution for decision-making is relatively common in EU law, although the role of outsiders within the institution varies: stakeholders are simply observers of ECHA committee meetings, while in other contexts the process of norm elaboration might involve the collaboration of multiple public and private actors (see Lee 2014: ch 5). It is a potentially valuable way of embracing alternative perspectives and could be a route to deeper engagement and deliberation between participants. In principle it might be easier to be heard from within the organization, although it is not likely that participants will successfully challenge the agency's regulatory priorities very often (see Rothstein 2007 discussing the UK Food Safety Agency's ill-fated Consumer Committee). And this sort of narrow but deep participation generates its own difficulties. Selecting participants is clearly important and potentially contentious, and there are recurring concerns in the EU that industry (with its financial and informational advantages over public interest groups) dominates.²⁹ Further, these fora could be especially prone to the risk that the elite participants will develop shared interests that blunt the accountability function (Harlow and Rawlings 2007).

The broader accountability and legitimacy models in EU administration also apply to our cases. In particular, it will have been noted that final EU-level decisions are generally taken by the Commission with comitology. This reflects the insistence of the EU courts and institutions that final decisions are taken by a *politically*, rather than scientifically, legitimate decision maker.³⁰ The comitology process is formally a mechanism by which the Member States can supervise the Commission's exercise of administrative powers, but more importantly provides opportunities for negotiation, collaboration, and consensus-seeking between the Member States and the Commission. Essentially, while the comitol-

ogy process takes a number of sometimes elaborate forms, for our cases it provides two levels of committee, composed of national representatives (the members of the 'Appeal Committee' have higher national political authority), who debate and then vote, by qualified majority, on Commission draft decisions.³¹ In almost all cases, comitology committees simply agree with the Commission, and the measure is adopted. In the absence of agreement, the decision is taken to the Appeal Committee. If the Appeal Committee adopts a positive opinion, the Commission 'shall' adopt its draft; if it adopts a negative opinion, the Commission 'shall not adopt' it. In some cases, including decisions on the authorization of GMOs,³² the Member States have been unable to reach a qualified majority in either direction, and so issue no opinion. In the absence of an (p. 628) opinion, the Commission 'may' adopt its draft, effectively acting without the accountability to Member States that comitology is supposed to provide. For current purposes, comitology provides an opportunity for the Member States to feed their citizens' concerns, including results of national participation, into decision-making.³³ This is inevitably complicated by the presence of 28 Member States, and by the difficulty of holding national governments to account for their role in comitology. The European Parliament is generally limited to a weak 'right of scrutiny' over comitology, under which it can bring attention to any excess of implementing powers.³⁴

4. The Continued Dominance of 'Technical' Reasoning

Notwithstanding an apparent acceptance of the need for broad participation in decision-making, a distinct preference remains for articulating the reasons for a decision in technical terms, for example in terms of risk assessment. In many cases, this amounts also to justifying the decision independently of the 'participatory' input (Cuellar 2005 discussing the importance of 'sophistication' if a participant's input is to be heard). This description of explanations as 'technical' is not to assert the reality of the purported division between facts and values, or the inevitability or objectivity of technical assessments. On the contrary, the ability of the decision maker to define its outcomes in these terms is made possible by considerable work on what counts as 'science' or as 'politics' (see Irwin 2008 on 'boundary work' and 'co-production'). But this technical framing of choices on technologies, an insistence that the 'public meaning of technoscientific innovations and controversies' is a question of 'risk and science', tends to sideline social or political questioning of technological choices (Welsh and Wynne 2013: 543). This sort of exclusion of certain public concerns is apparent in a range of areas and across jurisdictions (e.g. Wynne 2001 discussing 'agricultural biotechnology'; Cuellar 2005 discussing access to financial information, campaign contribution, and nuclear energy in the US; Petts and Brooks 2006 on air pollution). In our cases, a reading of the decisions demonstrates the Commission's striking preference for EFSA risk assessment in respect of GMOs (rather than any social considerations, or even competing risk assessments).³⁵ It is a little early to comment on the extent to which the Commission will follow ECHA advice under REACH's authorization procedure, although there are indications of greater willingness to dissent. There

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have been three Commission Implementing Regulations for the inclusion of substances already on the Candidate List in the Annex XIV authorization list.³⁶ It is not surprising that these are highly (p. 629) concerned with technical compliance with the SVHC criteria (CMRs, PBTs, vPvBs, and 'equivalent concern'). The implementing Regulations are reliant on ECHA advice, referring to the ECHA's prioritization of substances on the Candidate List, but do not follow that advice in its entirety.³⁷

While EU-level technical/scientific advice is extremely influential, it is not decisive in all cases. It is not difficult to find cases in which the Commission does not follow its scientific advice.³⁸ Certainly, in law, while the courts generally consider a risk assessment to be a mandatory starting point for many administrative decisions,³⁹ and prohibit decisions based on 'mere conjecture which has not been scientifically verified',⁴⁰ the (political) institutions are expressly not bound by experts. However, if the political institution does not follow the opinion of its expert adviser, it must provide 'specific reasons for its findings', and those reasons 'must be of a scientific level at least commensurate with that of the opinion in question'.⁴¹ Similarly, complex technical or scientific decisions can only be taken without consulting the relevant EU-level scientific committee in 'exceptional circumstances', and where there are 'otherwise adequate guarantees of scientific objectivity'.⁴² In principle, if the legislative framework permits it (and see the discussion of 'other legitimate factors' below), the political institutions could rest their decision on reasons unconnected with a technical assessment of the risk posed. There are however very strong legal incentives to provide scientific reasons for a decision.

Even where the 'risk' framework fits less comfortably, there may be a preference for technical assessment. Decisions on projects subject to EIA are taken at the national level, and the role of different types of evidence will vary according to national approaches and cultures, as well as according to context. However, Examining Authority reports on 'nationally significant' wind farm projects in England and Wales suggest that in this context as well, the 'expert' voice of technical assessment weighs more heavily than the personal experience of lay participants (Rydin, Lee, and Lock 2015). The discussion of landscape and visual impacts may be thought to be least readily represented in technical rather than experiential terms, but even this has in practice revolved around questions of technical methodology and the scope of agreement between the 'experts'.⁴³

5. The Legal and Policy Constraints on Participation

A number of explanations have been provided for the preference for technical explanations of decision-making. Increased demands for accountability and (p. 630) transparency may enhance political pressure to explain through the apparently neutral language of technical assessment (Jasanoff 1997; Power 2004).⁴⁴ Diverse legitimacy communities (Black 2008: 144), at different levels of governance (local, national, EU, and global), lay and specialist publics, require reasons, even for something as apparently local as infrastructure development. EU-level decisions face additional pressures from the contested

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legitimacy of the EU political and administrative institutions, making an assertion of the 'facts' as a justification even more attractive. The inscrutability of technical assessments may further increase the difficulties of looking behind technical advice, excluding contributions not defined in those technical terms. Perhaps the most important of the explanations for a technical approach to the reasons provided by regulators is the framing of participation and decision-making processes, as suggested above, in technical terms, creating 'hidden choreographies of what is put up for debate ... and what is not' (Felt and Fochler 2010: 221). A particular interpretation of legal requirements often sits behind, and contributes to, the shaping of these 'choreographies'.

In principle, decisions on infrastructure development could be constructed in a range of ways. Nevertheless, the way that the legal and policy question is framed can limit the ability of certain perspectives to be fully heard, rather than dismissed out of hand. Many important decisions have been taken by the time that consultation on the construction of wind farms takes place. The UK is subject to an EU legal obligation to provide 15 per cent of final energy consumption from renewable resources by 2020; the national Climate Change Act 2008 imposes a target to reduce carbon emissions by 80 per cent (from 1990 levels) by 2050. Decisions must also be set in the context of national energy policy. Looking particularly at 'nationally significant' wind farms authorized under the Planning Act 2008 (see Lee and others 2013), National Policy Statements (NPS) on energy and renewable energy set a narrow framework for participation (Department of Energy & Climate Change 2011a, 2011b). NPSs are not decisive, but applications under the Planning Act must be decided in accordance with the policy, unless such a decision would be unlawful (for example on human rights grounds) or 'the adverse impact of the proposed development would outweigh its benefits'.⁴⁵ Decision makers are explicitly permitted to 'disregard' any comments that 'relate to the merits of policy set out in a national policy statement'.⁴⁶ Without going into too much detail here, it is not difficult to find evidence in the policy that participants have *relatively* little claim on the decision maker's attention. Decisions are to be made 'on the basis that the government has demonstrated that there is a need for these types of infrastructure and that the scale and urgency of that need is as described' (Department of Energy and Climate Change 2011a: para 3.1.3); identifying alternative locations for the wind farm is unlikely to sway a decision, since the decision maker should have regard to 'the possibility that all suitable sites for energy infrastructure of the type proposed may be needed for future proposals' (Department of Energy and Climate Change 2011a: para 4.4.3). 'Significant landscape and visual effects' are presented as *inevitable* (p. 631) (and so implicitly, acceptable) consequences of onshore wind energy development (Department of Energy and Climate Change 2011b: para 2.7.48), and while some mitigation might be possible, such landscape and visual effects are unlikely to weigh in the scales against authorization.⁴⁷ The relative lack of responsiveness to likely public concerns is confirmed by the Assessment of Sustainability that was carried out on the renewable energy NPS. This considered a policy that would be 'less tolerant of the adverse visual, noise and shadow flicker impacts of onshore windfarms', but dismissed it because fewer wind farms would then be authorized, with negative impacts on energy security and greenhouse gas emissions (Department on Energy & Climate Change 2011b:

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para 1.7.3(a)). Consultation around wind energy projects, then, takes place in a context that assumes the need for wind farms, and that local communities will inevitably bear costs in the hosting of those projects. My point is not to question the commitment to renewable energy; rather, it is simply to observe how carefully, even in this potentially most open of contexts, any participant wanting to influence a decision will need to shape their contribution, and how unlikely it is that *significant* alterations will be made to a proposal as a result of participatory processes (see Rydin, Lee, and Lock 2015).⁴⁸ Potential responses to climate change are presented as ‘closed and one-dimensional’, rather than ‘emphatically open and plural’ (Stirling 2009: 16).

REACH quite explicitly limits the grounds for engagement (see also Heyvaert 2011), and the ECHA’s website describes the ‘type of information requested during ... public consultation’ in highly technical terms (ECHA 2015). Sticking with our authorization case, when substances on the Candidate List are proposed for addition to the ‘authorisation list’ in Annex XIV of the Regulation itself, ‘comments’ are sought from ‘all interested parties’, ‘in particular on uses which should be exempt from the authorisation requirement’.⁴⁹ Broader contributions could in principle be taken into account, but this is clearly an opportunity for industry (including downstream users) to bring difficulties to the regulator’s attention, rather than an opportunity to explore broader concerns about hazardous chemicals. And, in the authorization process itself, third parties are only explicitly invited to provide information on ‘alternative substances or technologies’,⁵⁰ rather than to comment more generally on the social role of SVHCs.

As suggested in section 1, the framing of chemicals regulation as a ‘technical’ question of safety, rather than a question of public values, may often be uncontentious, certainly when compared with the construction of energy infrastructure. The need for expertise provides an important reason for broad participation, but simultaneously poses barriers to public participation. However, we should not discount the importance of public participation opportunities in the governance of chemicals. First, the ability of ‘expert’ outsiders, such as environmental groups, to participate may provide a necessary form of informed, expert accountability (Black 2012). Further, lay publics may contribute both their own situated expertise (Wynne, 1992), and different perspectives on the social and ethical implications of chemicals. (p. 632) For example, the risks and benefits of SVHCs are unlikely to be evenly distributed, and judgements on distribution are not solely a question of expertise. Even for those who accept the legitimacy of regulating more or less solely on the basis of safety for human health and the environment, the acceptability of the risk at stake is a political question. Another clear example can be found in the area of animal testing. If a manufacturer or importer does not have all the necessary information on a substance, it must submit testing proposals to the ECHA. Proposals involving *animal* testing (only) must be made public, and comments are invited. However, only ‘scientifically valid information and studies received shall be taken into account by the Agency’.⁵¹ This means that alternative testing proposals will be heard by the ECHA, but not for example challenges along the lines that the substance’s use (for example a soft-furnishings dye) is insufficiently weighty to justify animal testing.

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As well as the explicit narrowing of the information sought during participation, the legal context constrains what outsiders might contribute. Permissible grounds for refusal to authorize SVHCs are tightly drawn. Authorization 'shall be granted' if the risk to human health or the environment 'is adequately controlled'⁵² (meaning very basically that particular 'safe' exposure levels have been identified and will not be exceeded, and the likelihood of an event such as an explosion is negligible).⁵³ If authorization cannot be granted on the grounds of 'adequate control', authorization 'may' be granted 'if it is shown that socio-economic benefits outweigh the risk to human health or the environment ... and there are no suitable alternative substances or technologies'.⁵⁴ The framing of the process revolves around risk. The only space for broader social observations about the role of chemicals in society, is in respect of the role of socio-economic assessment—which enables only the continued use of chemicals already identified as being 'of very high concern', and is in any event a technical cost benefit analysis. Authorizing the use of an SVHC for social reasons is not necessarily a bad thing, but the traffic is all one way; social concerns, such as the triviality of a particular use relative to its risks or harms or costs in animal welfare, cannot prevent authorization of an SVHC that is 'adequately controlled', or the marketing of a chemical that does not meet the SVHC criteria.⁵⁵ This suggests that a particular set of economic assumptions underpin the process, in which good reasons are needed to limit, rather than to permit, the introduction of new technologies.

These limitations are explicit in the legislation. Equally significant, especially in respect of product authorization, is the general administrative and internal market legal context.⁵⁶ The significance of the free movement of goods in the EU's internal market tends to contribute to the pressure on the sorts of reasons that can be used to shape technological innovation. The role of 'other legitimate factors', in the authorization of GMOs is a good illustration of the challenges. The GMO legislation provides that the Commission's draft decision on authorization can take into account 'the opinion of [the EFSA], any relevant provisions of Union law and other legitimate factors relevant to the matter under consideration'.⁵⁷ While a simplistic (p. 633) dichotomy between 'science' and 'other legitimate factors' is problematic, the option of drafting a decision on the basis of 'other legitimate factors' is a potentially important expansion of the good reasons for a decision, and so of the things that can be taken into account by decision makers.⁵⁸ In principle it allows for the incorporation of broad interventions that go beyond the dominant framing of agricultural biotechnology as a question of 'risk', including for example the possible concerns that the high capital costs associated with agricultural biotechnology may disadvantage small and organic farmers, and enhance corporate control of food and agriculture (see Lee 2008: ch 2). More generally, questions might be asked about the social purposes of any technology.

But 'other legitimate factors' operate within a particular legal context. Administrative powers must be exercised for purposes for which they were granted; in the case of GMOs, the grounds for refusing authorization are drawn largely (not entirely)⁵⁹ around environmental protection and safety for humans (see Lee 2008: ch 2). So while the acceptable level of risk to human health and the environment is a clearly legitimate reason for a decision, broader concerns (such as distributive or ethical questions, or concerns

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about our ignorance of the effects of a technology), while legitimate, are more difficult to incorporate. The judicial preference for explanations based in risk assessment, discussed above, applies an additional brake on broad justifications for decisions, apparently ruling out the possibility of expressing doubts about the adequacy of risk assessment as a universally applicable form of knowledge (see also Lee 2009). However, while the incentives to rely on technical framings of decisions on GMOs are clear, and the strength of those incentives is indicated by the absence (to the best of my knowledge) of any decisions justified on the basis of 'other legitimate factors', the judicial interventions on scientific advice concerned legislation that did not benefit from an explicit reference to 'other legitimate factors'.⁶⁰

Other legitimate factors at the authorization stage implies a willingness in principle to open up decision-making, stymied in practice by a complex resistance found in long-entrenched legal assumptions about what counts as a 'good' reason for a decision. We see something similar at the post-authorization stage. In principle, a GM seed authorized in the EU can be grown anywhere in the EU, and food or feed can be sold anywhere. Following many years of profound disagreement over the authorization of GMOs at EU level, the Commission has proposed a new provision that would apparently expand the freedom of Member States to restrict the cultivation of *authorized* GMOs in their own territory.⁶¹ The provisions of the Proposal would apply in limited circumstances, first only to the *cultivation* of GMOs (rather than for example their use in food), and secondly only if restrictions are imposed for reasons not connected to the protection of human health or the environment. Even leaving those problematic restrictions to one side (Wickson and Wynne 2012),⁶² and taking the Proposal in its own terms, the Member States are left with the challenge of complying with the Treaty's internal market law. Secondary legislation (directives (p. 634) and regulations) must comply with the Treaty, which cannot be set aside on a case by case basis. Article 34 TFEU prohibits 'quantitative restrictions on imports and all measures having equivalent effect'. Such measures (including a ban on the cultivation of GMOs) can be justified in certain circumstances if they are designed to protect values specified under Article 36 TFEU ('public morality, public policy or public security; the protection of health and life of humans, animals or plants; the protection of national treasures possessing artistic, historic, or archaeological value; or the protection of industrial and commercial property'), or other public interests ('mandatory requirements') permitted by case law.⁶³

Member States which restrict the cultivation of GMOs must justify that restriction in terms of a legitimate objective. In the absence of EU-level harmonization, Member States can act to protect human health or the environment, but because those interests have in principle been addressed during the authorization process, they are not available under the Commission's proposal.⁶⁴ The case law suggests that the Court is unlikely to dismiss out of hand an objective deemed by a Member State to be in the interests of its citizens (see Lee 2014: ch 10). Most pertinently for current purposes, the Court has allowed for the importance of 'preserving agricultural communities, maintaining a distribution of land ownership which allows the development of viable farms and sympathetic management of green spaces and the countryside',⁶⁵ and has explicitly left open the question of whether

ethical and religious requirements could in principle be used to defend a ban on GM seeds.⁶⁶ It seems plausible that a Member State ban on the cultivation of GMOs to protect the viability of family or organic farming (for example) would pursue a legitimate objective. Some care needs to be taken, since economic considerations cannot *prima facie* justify an interference with the free movement of goods, although it might be possible to explain economic protection of (for example) small farmers in terms of underlying social benefits.⁶⁷

Any measure that genuinely pursues a legitimate public interest objective must also be 'proportionate'. The precise stringency of 'proportionality' in internal market case law is not clear (e.g. Jacobs 2006). However, the Member State must establish at least, first, the measure's effectiveness, and secondly, its necessity. So the Member State would need to satisfy the Court that its restrictions on GM cultivation actually contribute to the maintenance of traditional forms of farming (for example), and that no lesser measures would suffice. Again, it is possible to imagine such an argument. Advocate General Bot has however indicated that this might not be straightforward, suggesting (in a case about the co-existence of conventional and organic crops with GM crops) that a wide ban on cultivation must be 'subject to the provision of strict proof that other measures would not be sufficient'.⁶⁸

The arguments would require very careful handling, but are plausible. However, Member States cannot simply assert their position,⁶⁹ and they may face real evidential challenges (see also Nic Shuibhne and Maci 2013). They need to establish (p. 635) the authenticity of their claim that the protected value is at issue in the Member State (perhaps through public participation exercises), and that their measure does indeed pursue the claimed value, is capable of meeting its objective, and moreover that no measure less restrictive of trade would be capable of meeting such an objective. There is an enormous literature on the detail of internal market law. For current purposes, we can note that while there is potential, it is deceptively simple to change the rules, but far more difficult to change the legal background that tends to limit national measures inhibiting the free movement of goods in the EU.

6. Enhancing Participatory Processes Beyond Regulation

Simply adding participation to a technocratic process without examining the underlying assumptions in the process (for example with respect to free movement of goods, the ways in which we might respond to climate change, the dominance of the language of risk over values), a belated consideration of 'other' issues, is inherently limited. While I have focused on the detailed framing of the decision, more fundamentally, this approach fails to recognize that facts and values/science and politics, cannot be neatly separated (Irwin 2008 discussing 'boundary work'), that knowledge and power are co-produced (Jasanoff

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2004). In short it misses the very complexity of the governance of technological development to which public participation purports to respond (Jasanoff 2003; Wynne 2006).

It is by no means clear how one might respond to this challenge. The fragile legitimacy of comitology, due to its distance from those affected by the decisions as well as its own possibly technocratic approach to decision-making (Joerges and Vos 1999), is insufficient to remedy any shortcomings in participation processes. Moving beyond the current regulatory context, and recognizing that the *legally* significant decision is just one moment in a lengthy process, is one important response. The EU institutions (especially the Commission, but including agencies like the ECHA and EFSA) have long used a range of approaches to gather information and allow participation at earlier stages of legislation—and policymaking.⁷⁰ At a more mundane level, strategic environmental assessment (SEA) might be understood as ‘up-stream’ to the ‘down-stream’ EIA (European Commission 2009: para 4.1). Done well, earlier participation can be more proactive, and allow for more constructive engagement around a broader range of issues. Lord Carnwath in the *HS2* litigation describes SEA as a way ‘to ensure that the decision on development consent is not constrained by earlier plans which have not themselves been assessed for likely (p. 636) significant environmental effects’,⁷¹ or by implication have not themselves been subject to public participation.

Earlier, more strategic engagement is important, but it is not a straightforward legitimating tool, and changing the institutional commitments at the heart of the problem is not something that happens easily in any forum. One significant challenge is who participates. Strategy can seem rather abstract to non-specialist publics, and the actual effects of a policy may only become clear at the stage of concrete projects or technologies. All the usual challenges with respect to the involvement of ‘ordinary’, non-specialist, publics are exacerbated at EU level by the complexity, and the literal and metaphorical distance, of the process itself. Furthermore, different parts of the process involve different groups and individuals, with different perspectives, interests, and values, and so the legitimacy communities change, and with that the legitimacy demands. ‘Participation’ around the negotiation of the REACH regulation was famously intense, inclusive and lengthy, and seems to have satisfied diverse constituents (see Lindgren and Persson 2011). The desire for stability in the application of that legislation is entirely understandable, but so too are continued attempts to unsettle the parameters of the debate. In short, the quality of participation around ‘strategy’ or legislation will also be up for critique on a case-by-case basis: ‘contesting representativeness’, ‘contesting communication and articulation’, ‘contesting impacts and outcomes’, ‘contesting democracy’ (Irwin, Jensen, and Jones 2013: 126–127).

It is probably counter-productive to manipulate public participation as a legitimating technique, promising inclusion that does not materialize. Clarity on precisely what is up for discussion is important (Lee and others 2013). The particular difficulty at this point is less with the nature and forum of participation itself (although that must not be underestimated), than with the legal and policy context in which it takes place. Participation and contestation around the setting of background assumptions and framing could be one im-

portant response to the limits of subsequent participation, and to the extent that such assumptions are accepted as legitimate, their bracketing in the participatory processes discussed here is a little easier to bear. But we might also think about what it means to challenge the background assumptions, so that a broad range of public contributions can be taken into account. In the context of wind farms, this might involve acknowledging the range of energy options that could respond to climate change (Stirling 2009). In respect of products, it might involve acknowledging that the current legal and administrative dynamics of trade, let alone the detail of EU trade law, are not a natural inevitability (Lang 2006 on destabilizing our vision of a plausible liberal international trade regime). But although the detail of the EU's internal market is contingent, it is extraordinarily well entrenched, and difficult to change around the edges. Taken at face value (and while it is difficult not to be cynical, it would be churlish to dismiss it out of hand) the Commission's proposal to increase national diversity on cultivation constitutes an impressive effort to mitigate the constraining legal context. (p. 637) Along with the 'other legitimate factors' formula during authorization, it may allow publics to be meaningfully included in decision-making processes, recognizing the 'intellectual substance' (Wynne 2001: 455) of their contributions. Even more profound questioning of the applicability of the EU's risk assessment process, while problematic due to the limited scope of the proposal, is not inconceivable. For example, an argument that the acceptability of uncertainty (or even ignorance) varies in particular (nationally) valued contexts, might be taken into account under this provision.

At the same time, however, the extremely careful legal argument (undoubtedly distorting to at least some degree the reality of social concern) that will be necessary if any member state wishes to restrict the cultivation of GMOs in its own territory, indicates how difficult it is to challenge broader frameworks for decision-making simply by changing the surface rules of engagement. Moreover, the way in which the Member States themselves engage with and represent their own 'publics' on these matters will no doubt be open to critique.

7. Conclusions

The depth of the challenge is clear. The framing of a participation process will shape the possibility of contestation, the amount of dissent that can be heard or taken into account in a decision. Simply calling for more participation is politically and practically (especially at EU level) unrealistic, and in many cases, simply changing the rules will not achieve a great deal. Moreover, it must be conceivable that the broader assumptions restricting participation would themselves enjoy general acceptance. The environmental advantages of wind farms bring out this dilemma particularly well; and while there might be strong dissent on their value, the economic benefits associated with free trade are an ethically serious issue to weigh against other concerns. Which might take us rather far away from the institutionalization of participation, or even from the governance of technologies: credible climate change commitments across the board, so that the local area does not

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become a symbolic sacrifice; perhaps a recognition that the (economic) benefits of (this particular) economic development must be shared.

The Commission's proposed new approach to GMOs, while dismally received and profoundly problematic in many respects, provides a glimpse of what might be possible for participation, if we insist on an imaginative and ambitious approach to institutional reason-giving. Similarly, the possibility of relying on factors *other* than scientific risk assessment leaves a slither of space for more generous and imaginative inclusion of publics in decision-making processes. It is difficult to be optimistic, (p. 638) given the history, the lack of legislative progress so far, and the limits on the face of and sitting behind the proposal, but no mechanism for institutionalizing democratic participation is simple, complete, or without the potential for perverse effects. The challenges are daunting, but the creative possibilities of opening up processes, so that a broad range of issues can be taken into account, demand perseverance.

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Notes:

(*) I am grateful to participants at the ECPR Regulatory Governance Conference, June 2014, and to the editors, for their comments on this paper.

(1.) Dir 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (codification) [2012] OJ L26/2, amended by Dir 2014/52/EU on the assessment of the effects of certain public and private projects on the environment [2014] OJ L124/1 (EIA Directive); Dir 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment [2001] OJ L197/30.

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(2.) Reg 1907/2006/EC concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency [2006] OJ L396/1 (REACH Regulation).

(3.) 'substance: means a chemical element and its compounds in the natural state or obtained by any manufacturing process' (REACH, art 3(1)).

(4.) Notoriously, under the former legislation, the safety of 'existing' chemicals was not investigated adequately (if at all), see European Commission (2001b) 88.

(5.) Dir 2001/18/EC on the deliberate release into the environment of genetically modified organisms [2001] OJ L 106/1; Reg 1829/2003/EC on genetically modified food and feed [2003] OJ L 268/1 (Reg GM Food and Feed).

(6.) Environmental protection is an obvious forerunner; consider the UNECE Aarhus Convention on Access to Environmental Information, Public Participation in Decision-Making, and Access to Justice on Environmental Matters United Nations Economic Commission for Europe (1998) 38 ILM 517 (1999). The move to participation in environmental decision-making is closely linked to technological change, given the contributions of technologies to both environmental problems and protection.

(7.) There is an enormous literature. See e.g. Craig (2011). Forcing national governments to consider non-national interests, through EU membership, may even be democracy-enhancing, Menon and Weatherill (2007).

(8.) e.g. NGOs have produced a SIN ('substitute it now') list of substances that they say meet the regulatory criteria for qualification as an SVHC, and should be replaced with less harmful substances, challenging the slow pace of official listing of SVHCs: see International Chemical Secretariat (2015); Scott (2009).

(9.) EIA Directive, art 4.

(10.) EIA Directive, art 5. Also new Annex IV with more detail.

(11.) EIA Directive, art 6.

(12.) Defined broadly: those 'affected or likely to be affected' or having 'an interest in' the procedures; environmental interest groups are 'deemed to have an interest' (EIA Directive, art 1(2)(e)).

(13.) EIA Directive, art 6.

(14.) EIA Directive, art 8.

(15.) EIA Directive, art 1(2)(g)(iv).

(16.) REACH Regulation, art 59.

(17.) REACH Regulation, art 59.

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(18.) REACH Regulation, art 59(4). Interested party is not defined in legislation.

(19.) REACH Regulation art 59. If no comments are received following publication of the dossier, the substance is simply added to the Candidate List.

(20.) REACH Regulation, art 58.

(21.) REACH Regulation, art 58(4).

(22.) REACH Regulation, art 64(3).

(23.) REACH Regulation, art 64(8).

(24.) The process varies depending on the GMO; here I will discuss the process for authorization of a GMO destined for food or feed use.

(25.) Reg GM Food and Feed, art 5(2)(b) (food) and art 17(2)(b) (feed).

(26.) Reg GM Food and Feed, art 6(7) (food); art 18(7) (feed).

(27.) EIA Directive, art 79(1). Currently a professor of regulatory ecotoxicology and toxicology and an MEP.

(28.) EIA Directive, art 108.

(29.) e.g. the Commission refers to concerns from other outsiders about the ECHA's 'strong engagement with industry stakeholders', European Commission (2013: [4]). Participation and influence vary greatly, depending eg on institution and sector at stake, see eg Dur and de Bièvre (2007). See also Abbot and Lee (2015).

(30.) e.g. Case T-13/99 *Pfizer Animal Health SA v Council* [2002] ECR II-3305.

(31.) Reg 182/2011/EU laying down the rules and general principles concerning mechanisms for control by Member States of the Commission's exercise of implementing powers [2011] OJ L 55/13.

(32.) Decisions, which recite the results of comitology, can be found on the GMO register, European Commission.

(33.) Note that the Member States are also closely involved in the 'scientific' governance process in agencies, eg through the ECHA's Member State Committee.

(34.) Art 11. Under the 'regulatory procedure with scrutiny', which survives from an earlier version of comitology, but is supposed to be removed by legislation in 2014, Parliament can reject a Commission draft decision by simple majority.

(35.) Looking only at decisions does not of course account for the avoidance or postponement of some decisions, especially on the *cultivation* of GMOs. EFSA advice is also generally decisive in areas other than GMOs, see Vos (2010).

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(36.) Commission Regulations 143/2011, 125/2012 and 348/2013 amending Annex XIV to Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) [2011] OJ L 44/2; [2012] OJ L 41/1; [2013] OJ L 108/1.

(37.) One regulation postpones inclusion in Annex XIV pending consideration of the imposition of restrictions on the substance; another provides an extended deadline for application following Member State comments.

(38.) e.g. *Pfizer* (n 30), Case C-77/09 *Gowan Comércio Internacional e Serviços Lda v Ministero della Salute* [2010] ECR I-13533.

(39.) The legislative context is important, and in some cases will preclude a demand for risk assessment to justify action, see eg Case C-343/09 *Afton Chemical Limited v Secretary of State for Transport* [2010] ECR I-7027, Kokott AG.

(40.) *Pfizer* (n 30), [143].

(41.) *Pfizer* (n 30) [199].

(42.) Case T-70/99 *Alpharma v Council* [2002] ECR II-3495, [213].

(43.) In this case, the applicant and the local authority. *Examining Authority's Report of Findings and Conclusions and Recommendation to the Secretary of State for Energy and Climate Change Brechfa Forest West Wind Farm* (2012). Query also the space for real influence on decision-making when a project has been identified as a Project of Common Interest, see European Commission (no date).

(44.) See Jasanoff (1997) on the difficulty of maintaining the British tradition of relying on the 'quality' of the *people* involved to legitimize decisions, as the need to explain across cultures grows.

(45.) Planning Act 2008 (UK), s 104.

(46.) Planning Act 2008 (UK), ss 87(3)(b) and 106(1)(b).

(47.) Negative impacts on nationally designated landscape is potentially a more weighty consideration.

(48.) Note that there may be sufficient space in principle to satisfy the legal requirement (Art 6(4)) that 'all options' be open at the time of consultation. See also *R (on the application of HS2 Action Alliance Limited) (and others) v Secretary of State for Transport* [2014] UKSC 3, on parliamentary decision-making.

(49.) REACH Regulation, art 58(4).

(50.) Rolls-Royce declined to comment on consultation responses other than those relating to these criteria in respect of its application for the use of Bis (2-ethylhexyl) phthalate (DEHP), ECHA, <http://www.echa.europa.eu/web/guest/addressing-chemicals-of-concern/>

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authorisation/applications-for-authorisation-previous-consultations/-/substance-rev/1601/term accessed 21 October 2015.

(51.) REACH Regulation, art 40(2).

(52.) REACH Regulation, art 60(2).

(53.) REACH Regulation, s 6.4 of annex I, art 60(2).

(54.) REACH Regulation, art 60(4).

(55.) Although note that restrictions can be imposed on substances posing unacceptable risks, even if they are not SVHCs, Art 68.

(56.) See also Stokes (2012), on how (internal) market objectives are unreflectingly embedded in the regulatory framework for nanotechnology.

(57.) Reg GM Food and Feed, art 7(1)(Food).

(58.) Reg GM Food and Feed, Recital 32: 'Other legitimate factors' applies only to food and feed GMOs: 'in some cases, scientific risk assessment alone cannot provide all the information on which a risk management decision should be based, and ... other legitimate facts relevant to the matter under consideration may be taken into account'. This is a formula that recurs throughout EU food law, see eg Reg 178/2002/EC Laying Down the General Principles and Requirements of Food Law, Establishing the European Food Safety Authority and Laying Down Procedures in Matters of Food Safety [2002] OJ L 31/1.

(59.) e.g. consumer protection is a relevant concern under Reg Genetically Modified Food and Feed (n 5).

(60.) Although see the narrow approach of Kokott AG in Case C-66/04 *United Kingdom v European Parliament and Council (Smoke Flavours)* [2005] ECR I-10553, discussed in Lee (2009).

(61.) European Commission, *Proposal for a Regulation amending Directive 2001/18/EC as regards the possibility for the Member States to restrict or prohibit the cultivation of GMOs in their territory* COM (2010) 375 final. For discussion of the final legislative measures, see Lee (2016).

(62.) Note that other provisions (Article 114 TFEU and safeguard clauses) that allow for national autonomy in respect of environmental or human health concerns, but these have been very (arguably unnecessarily) narrowly interpreted as turning around new scientific evidence, see Lee (2014: ch 10).

(63.) Case 120/78 *Rewe-Zentral AG v Bundesmonopolverwaltung für Branntwein (Cassis de Dijon)* [1979] ECR 649.

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(64.) Although note that Article 114 TFEU or the safeguard clause in the legislation allows Member States to take measures in respect of health or environmental protection. On the narrow framing of those possibilities, see Lee (2014: ch 10).

(65.) Case 452/01 *Margarethe Ospelt v Schlössle Weissenberg Familienstiftung* [2003] ECR I-9743, [39]. Note also the public goods associated with organic farming by European Commission, *European Action Plan for Organic Food and Farming* COM (2004) 415 final, section 1.4.

(66.) C-165/08 *Commission v Poland* [2009] ECR I-6943, [51].

(67.) Nic Shuibhne and Maci (2013); Jans and Vedder (2012: 281–283).

(68.) Case C-36/11 *Pioneer Hi Bred Italia Srl v Ministero dell Politiche agricole, alimentari e forestali* [2012] ECR I-000, [61].

(69.) In *Poland* (n 66), Poland made no real effort to justify its claim that it was pursuing religious and ethical objectives; general comments are not sufficient.

(70.) A sense of the variety of approaches can be gained from the contributions to Kohler-Koch, de Bièvre, and Maloney (2008). See also Consolidated Version of the Treaty on European Union [2008] OJ C115/13, art 11; Mendes (2011).

(71.) *R (on the application of HS2 Action Alliance Limited) (and others) v Secretary of State for Transport* [2014] UKSC 3, [36].

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The Role of Non-State Actors and Institutions in the Governance of New and Emerging Digital Technologies



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Abstract and Keywords

New digital technologies pose particular problems for regulators. The utility of these technologies is maximized by linking them to the Internet. But Internet technology does not respect national borders, thereby undermining the traditional legitimacy of the Westphalian state to regulate activity within its jurisdictional borders. This has led to the development of competing cyber-regulatory models that attempt to bridge the gap between traditional Westphalian governance and the new reality of the global digital space. Many of these, although not all, fit within post-Westphalian literature. Some, drawing from globalization and post-Westphalian models, seek to identify and deploy key governance nodes. Such models identify roles for non-state actors, private corporations, and supranational governance institutions. The unhappy relationship between old-world, Westphalian legal governance and new-world, post-Westphalian governance generates ongoing conflict and is the backdrop to this chapter which identifies and discusses a number of case studies in digital governance.

Keywords: nodal governance, transnational regulation, multistakeholder regulation, private actors, gatekeepers, intermediaries, legitimacy

1. Introduction

1.1 Traditional, Nodal, and Transnational Governance Models

Traditional models of regulation and governance draw authority from the sovereign power of the state and convert that authority into an action in regulation or in governance.¹ As Morgan and Yeung outline in their classic *Introduction to Law and Regulation* (Morgan and Yeung 2007) traditional models of regulation and (p. 671) governance begin from the cybernetics principle. Such a model begins with three components of a control system: capacity for standard setting; capacity for information gathering; and capacity for behaviour modification. In essence a model for regulation or for governance is predicated upon

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a standard-setting authority, a monitoring system which detects deviation from these standards and a form of corrective action to remedy deviation. Lawyers tend to more commonly apply a narrow definition of regulation: 'At their narrowest, definitions of regulation tend to centre on deliberate attempts by the state to influence socially valuable behaviour which may have adverse side-effects by establishing, monitoring and enforcing legal rules' (Morgan and Yeung 2007: 3). Some, however, employ a wider definition of what some may more properly suggest is governance: 'At its broadest regulation is seen as encompassing all forms of social control, whether intentional or not, and whether imposed by the state or other social institutions' (Morgan and Yeung 2007: 3–4). The true nature of regulation and governance, as applied in the real world, is probably closer to the latter than the former, but the study of such an ill-defined sphere would be nigh-on impossible as almost any social action by any institution could be defined as a regulatory act. Thus studies of regulation and governance have developed a number of refinements and supplementary models. Many such as risk based regulation (Black 2010) and responsive regulation (Ayres and Braithwaite 1992; Baldwin and Black 2008) are modelled upon specific relationships between an industry or sector and its regulator. They assume commonality of experience and language: in essence these approaches are institutional approaches to both regulation and governance. Another set of models examines the social structures of regulation and governance such as libertarian paternalism and empirical regulation (Sunstein and Thaler 2003; Sunstein 2011), and 'smart' regulation (Gunningham and others 1998). These are valuable additions to both the normative cybernetic model and the risk/responsive institutional models. They are not particularly helpful to the current analysis as their focus is on responses of the social actor in the regulatory matrix whereas the instant analysis is on technology and technological actors. Therefore, although we acknowledge the importance these contributions make to wider discourse on regulation and governance, and in particular their contribution by acknowledging the potential exploitation of biases and heuristics in human actors, we do not intend here to examine such socially mediated forms of regulation.²

Some regulatory models do capture the role played by technology as an actor. The most relevant are applications of actor-network theory (ANT) or science and technology studies (STS) (Kuhn 1962; Latour 2005). ANT is often associated with Michel Callon and Bruno Latour and is closely linked to the work of the Centre de Sociologie de l'Innovation, Paris. It was not developed particularly to deal with computer networks (Latour 1996) but rather was designed to model the semiotic relationships between all actants in a network human or non-human. It can be (p. 672) extremely difficult to model without years of study but a good and simple description is given by Ole Hanseth and Eric Monteiro:

When going about doing your business—driving your car or writing a document using a word-processor—there are a lot of things that influence how you do it. For instance, when driving a car, you are influenced by traffic regulations; prior driving experience and the car's manoeuvring abilities, the use of a word-processor is influenced by earlier experience using it, the functionality of the word-processor and so forth. All of these factors are related or connected to how you act. You do not go about doing your business in a total vacuum but rather under the influence

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of a wide range of surrounding factors. The act you are carrying out and all of these influencing factors should be considered together. This is exactly what the term actor network accomplishes. An actor network, then, is the act linked together with all of its influencing factors (which again are linked), producing a network. An actor network consists of and links together both technical and non-technical elements. Not only the car's motor capacity, but also your driving training, influence your driving. Hence, ANT talks about the heterogeneous nature of actor networks.

(Hanseth and Monteiro 1998: 96–97)

As can be seen this is a very attractive model for anyone working in the information and communications technology (ICT) field including those of us working in ICT regulation or governance as it helps model the role and influence of non-human actors in the network and arguably allows for better modelling of the response of human actors to attempts to regulate their activity. ANT is in itself a subset or perhaps a development depending upon your point of view of STS. This is the rather broader study of the interrelationship between scientific discovery and advancement and external social, political, and cultural influences. This covers many fields from technological determinism to modernity and deliberative democracy. Much modern structuring of STS owes a debt to the work of Thomas Kuhn and in particular his work *The Structure of Scientific Revolutions* (1962). Kuhn posited the thesis that revolutionary changes in scientific theories may be attributed to changes in underlying intellectual paradigms. For those of us working in the ICT field, it is not Kuhn's thesis itself which is particularly appealing but the question of technological determinism which also plays a vital role in STS theory and in particular the distinction between hard and soft determinism. Hard determinists see technology as a driving force in societal development. According to this view of determinism, we organize ourselves to meet the needs of technology and the outcome of this organization is beyond our control or we do not have the freedom to make a choice regarding the outcome (Ellul 1954). This may be seen as an influencing factor in movements such as cyber-collectivism or cyberpaternalism (Lessig 2006; Goldsmith and Wu 2006; Zittrain 2008). Soft determinists still subscribe to the fact that technology is a guiding force in our evolution but would maintain that we have a chance to make decisions regarding the outcomes of a situation. This is reflected in movements such as network communitarianism (Murray 2006). A third application of STS in the ICT field is of course media determinism which was famously discussed by Marshall (p. 673) McLuhan in his 1964 book *Understanding Media: The Extensions of Man* and in which he set out the famous phrase 'the medium is the message'.

The application of both ANT and STS theories to ICT regulation and governance is an area already extremely well developed with excellent work available (Knill and Lehmkuhl 2002; Gutwirth and others 2008; DeNardis 2014). Due to the already established nature of the literature in this area, we do not propose to apply ANT or STS theory in this chapter; instead, the tools to be applied in this analysis are to be found in nodal or decentred governance and transnational governance or regulation. Nodal or decentred governance is found in the work of Clifford Shearing (Shearing and Wood 2003), Peter Drahos (Burris

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and others 2005), and Julia Black (2001). In essence, it is the acknowledgement that the regulatory environment has many more active participants than is recognized by traditional cybernetic theory. As Black observes:

The decentred understanding of regulation is based on slightly different diagnoses of regulatory failure, diagnoses which are based on, and give rise to, a changed understanding of the nature of society, of government, and of the relationship between them. The first aspect is complexity. Complexity refers both to causal complexity, and to the complexity of interactions between actors in society (or systems, if one signs up to systems theory). There is a recognition that social problems are the result of various interacting factors, not all of which may be known, the nature and relevance of which changes over time, and the interaction between which will be only imperfectly understood. (2001: 106–107)

The decentring analysis must also be placed within globalization and the transnational aspect of modern governance/regulation. Again, Black acknowledges this:

Decentring is also used to describe changes occurring within government and administration: the internal fragmentation of the tasks of policy formation and implementation. Decentring is further used to express observations (and less so the normative goal) that governments are constrained in their actions, and that they are as much acted upon as they are actors. Decentring is thus part of the globalization debate on one hand, and of the debate on the developments of mezzo-levels of government (regionalism, devolution, federalism) on the other. (2001: 104)

The integration of decentred/nodal governance with ANT or STS theory gives a strong regulatory model for the regulation of emergent digital technologies (Teubner 2006; Sartor 2009; Koops and others 2010). It is the foundation of the cyber-collectivist, or cyberpaternalist, movement that took root in East Coast US institutions and which has become dominant in our understanding of cyber-governance (Lessig 2006; Goldsmith and Wu 2006; Zittrain 2008). Central to this thesis is the role of code, or to widen the analysis from merely Internet-enabled technologies, the standards and protocols employed by digital technologies of all types. Cyberpaternalists believe that the guidance of the state, or an elite, achieved through manipulation of software code or network hardware, is necessary to prevent cyberspace from becoming anarchic or simply inefficient (Lessig 2006: 120–137; (p. 674) Zittrain 2008: 11–19, 101–126). This is most famously captured by Lawrence Lessig's model of regulation whereby he identified four regulatory modalities—law, social norms, architecture or design, and markets (Lessig 2006: 122–123). These modalities act as constraints on action or behaviour and within the plastic environment of the digital space where almost all aspects of the environment may be altered by human intervention. Lessig identifies architecture, or code, as the key modality (Lessig 2006: 83–119). As Wu observed in discussing Lessig's work:

The reason that code matters for law at all is its capability to define behavior on a mass scale. This capability can mean constraints on behavior, in which case code

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regulates. But it can also mean shaping behavior into legally advantageous forms. (2003: 707–708)

Lessig identifies a shift in regulatory ability and power in this environment. The power and plasticity of code makes it the pre-eminent control mechanism for digital technologies as:

[C]ode or software or architecture or protocols [which] set [the] features of the [digital space] are selected by code writers. They constrain some behavior by making other behavior possible or impossible. The code embeds certain values or makes certain values impossible.

(Lessig 2006: 125)

He identifies two competing regulatory interests. The first are the East Coast codemakers:

[T]he ‘code’ that Congress enacts ... an endless array of statutes that say in words how to behave. Some statutes direct people; others direct companies; some direct bureaucrats. The technique is as old as government itself: using commands to control. In our country, it is a primarily East Coast (Washington, D.C.) activity.

(Lessig 2006: 72)

The second regulatory interest come from the West Coast codemakers, which he describes as ‘the code that code writers “enact”—the instructions imbedded in the software and hardware that make cyberspace work’ (Lessig 2006: 72). Often they will work in concert with traditional, or East Coast, codemakers mandating technical standards from the technical community. Sometimes they work in parallel with the same values driving both East Coast and West Coast code. Occasionally they will come into conflict and in some cases East Coast code prevails, in others West Coast code survives. What Lessig identified more than anything though was the contribution of the West Coast codemaker: this was another example of the developing nodal or decentralized model of regulation, but, importantly, Lessig put considerable regulatory power into the hands of non-state actors.

1.2 Non-State Actors in the Technology Sectors

As digital technologies have moved from the lab to the home, and more recently to the world around us through mobile and wearable digital technology, non-state (p. 675) actors have come out from Silicon Valley and the US West Coast to inhabit and represent almost all areas of society. In this chapter we have categorized them into four classifications: (1) business actors; (2) transnational multistate actors; (3) transnational private actors; and (4) civil society groups. Each has a particular value set and unique ability to influence key regulatory designers (East Coast and West Coast regulators). Although none of these have the ability to directly make policy, law, or to develop underlying architectures of con-

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trol, each actor has the ability to access those who do have that ability and each have a particular method or means of influence.

The first group, business actors, are made up of those technology companies who have the ability to directly influence the design or code of emergent technologies including actual code developers, such as Microsoft, Google, and Apple; hardware developers, such as Sony or LG, and media and content companies such as Fox, Disney, or UMG. The tools available to business actors are varied. Those who have direct access to software or hardware design may directly manipulate design or code to their advantage. Others may find that due to their intermediary role, such as Internet service providers (ISPs) or search engines, they become proxy regulators for the interests of others (Laidlaw 2015). Developers of new platforms and technologies often find themselves quickly in a dominant position, particularly if the technology is both disruptive and widely adopted. In the last 20 years, Google has developed a dominant position in a number of technology sectors, but in particular in search, while Apple had (but may no longer have) dominance in digital music distribution. Currently Spotify seems to hold the leading position in streaming music distribution against strong competition in the form of Apple Music, Google Play Music, and Amazon Prime Music, while Netflix, Hulu, and Amazon fight for dominance in streaming video distribution. The need for content suppliers to be on these dominant platforms gives these companies considerable market power, a position that it takes competition authorities a considerable time to address, as we shall see in our discussion of the Microsoft dominance cases (see section 3.2).

Our second group, transnational multistate actors, reflect the global reach of new and emergent technologies: markets for new technologies are worldwide. As a result, and as predicted by Johnson and Post (1996), the ability of nation states to legitimately and effectively regulate emergent technologies is limited. This enhances the role of supranational organizations like the European Union (EU) and United Nations (UN). The EU is taking the lead in a number of areas of emergent technology, in particular privacy and data privacy and in abuse of dominance and more widely through its Digital Agenda for Europe. UN bodies also play a key shaping role. Most obviously through the World Summit on the Information Society, and the International Telecommunications Union Internet Policy and Governance Programme.³ Finally there are multilateral initiatives such as the Transatlantic Trade and Investment Partnership which proposes common standards in a number of technology industries including ICTs, pharmaceuticals, engineering, and (p. 676) medical devices. It is the second proposed multilateral trade treaty following on from the Anti-Counterfeiting Trade Agreement. These treaties are proving to be highly controversial with civil society groups and may be interpreted as an attempt to secure the dominance of current technology providers against possible emergent technologies.

The third group are transnational private actors. These are private regulatory organizations, as distinct from business actors, which have either organically developed into a regulatory role from a technical design or self-regulatory role, such as the Internet Architecture Board and the World Wide Web Consortium, or bodies created to fill a vacuum caused by the transnational nature of new and emergent technology such as the Internet

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Corporation for Assigned Names and Numbers (ICANN). As with transnational multistate actors a more recent development is the design of multistakeholder principles. These bodies draw authority and capacity to regulate from a number of sources. The Internet Architecture Board and the World Wide Web Consortium are essentially technocracies supported by the engineers who develop and make use of their systems. ICANN receives formal authority from two memoranda of understanding with the US Department of Commerce and the Internet Engineering Task Force,⁴ a not uncontroversial position (Hunter 2003).

Finally, we must acknowledge the role of civil society groups. One aspect of Internet-enabled technologies is that as commerce becomes global so does activism and civil society. Leading civil society groups such as the American Civil Liberties Union and the Open Rights Group (ORG), have found themselves supplemented by a number of international multi-issue and single issue civil society groups such as Privacy International, GovLab, Drones Watch, Stop the Cyborgs, and many more. Although not able to directly develop regulation or governance, these groups through steady pressure can influence the development and deployment of new and emergent technology. Privacy International has successfully, along with other international civil society groups, influenced the EU to classify some digital surveillance technologies as dual-use for the purpose of exportation,⁵ while Stop the Cyborgs, through a long and vocal campaign which attracted much negative media attention undoubtedly contributed to Google's eventual decision not to fully commercialize the explorer version Google Glass.⁶

Through a series of case studies this chapter examines how each of these groups plays a role in the development of governance for new and emergent technologies, demonstrating the role and contribution of non-state nodes of governance in emergent digital technologies. The first case study looks at business actors, and in particular the role of Internet intermediaries (IIs) such as Google, Facebook, and key ISPs such as BT or Sky, in controlling access to content online. As intermediary gatekeepers (Laidlaw 2015) they have a particular role, and some may argue commensurate responsibility, in allowing for the free flow of information from one part of the network to another. Their unique gatekeeper position has also led to them being identified by states as a key regulatory node targeted by them as proxy regulators. (p. 677) The second case study examines the particular role of transnational multistate public bodies such as the UN and the EU. Our examination of this area centres upon the role of the EU in competition law or antitrust. We examine the Microsoft series of cases which have seen some of the largest fines in corporate history levied. These may also be considered alongside the current EU Google investigations that include one on the Google Shopping marketplace and one on the Android operating system (OS) and app store. Our third case study examines transnational standards setting bodies and in particular the role of ICANN, in managing the generic top-level domain name space (gTLD). This is a space of considerable commercial value and some public interest. ICANN have over the years been required to manage a number of controversial programmes to expand access to the gTLD and we will examine two procedures in some detail, the .xxx space and the new top-level domain process (new gTLD). Finally, we will examine the role of civil society groups in this sphere and in particular the degree of suc-

cess achieved by civil society groups in the digital privacy sphere with particular attention to the role of Digital Rights Ireland and other European privacy groups in the series of challenges brought in response to the EU Data Retention Directive (Dir. 2006/24/EC).

2. Business Actors: Intermediaries as Proxy Regulators

2.1 Gatekeepers

IIs-ISPs, hosting providers, search engines, payment platforms, and participatory platforms (such as social media platforms), exercise key functions in their role as gatekeepers in the online environment (Laidlaw 2015). While IIs provide essential tools that 'enable the Internet to drive economic, social and political development', they may also 'be misused for harmful or illegal purposes, such as the dissemination of security threats, fraud, infringement of intellectual property rights, or the distribution of illegal content' (OECD 2011: 3). Their role as gatekeeper made IIs clear targets for regulatory reform. East Coast codemakers wanted to encourage them to act in an editorial, self-regulatory role; to police and remove harmful content, while IIs wanted to remove any risk of being held liable for that same harmful content.

In the USA, this issue came to a head with the decision in *Stratton Oakmont, Inc. v Prodigy Services Company* 1995 WL 323710 whereby the New York Supreme Court ruled that IIs who assumed an editorial role with regard to customer content could be held liable as publishers, potentially making ISPs legally responsible (p. 678) in libel or tort for the actions of their users. This effectively discouraged IIs from self-regulating, an outcome which went against the intention of Congress. This led to the passing of s. 230 of the Communications Decency Act 1996 (47 USC) which provides immunity for IIs operating in an editorial capacity. Unlike the controversial anti-indecency provisions found in the Act that were later ruled unconstitutional, s. 230 is still in force. It allows ISPs to restrict customer actions without fear of being found legally liable for their intervention. In *Zeran v America Online* 129 F 3d 327 the Fourth Circuit Court of Appeals noted Congress 'enacted s. 230 to remove the disincentives to self-regulation created by the *Stratton Oakmont* decision'. Fearing this spectre of liability would deter ISPs from blocking and screening offensive material, Congress enacted s. 230 'to remove disincentives for the development and utilization of blocking and filtering technologies that empower parents to restrict their children's access to objectionable or inappropriate online material' (47 USC §230(b)(4)). Thus, s. 230 was specifically passed to encourage IIs to play a regulatory role.

In Europe, regulators undertook a nuanced approach to IIs as gatekeeper regulators. The e-Commerce Directive focused energies on notice and take down, imposing liability for ISPs only with attainment of actual knowledge of illegal content or activity (Art. 14, Dir. 2000/31/EC). This approach has been fine-tuned through case law where courts have struggled to find a sense of proportionality that balances the rights of Internet users with

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litigants. In carrying out this unenviable task, courts have to balance not only rights of users against other rights-holders, within an acceptable framework for advocates of Internet freedoms that *also* complies with international standards.

2.2 Searching for Proportionality

Searching for ‘nuance’ has led to a series of cases in the UK where the courts examined various questions relating to the passivity of IIs in content moderation: for example, how involved in moderation does an II have to be before they lose their exemption from liability?⁷ What actually qualifies as ‘notice’ under Art. 14 of the e-Commerce Directive?⁸ And what is meant by the term ‘intermediary’ under the Directive?⁹ This search for nuance has had three effects. First, it has fragmented intermediary liability into subject-specific pockets of analysis. In copyright law, UK (and European) law has responded to immunity for conduits under Art. 12 of the e-Commerce Directive by developing Art. 8(3) of the Information Society (Dir. 2001/29/EC). This was given effect in the UK by s. 97A of the Copyright, Designs and Patents Act 1988, and is a provision specifically designed to allow injunctions against IIs. Meanwhile, s. 1 of the Defamation Act 1996, ss. 5 and 10 of the Defamation Act 2013 and the Regulations for Operators of Websites, when taken together, provide a specific defence for the II if they can show that they did not post a (p. 679) defamatory statement.¹⁰ Second, there has been an additional series of cases so fact sensitive that it is hard to draw a line of authority in order to advise actors on how to structure their business.¹¹ Finally, agreements outside formal legal frameworks occur without the oversight and transparency that one would normally expect from traditional state actors. For example, agreements between the UK government and major ISPs allow for the restriction of access to content deemed pornographic unless a broadband user ‘opts in’ with their ISP to access such content. The UK government has stated its intention to extend this regime to sites hosting extremist content (Clark 2014), while companies like BT have implemented wider content filtering systems under frameworks for of parental control, whereby new users must opt in to a variety of content, ranging from obscene content, to content featuring nudity, drugs and alcohol, self-harm, and dating sites (BT 2015).

Since 2012, a series of orders pursuant to s. 97A of the Copyright, Designs, and Patents Act 1988 have been made by the English courts requiring ISPs to block or at least impede access to websites that offer infringing content. Since the initial cases of *Twentieth Century Fox Film Corp v British Telecommunications plc* [2011] EWHC 1981 (Ch) and *Twentieth Century Fox Film Corp v British Telecommunications plc (No. 2)* [2011] EWHC 2714 (Ch), ISPs have not opposed a single blocking order sought by rights-holders. They have instead limited themselves to negotiating the wording of orders. To date there has not been a single appeal regarding the costs of the applications or the costs of implementing the orders.¹² All section 97A orders relating to copyright have been obtained by film studios, record companies or by the FA Premier League. The courts have also allowed for an s. 97A-style order to be made under s. 37 (1) of the Supreme Courts Act 1981 against a site selling mass quantities of trademark infringing goods.¹³ Injunctions issued under s. 97A (or s. 37(1)) pose a new set of challenges for the courts, in large part due to Art. 11 of the Enforcement Directive which requires that any remedies for relief be ‘effective,

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proportionate, and dissuasive’ and implemented in a way that does not create ‘barriers legitimate trade’ and ‘safeguards against abuse’. The courts must take into account the interests of third parties, particularly those consumers and private parties acting in good faith (Recital 24, Dir. 2004/48/EC). Taken together, Recital 24 and Article 3(2) of the Enforcement Directive (Dir. 2004/48/EC), and the ruling from the European Court of Justice in *L’Oréal v eBay* [2012] All ER (EC) 501 require that any injunctions must not only be ‘effective, proportionate, and dissuasive and must not create barriers to legitimate trade’, but also must have regard to safeguards against abuse and interests of third parties.¹⁴

2.3 Business Actors

Major benefactors of increased regulation over IIs are arguably those who offer legal alternatives to the now regulated copyright infringing services. This has led to (p. 680) greater demand for legal services such as Spotify, Apple Music, Google Play Music, or Amazon Prime Music for accessing and/or purchasing copyrighted music and Netflix, Hulu, and Amazon Prime in the lucrative video market. The role of commerce in the governance of new and emerging technologies never has been more relevant. Companies like Dropbox, Spotify, and Netflix have developed their services in response to user frustrations with the digital environment. Dropbox, a cloud storage company, thrived by providing a user-friendly solution to secure off-line access to files from multiple devices while offering a product that circumvents limitations in capacity found in personal computer hardware. By summer 2016, the music service Spotify had grown to over 100 million users and over 40 million paying subscribers¹⁵ providing a legal streaming alternative to Apple’s iTunes download service. The success of Spotify eventually forced market leaders in music downloads Apple, Google, and Amazon to begin their own streaming services in competition. At the same time video service Netflix boasted over 83 million members in over 190 countries enjoying more than 125 million hours of TV shows and movies per day.¹⁶ With growing popularity in cloud-based, legitimate, and income-generating media providers, it is unsurprising rights-holders continue to take steps to protect their intellectual property in the online environment.

Section 97A appears to be a powerful and symbolic tool in the East Coast codemaker’s arsenal. Orders made under s. 97A provide allow rights-holders to compel ISPs into becoming *complicit* deputies in their fight, whatever that fight might be. Intermediary gatekeepers, discussed so eloquently by Laidlaw, now arguably have dual roles: the gatekeeper is not only an independent regulator, enforcing their own moral or corporate values (as allowed by s. 230), but is also a proxy—a mere tool or node in a larger regulatory matrix. In many cases the second category captures that most Lessigian act—seizing and deployment of non-state actors by the state to protect wider political or commercial interests: West Coast Code has been enrolled by East Coast Code.¹⁷

3. Transnational Multistate Actors: The EU DG Competition

3.1 Emerging Markets and Disruptive Innovation

Governments, of course, remain engaged in the digital governance debate. The very premise of a chapter which discusses the role of non-state actors in the governance of emergent digital technologies is that state actors are still the primary regulators (p. 681) in this sphere. State actors may leverage control directly and indirectly and they play key roles in the private governance space through governmental advisory committees and policy committees. More directly governments through organizations such as the UN, the EU, or the African Union form supranational regulatory blocs. One area where the European Union has been particularly active in the field of new and emergent digital technologies is in competition abuses.

New and emergent technologies are often disruptive in nature and as such pose a threat to established market participants. The risk to established market participants has been identified and discussed extensively in economics literature, especially by Clayton Christensen of Harvard Business School whose work *The Innovator's Dilemma* (Christensen 1997) has become the foundational text in this discourse. In a contemporary attempt to modernize and give flesh to Schumpeter's now dated conceptualization of creative destruction (Schumpeter 1942: 81–87), Christensen replaces Schumpeter's macroeconomic concept of a collapse of capitalism with a microeconomic business-centred concept of disruptive innovation (Christensen 1997: 10–19). While Schumpeter is looking at the outcome of disruption, Christensen is looking at the causal mechanism. Christensen notes that while most technological innovations are sustaining innovations 'technologies ... that [] improve the performance of established products, along the dimensions of performance that mainstream customers in major markets have historically valued' (1997: 11) disruptive technologies are quite different:

[They] result in worse product performance, at least in the near-term ... they bring to a market a very different value proposition than had been available previously. Generally, disruptive technologies underperform established products in mainstream markets. But they have other features that a few fringe (and generally new) customers value. (1997: 11)

In time these technologies become mainstream as more customers are attracted to the benefits the new technology offers. Meanwhile the operators of established technologies lose out as they fail to invest in the disruptive technology for three reasons:

First, disruptive products are simpler and cheaper; they generally promise lower margins, not greater profits. Second, disruptive technologies typically are first commercialized in emerging or insignificant markets. And third, leading firms'

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most profitable customers generally don't want, and indeed initially can't use, products based on disruptive technologies.

(Christensen 1997: 12)

As a result, established firms fail and new entrants take over. We have seen this happen frequently with digital technologies. IBM and DEC, major mainframe manufacturers lost out to smaller and more nimble desktop computer manufacturers such as Dell, Wang, and Apple in the 1980s; IBM lost out again to Microsoft in the OS market, while more recently Internet technologists such as Google, Adobe, Netflix, and Spotify have disrupted a number of markets including web browsing, file storage, applications software, mobile OSs, television and film, and music distribution. (p. 682) It is unsurprising therefore that established market participants often take defensive positions vis-à-vis new and emergent technologies which display disruptive characteristics. These defensive positions vary dependent upon the market and the new entrant. Often extensive patent thickets will be employed with dominant market participants patenting all aspects of their technology as has been seen in the *Samsung v Apple* series of cases fought globally over a number of patents including the Apple 381 'bounce back' patent and the Samsung 711 'music multi-tasking' patent.¹⁸ An alternative strategy is to leverage market dominance in one technology market to achieve control or dominance over an emergent market. This strategy is employed usually when the dominant player in one market wishes to move into a vertically related emerging market such as Microsoft's attempts to leverage dominance in the OSs market to achieve dominance in the web browser market or Google's attempts to leverage dominance in web search into vertical search, online advertising and mobile platforms. Unsurprisingly, these attempts have drawn the attention of competition authorities in both the US and the EU and provide the perfect case study to analyse the regulatory activity of the EU Directorate General for Competition as a multistate, supranational, public regulatory body.

3.2 Microsoft: Interoperability, Media Players, and Web Browsers

In the 1990s, the disruptive innovation for OS and applications software (AS) developers like Microsoft was web browsers. The risk was that anything which could be achieved through a personal computer could be achieved through a network computer connected to a server. The fruits of the network computer concept may be seen today in inexpensive and lightweight notebook computers such as the Google Chromebook, which operate using the Chrome OS, a variant of Linux, designed to be used with network applications such as Google's online office suite. For Microsoft, there was a dual threat: browsers could challenge their dominance in the OSs market while online applications could undermine their dominance in office applications software. Despite this threat, as Christensen could have predicted, Microsoft as the incumbent in the wider OS/AS markets was a slow adopter to web-browsing technology. The first commercial web browser was the Netscape or Mosaic browser which in January 1994 was used by 97 per cent of Internet users.¹⁹ Microsoft would not debut its browser, called Internet Explorer, until August 1995 by which time Netscape Navigator, the replacement for Mosaic, was on its way to controlling

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nearly 90 per cent of the browser market.²⁰ Remarkably though by October 1998 Internet Explorer would overtake Netscape Navigator to become the most popular web browser: in a little over three years Microsoft had gone from less than 4 per cent of the browser market to 49.1 per cent²¹ and in time Internet Explorer would go (p. 683) on to hold nearly 97 per cent of the browser market.²² The story of how Microsoft achieved this is of course well known and is recorded by the findings of facts in *United States v Microsoft* (253 F.3d 34):

In early 1995, personnel developing Internet Explorer at Microsoft contemplated charging Original Equipment Manufacturers and others for the product when it was released. Internet Explorer would have been included in a bundle of software that would have been sold as an add-on, or 'frosting', to Windows 95. Indeed, Microsoft knew by the middle of 1995, if not earlier, that Netscape charged customers to license Navigator, and that Netscape derived a significant portion of its revenue from selling browser licenses. Despite the opportunity to make a substantial amount of revenue from the sale of Internet Explorer, and with the knowledge that the dominant browser product on the market, Navigator, was being licensed at a price, senior executives at Microsoft decided that Microsoft needed to give its browser away in furtherance of the larger strategic goal of accelerating Internet Explorer's acquisition of browser usage share. Consequently, Microsoft decided not to charge an increment in price when it included Internet Explorer in Windows for the first time, and it has continued this policy ever since. In addition, Microsoft has never charged for an Internet Explorer license when it is distributed separately from Windows.

(*US v Microsoft*: [137])

As District Judge Jackson notes:

over the months and years that followed the release of Internet Explorer 1.0 in July 1995, senior executives at Microsoft remained engrossed with maximizing Internet Explorer's share of browser usage. Whenever competing priorities threatened to intervene, decision-makers at Microsoft reminded those reporting to them that browser usage share remained, as Microsoft senior vice president Paul Maritz put it, 'job #1'.

(*US v Microsoft*: [138])

Applying this ethos Microsoft leveraged a 3.7 per cent market share into a 96.6 per cent market share in six and a half years. The infamous case of *United States v Microsoft* examined both the bundling of Internet Explorer and Windows Media Player in the Windows OS. The outcome of this case, which took six years to final disposal (*Massachusetts v Microsoft Corp*, 373 F. 3d 1199), was roundly criticized for not doing enough to prevent future abuses of dominance in the OS market by Microsoft (Chin 2005; Jenkins and Bing 2007).

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It is arguable that the outcome of the *United States v Microsoft* case represents a failure by the state to regulate one of its own citizens. However, in addition to the US antitrust investigation, the Commission of the EU undertook a separate investigation. This investigation was begun in 1993 and related to the licensing of Windows OS, access to Windows OS application program interfaces (APIs), and the bundling of Windows Media Player (WMP). The initial investigation in Europe did not involve Internet Explorer but a later investigation did involve Internet Explorer bundling. The initial case was brought in 1998 and was an investigation of two breaches of Art. 82 of the EC Treaty (now Art. 102 TFEU), and Art. 54 of the EEA Agreement: (1) refusing to supply interoperability information and allow its use for the purpose of developing and distributing work group server OS products (the interoperability investigation); and (2) making the availability of the Windows (p. 684) Client PC OS conditional on the simultaneous acquisition of WMP from May 1999 until the date of this decision (the bundling investigation).²³ The case is, of course, extremely well known. Following a five-year investigation, the Commission found that Microsoft had a dominant position in both the group server OS market and the PC OS market. They further found Microsoft had abused both market dominances to leverage control into related markets, eventually fining Microsoft over €497 million although over time this fine has increased considerably due to Microsoft failing to comply in good time, with an additional fine of €899 million (reduced on appeal to €860 million) added in 2008.²⁴ With a clear, and for Microsoft costly, precedent set that, for the purposes of former Art. 82 of the EC Treaty bundling was unlawful the Commission opened up the entire market for software which operated on the Windows platform. When soon after the Commission announced that it was turning its attention to Internet Explorer bundling Microsoft immediately took action to ensure that it complied with EU competition law by offering an 'E' version of Windows 7 which would unbundle Internet Explorer for distribution within the EU (Heiner 2009), although in 2013 Microsoft were fined an additional €561 million for failure to implement correctly and in good time the settlement agreed to in 2009.²⁵

The actions of the European Commission have generally been viewed as being much more successful than the intervention of the US federal government into Microsoft's activities. While the US antitrust case is viewed as being less effective in regulating Microsoft's leverage of its dominant position in the OS market, the collected EU competition actions are seen as effective interventions into especially the emergent streaming video and browser markets. Market share data seems to demonstrate that given a free choice the consumer chose not be tied to the Microsoft product. The global market share for Internet Explorer has fallen from nearly 97 per cent in April 2002 to 9.5 per cent today. In addition the market is much more open with no browser holding a clearly dominant position, the market leader Google Chrome holds 58.1 per cent, Apple Safari 12.7 per cent, Firefox 12.4 per cent, Internet Explorer/Edge 9.5 per cent and Opera 2.8 per cent.²⁶ While much of this change in market share can be tracked to the emergence of new browsing technologies such as smartphones and tablets which make extensive use of Google and Apple OSs (and hence a pre-eminence for Chrome and Safari on these products), there is no doubt the actions of the EU Commission helped create an environment

where new (and existing) technologies such as Chrome and Safari could develop their product in the PC market before phone and tablet versions were developed. Accurate figures for just desktop market share are harder to find but online site 'Net Market Share' suggests that Internet Explorer/Edge holds a stronger position in the desktop browser market, with Chrome being the dominant browser on 43.4 per cent of desktops, Internet Explorer/Edge on 26.1 per cent, Firefox on 5.4 per cent, Safari on 3.3 per cent and Opera on 1 per cent. Internet Explorer's greater desktop application seems to be a legacy issue with Internet Explorer 8, still being (p. 685) used by 4.2 per cent of users (almost the same as Safari and Opera combined). This was the version released in 2009 which was bundled with Windows 7 outside the EU, and which according to the Commission was bundled to 15 million EU citizens in error.²⁷ There is little doubt that the browser market is much healthier today than in 2009. Equally data shows that the market for streaming video players is much healthier post the intervention of the Commission.²⁸ The Commission's interactions with Microsoft may have been critiqued by some free market thinkers (Ahlborn and Evans 2009; Economides and Lianos 2009) but there seems little doubt that by cutting back the leveraged vertical dominance of Microsoft they have allowed new entrants and new technologies to flourish in what may not be sexy but are important everyday markets.

4. Transnational Standards and Private Actors: ICANN

4.1 ICANN

When one thinks of a transnational private actor in the digital environment, one invariably thinks of ICANN. ICANN is a high-profile private regulator with global reach. It was formed in 1998 to take over management of the root domain name space which meant ICANN became responsible for the allocation of Internet Protocol (IP) address spaces to regional registrars and for the management of generic top-level domains (gTLDs) such as .com, .net, and .org. This was all achieved by the signing of a memorandum of understanding with the US government which transferred to ICANN the so-called IANA function of assigning Internet address blocks previously under the management of the Information Sciences Institute at the University of Southern California (Mueller 1999). ICANN was the conscious creation of a private multistakeholder regulator to replace the old system of public/private governance (NTIA 1998). In the years since ICANN's creation, it has grown to be an effective, although controversial, multistakeholder regulator. Despite initial criticism that it was unrepresentative (Mueller 1999; Froomkin 2001) and lacked legitimacy (Froomkin 2000), ICANN has withstood a number of challenges, including a sustained challenge to its role at the 2005 WSIS summit in Tunis (Pickard 2007), and today despite ongoing challenges seems to be secure in its role as the established global regulator not only of the IANA function and the root domain name system (DNS), but of domain name policy more generally (Take 2012).

One policy area continually debated by ICANN and stakeholders is the creation of New gTLDs. These are thought to be necessary due to a paucity of available addressing options in the domain name structure. The limited number of gTLDs (in 1998 when ICANN was formed there were only three open gTLDs .com, .org, and .net) meant that once someone had registered say apple.com it was unavailable for anyone else. This meant once Apple, Inc. had registered this address it was no longer available for Apple Records or Apple Bank (Murray 1998). The scarcity of available domain name space meant the push for a greater number of gTLDs to alleviate pressure on the ever expanding use of the DNS is older than ICANN. In 1997, the International Ad-Hoc Committee (part of IANA the forerunner to ICANN) proposed seven New gTLDs including .firm, .store, and .web as 'the DNS was lacking when it comes to representing the full scope of the organizations and individuals on the internet' (Gibbs 1997). These proposals were abandoned when ICANN took over management of the DNS but in November 2000, following a short public consultation, it announced seven New gTLDs of its own: .aero, .biz, .coop, .info, .museum, .name, and .pro. They were quickly criticized for being, with the exception of .biz, too narrow in reach (Levine 2005; Nicholls 2013) and ten years later an analysis of the .biz gTLD found it too had failed to meet its policy objectives (Halvorson and others 2012). Despite this, ICANN continued to introduce a drip of gTLDs including six more between 2004 and 2007 and another in 2012. During this time, the major controversy was over the .xxx proposal. This was a proposal for an adult space on the Internet delineated by a .xxx gTLD, proposed by ICM Registry in 2004. Initially, ICANN approved the application but in the aftermath of this decision national governments became engaged through ICANN's Government Advisory Committee (GAC), an advisory committee formed of representatives of all UN member states and a number of supranational organizations including the African Union and the European Commission, supplemented by a number of observers from multinational organizations including the European Broadcasting Union and the International Telecommunications Union.

Initially, it appeared members of the GAC had no objections to the .xxx proposal. A letter from GAC chair Mohamed Sharil Tarmizi in April 2005 had stated '[n]o GAC members have expressed specific reservations or comments in the GAC, about the applications for sTLDs in the current round'.²⁹ This quickly changed, though. Under pressure from groups like the Family Research Council and Focus on the Family, the US government hardened its stance against .xxx. This was quickly followed by objections from Australia, the UK, Brazil, Canada, Sweden, the European Commission, and many others. As a result, in May 2006 ICANN withdrew its approval. There are many ways to view this. It can be seen as a success for the multistakeholder model in that an initial decision of the ICANN Board taken following limited consultation was reversed following action from civil society groups and (p. 687) discourse by representatives of democratic governance in the GAC. In the alternative, it could be viewed as a failure by ICANN to represent the wider community and the variety of stakeholders with an interest in liberalization of the gTLD space. In the first major challenge to the ICANN multistakeholder model, national governments had flexed their muscles and had won the day. As Jonathan Weinberg states: 'National governments

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had become involved with the issue late in the day, but their objections were powerful ... empowered by that experience, GAC members sought to make their views known more broadly' (Weinberg 2011: 203); certainly there was a prevailing view that ICANN had allowed themselves to be dominated by the GAC in this exchange (Berkman Centre 2010; Mueller 2010: 71–73; Weinberg 2011). Perhaps fortuitously, ICANN had previously agreed to arbitration should there be any challenges to their decisions and ICM took advantage of this to challenge the decision. The eventual decision of the International Center for Dispute Resolution in February 2010 found that ICANN had been wrong to reverse their decision (*ICM v ICANN*, ICDR Case No. 50 117 T 00224 08, 19 February 2010). They found that ICANN had a duty to 'operate for the benefit of the Internet community as a whole, carrying out its activities in conformity with relevant principles of international law and applicable international conventions and local law', that 'the Board of ICANN in adopting its resolutions of June 1, 2005, found that the application of ICM Registry for the .XXX sTLD met the required sponsorship criteria' and vitally that 'the Board's reconsideration of that finding was not consistent with the application of neutral, objective, and fair documented policy' (*ICM v ICANN*: [152]). They also tacitly supported ICM's contention that '[ICANN] rejected ICM's application on grounds that were not applied neutrally and objectively, which were suggestive of a pretextual basis to "cover" the real reason for rejecting .XXX, i.e., that the U.S. government and several other powerful governments objected to its proposed content' (*ICM v ICANN*: [89]). As a result of this, ICANN reviewed the decision, and in March 2011 ICANN approved the .xxx domain.

4.3 The New gTLD Process

The fallout from the .xxx case was felt acutely in the next stage of domain name liberalization, the creation of 'New gTLDs' a process formally begun in 2008. It reached fruition in 2011 when the ICANN Board agreed to allow applications for New gTLDs from any interested party upon payment of a substantial management fee.³⁰ To date, over 1200 New gTLDs have been approved,³¹ and they fall mostly into four categories: trademarks such as .cartier, .toshiba, and .barclays; geographical such as .vegas, .london, and .sydney; vocational such as .pharmacy, .realtor, and .attorney; and speculative such as .beer, .porn, and .poker.³² Learning from their experience in the .xxx controversy, ICANN approached the New gTLD process differently. (p. 688) First, an attempt by some members of the GAC to regain control over the approval process was met head on. An attempt by the Obama administration to secure for the US and other GAC members a veto right against New gTLD applications (McCullagh 2011) was deflected by ICANN who refused to act on the proposal. Instead, ICANN reaffirmed the process which had been previously agreed; a proposal which ultimately met with agreement of most members of the GAC.³³ To meet both the concerns of allowing an open registration process, which allows any string of letters or characters to be registered, and the .xxx concern, the New gTLD registration process has two safeguards. The first is that once an application is made there is a period during which objections against grant may be lodged on one of four grounds: string confusion (where the applied for name is confusingly similar to an already in use or applied for string, such as .bom or .cam); legal rights objections (where the name is confusingly

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similar to a legal trademark or right in a name, such as .coach or .merck); community objections (where a challenge may be brought by representatives of a community to whom the name is impliedly or implicitly addressed, such as .amazon or .patagonia); and finally and vitally for our analysis a limited public interest challenge which may be brought where the gTLD string is contrary to generally accepted legal norms of morality and public order that are recognized under principles of international law. Each objection gives rise to an arbitration process with the WIPO Arbitration and Mediation Centre dealing with legal rights objections; the International Center for Dispute Resolution dealing with string confusion objections and the International Center of Expertise of the International Chamber of Commerce dealing with both community and public interest challenges. New gTLDs cannot be awarded until they have either passed the period for objection without any objection being lodged or the applicant has been successful at arbitration. Any interested party with standing, including GAC members, can bring challenges. As with the .xxx case, arbitration was seen as the best way to settle disputes, and as with the longstanding dispute resolution procedure, independent arbiters are preferred. The second safeguard was the creation and appointment of an 'Independent Objector'. This was an office created solely to serve the best interests of global Internet users. The Independent Objector could lodge objections in cases where no other objection has been filed but only on limited public interest and community grounds. The appointed Objector was Professor Alain Pellett and he lodged 23 such objections ranging from .amazon to .health. He prevailed in five claims, lost in 14 and four claims were withdrawn.

The New gTLD process is clearly a refinement of the processes used in previous rounds of gTLD creation. There have been a number of critiques of ICANN that have drawn into question its legitimacy. Many of these have focused upon its processes for renewing and reforming the DNS. Claims made by critics include that ICANN, despite being set up as a multistakeholder regulator, has been too narrow in approach, unresponsive to criticism and undemocratic in action (Mueller 1999; Froomkin 2000; Froomkin 2001; Koppell 2005; Pickard 2007). Fears about undue (p. 689) influence of GAC members remain to this day (Mueller and Kuerbis 2014), but the New gTLD process, although not without flaws (Froomkin 2013), is clearly more inclusive of the wider Internet community and stakeholders outside of the usual closed group of ICANN board members, GAC members, and trademark holders. Objections have come from diverse interest groups such as the International Lesbian Gay Bisexual Trans and Intersex Association and the Union of Orthodox Jewish Congregations of Americas, member associations such as the Universal Postal Union and the International Union of Architects, political associations including the Republican National Committee and local interest groups including the Hong Kong Committee on Children's Rights. All these challenges are in addition to the challenges brought by the Independent Objector and the large number of challenges brought by commercial entities as well as the limited number brought by national governments and public authorities. As noted at the outset of this section, the importance and value of domain names as a tool for identity as well as addressing mean they play a vital role in emergent online offerings. All too often, we think of new and emergent technologies in terms of hardware or innovative services. The development of the DNS from 1998 onwards has been a vital

component of the development of the Web and mobile content and ICANN have played a vital role in this. The importance and value of the DNS is exactly why they are such a controversial regulator. Much improvement is still clearly required of them but the New gLTD process is arguably a move in the right direction.

5. Civil Society Groups: Data Retention

5.1 Data Retention, Proportionality, and Civil Society

The EU Data Retention Directive (Dir. 2006/24/EC) sought to harmonize EU Member States' provisions 'concerning the obligations of the providers of publicly available electronic communications services or of public communications networks' with regard to data retention for the *purpose of the investigation, detection and prosecution of serious crime* (Data Retention Directive. Art. 1 (1)). Under Art. 10 of the Directive, Member States were required to provide statistics relating to the retention of data generated or processed in connection with the provision of publicly available electronic communications services or a public communications network. These statistics included: the cases in which information was provided to the competent authorities in accordance with applicable national law; the time elapsed (p. 690) between the date on which the data were retained and the date on which the competent authority requested the transmission of the data; and the cases where requests for data could not be met.³⁴

Given the rapid advance in technology, concerns for what amounted to sufficient legal safeguards remained unclear. After an advocacy group called Access to Information Program (AIP) initiated an action, the Bulgarian Supreme Administrative Court (SAC) annulled Art. 5 of the Bulgarian Regulation No. 40 which provided for a 'passive access through a computer terminal' by the Ministry of Interior, as well as access without court permission by security services and other law enforcement bodies, to all retained data by Internet and mobile communication providers. The SAC annulled the article, considering that the provision did not set any limitations with regard to the data access by a computer terminal and did not provide for any guarantees for the protection of the right to privacy stipulated by Art. 32(1) of the Bulgarian Constitution. In Romania a challenge to Law 298/2008, the Romanian implementing provision, found that

[T]he provisions of Law no. 298/2008 regarding the retention of the data generated or processed by the public electronic communications service providers or public network providers, as well as the modification of law 506/2004 regarding the personal data processing and protection of private life in the field of electronic communication area are not constitutional.³⁵

After over 30,000 German citizens brought a class action suit, Germany's highest court suspended its implementation of the Directive by ruling that it violated citizens' rights to privacy.³⁶ Finally, a constitutional challenge was raised in the Irish courts, brought by another advocacy group, Digital Rights Ireland, challenging the entire European legal basis

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for data retention (*Digital Rights Ireland Ltd v Minister for Communications, Marine and Natural Resources* (C-293/12) [2014] All ER (EC) 775).

The EU responded with data retention reform plans to reduce and harmonize the data retention period: It noted '[a]pproximately, 67% of data is requested within three months and 89% within six months' (EU Commission 2013: 7). Additionally, there was an increase in the types and scope of data to be retained, minimum standards for access and use of data, stronger data protection, and a consistent approach to reimbursing operators' costs.³⁷ Meanwhile, the Irish government attempted to discontinue the Irish action by seeking security for costs requiring payment into court to cover the costs of the state should they lose. Because of the high cost of High Court actions requiring such a payment at the outset could have effectively prevented the case from being heard. The Court rejected the state's application:

[G]iven the rapid advance of current technology it is of great importance to define the legitimate legal limits of modern surveillance techniques used by governments ... without sufficient legal safeguards the potential for abuse and unwarranted invasion of privacy is obvious ... That is not to say that this is the case here, but the potential is in my opinion so great that (p. 691) a greater scrutiny of the proposed legislation is certainly merited.

(*Digital Rights Ireland Ltd v Minister for Communication & Ors* [2010] IEHC 221: [108])

5.2 Transparency and Civil Society

In the fallout from the Snowden revelations, regulation of intelligence and surveillance agencies is slowly being increased, albeit not necessarily at the pace that privacy advocates would like. A right to privacy may not yet have the same bite as normally associated with other fundamental rights, but pressure to respond to civil society's bark has played an increasingly important role in checking the abuse of runaway state power (United Nations 2013, United Nations 2014). There have been a number of legal challenges at the European Court of Human Rights by civil society groups ranging from surveillance challenges to demands to the release documents detailing the spying agreements between the 'Five Eyes' partners (*Big Brother Watch & Or. v UK* ECtHR App. 58170/13; *Bernh Larson Holdings v Norway*, ECtHR App. 24117/08; *Liberty & Ors v The Secretary of State for Foreign and Commonwealth Affairs & Ors* [2015] 1 Cr App R 24). At the Court of Justice of the European Union (CJEU) civil society have successfully challenged the legal regime governing data retention (*Digital Rights Ireland Ltd v Minister for Communications, Marine and Natural Resources* (C-293/12) [2014] All ER (EC) 775) and, as seen have had considerable influence over domestic, implementing, legislation. The ORG along other European societies has led domestic campaigns forcing governments to rethink their approaches to domestic surveillance or programmes that do not embrace or understand how they may compromise fundamental rights. The German Constitutional Court partially upheld a complaint that the police authorities' audio surveillance of a home (a large-scale

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eavesdropping attack) breached fundamental rights; finding that any breach of a constitutional right on the basis of IT security requires factual evidence indicating a specific threat to an outstanding and overriding legal interest and judicial authorization.³⁸

Civil society has also played a role in moderating legitimate actions by the state to regulate content. In 2014, the British government demanded that ISPs and mobile phone companies make a change in their choice architecture to restrict access to adult content. Access to content that is pornographic would be blocked unless a broadband user 'opts in' with its provider to access such sites. Major ISPs implemented a filtering programme, marketing the programme as 'parental controls', whereby users must opt-in to a variety of content, ranging from obscene content, to content featuring nudity, drugs and alcohol, self-harm, and dating sites. However, blocking systems tend not to work quite as well as was intended; filters designed to stop pornography also block sex education, sexual health, and advice sites. Parental reliance on blocking can result in derogation of parental responsibility. (p. 692) Overreliance on a web-filtering programme often assumes that nothing is going to get through resulting in the misguided assumption by a parent that their child is safe. Civil society engaged in petitions to moderate the government's stance and to help ISPs engage with users who may be affected by their decision to change the default rule. Groups like 451 Unavailable and Blocked.org.uk have helped to highlight the problem of web blocking, and have encouraged courts to publish blocking orders to increase transparency. As a result of this type of advocacy, the UK courts adopted ORG's recommendations that any blocking orders should be required to have safeguards against abuse, and as a consequence adopted ORG's proposals about landing pages and 'sunset clauses' as safeguards against abuse.

6. Conclusions

This chapter elucidates roles and relationships of non-state actors in governance of the online environment. In doing so, it examines reasons for that role and discusses the utility and legitimacy of the relationship with traditional Westphalian forms of governance. The chapter also pays some attention to the equivalent role of law, charting its interaction with non-state actors. Its basic premise is that non-state actors play such a key part in regulation of cyberspace that the latter cannot be properly understood without explaining the frameworks in which they reside. At the same time, we have attempted to contribute to the legal and regulatory discussion about the legitimacy of regulatory roles non-state actors play. Accordingly, there is increasing awareness of the power embedded within non-state actors and the need for ongoing assessment of the balance of power between private and public bodies generally.

On another level the chapter also seeks to address the non-state actor's role in 'meta-regulation'—their coordination in networks with markets and governments. The extent of the role of the non-state actors attracts critical analysis; accordingly, there is growing awareness that the regulatory regimes for Internet regulation have an inherent complexity that is difficult to comprehend. This poses significant challenges for regulators and engenders

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legal uncertainty, but also creates opportunities for abuses of power by non-state actors. For Teubner, privatized rulemaking continues to exert 'massive and unfiltered influence of private interests in law making', and is characterized as 'structural corruption' (Teubner 2004: 3, 21). For others private ordering remains the most legitimate and effective means of regulating the online environment (Easterbrook 1996; Johnson and Post 1996: 1390–1391). The role of the non-state actor will continue for the foreseeable future to remain the subject of critique.

(p. 693) The ascendancy of non-state actors is a hallmark of the online environment. The largesse of the non-state actor's conquest is perhaps most strikingly demonstrated by its invasion of cyberspace. Legal scholars will continue to examine the relationships prevalent in cyberspace, not only relationships between private corporations, but also relationships that govern relationships between government agencies and non-state actors. These apply particularly to relationships between private sector actors (in the form of business-to-business or business-to-consumers relationships, and secondarily, to relationships between private actors and government bodies (in the form of business-to-government). Taken together they help to embed the emergence of recent macro-regulatory terms like 'nodal governance', 'Internet governance' and 'transnational private regulation' (Braithwaite 2008; Abbott and Sindal 2009; Calliess and Zumbansen 2010; Cafaggi 2011).

As we have attempted to show, ICANN is an illustration par excellence of the complexity and dynamics of a transnational private regulator. The organization of ICANN is also intricate and difficult to decipher (Bygrave and Michaelsen 2009: 106–110). This reflects the cornucopia of stakeholders that make up ICANN's *raison d'être* and its commitment to policymaking through broad consensus. An enduring criticism of ICANN is the lack of appeal processes to another body with the power to overturn them. Although a policy proposal may emerge with broad agreement from the constituencies concerned, it is the ICANN Board's decision alone to adopt or reject the proposal.³⁹ Although several mechanisms exist for reviewing Board decisions, none of these create legally binding outcomes (Weber and Gunnarson 2013: 11–12). Non-commercial user constituencies at ICANN exist solely to curb the influence of those stakeholders at ICANN that maintain considerable economic and political clout. Their function is to carve out a space for individual rights and individual registrants against excessive claims by rights-owners and governments. For example, the Non-commercial Stakeholder Group (NCSG) spent seven weeks in negotiations with other stakeholder groups to try to balance the rights of intellectual property owners with those of new and small businesses, other non-commercial entities, various users, and the registry/registrar communities.

The NCSG is only one example of civil society's role in 'checking' more traditional power structures. Civil society is no longer just a term used to aggregate non-governmental and non-commercial entities together. Groups like Privacy International, the ORG, and the Electronic Frontier Foundation exist to ensure accountability exists on two levels: organizational accountability to the stated purpose and function of the actor and procedural accountability to the behaviour and actions of internal management. Arguably, the increased role of civil society has come about in response to an increasing number of legal

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agreements falling under the 'soft law' umbrella, away from traditional statutory instruments. As a result, there is an inherent difficulty in establishing clear legal lines as to what legal instrument regulates what actor in the online environment. Soft law measures have incredible influence in changing established revenue streams (consider our earlier discussion (p. 694) on the financial consequences for a site blocked by an S97A order) or basic human rights (consider legislation on data privacy). The fluidity of political constellations can also force a change to the way civil society interacts with other actors in the online environment (for example, the replacement of the Joint Project Agreement between the US government and ICANN by the Affirmation of Commitments).

Sometimes civil society will be instrumental in pushing back against 'soft law' measures deployed by and over non-state actors. Sometimes soft law helps to shape the continuing nuances of online communication. While the Internet is said by some to be the great facilitator of freedom of expression, governments are constantly seeking to limit this right in line with the demands of their citizens; for example, passing measures to combat Internet facilitated crime unique to the modern era like cyberbullying, trolling, and revenge porn. However, we find ourselves concluding that whenever regulators needed 'hard law' to exercise fine-grained control tailored to the needs of a particular platform, service, or online community, contract law is most often deployed. Statutory forms of control over non-state actors remains largely an option of 'last resort', used mostly in an indirect fashion and designed to leverage control through the structural features of either the network or the market. This is seen in our study through the activities of the EU Directorate-General for Competition in regulating the market for media players and Internet browsers, and represented currently by the DG-COMP investigations into Google. Such interventions remain rare and given their complexity and costs are only exercised where all other solutions have run out. Non-state, decentred, and intermediary control are likely to remain at the heart of online regulation and governance for some time to come.

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Notes:

(1.) A suitable definition of regulation is difficult given the wide range of understandings about what the term 'regulation' means. The editors of this volume suggest contributors adopt the definition offered by Philip Selznick, and subsequently refined by Julia Black as

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'the intentional use of authority to affect behaviour of a different party according to set standards, involving instruments of information-gathering and behaviour modification' (Black 2002). On this understanding of regulation, law is but one means by which purposive attempts may be made to shape behaviour and social outcomes, but there may be many others, including the market, social norms and through technology itself. The term governance is if anything less well established. Again the editors suggest the adoption of governance (alongside government) as concerned with the provision and distribution of goods and services, as well as their regulation. Hence regulation is conceived as that large subset of governance that is primarily concerned with the purposive steering of the flow of events and behaviour, as opposed to providing and distributing (Braithwaite et al. 2007). The authors of this chapter are happy to adopt these definitions.

(2.) The importance of the actor in an actor-network is acknowledged elsewhere by the authors. Andrew Murray, *The Regulation of Cyberspace* (Routledge-Cavendish 2006); Andrew D Murray, 'Nodes and Gravity in Virtual Space' (2011) 5 *Legisprudence* 195; Mark Leiser, 'The Problem with "Dots": Questioning the Role of Rationality in the Online Environment', (2016) 30 *International Rev L Computers and Technology* 1.

(3.) ITU, 'Internet Policy and Governance' <<http://www.itu.int/en/action/internet/Pages/default.aspx>> accessed 19 September 2016

(4.) ICANN, 'Memorandum of Understanding between the U.S. Department of Commerce and Internet Corporation for Assigned Names and Numbers' (1998) <<https://www.icann.org/resources/unthemed-pages/icann-mou-1998-11-25-en>> accessed 19 September 2016; the Internet Society, 'Memorandum of Understanding Concerning the Technical Work of the Internet Assigned Numbers Authority' (2000) <<https://tools.ietf.org/html/rfc2860>> accessed 19 September 2016

(5.) Dual-use technologies can be applied to both civilian and military use. Export licences are required for the international trade in such items. Annex to the Commission Delegated Regulation amending Council Regulation (EC) No. 428/2009 setting up a Community regime for the control of exports, transfer, brokering, and transit of dual-use items C(2014) 7567 final.

(6.) It should be acknowledged that Google report that the Google Glass project is ongoing but details of product development or release dates for a new version of Glass are limited. What reports have come out suggest the new version will be an optimized version for use in the workplace by for example doctors, builders, or warehouse workers rather than for general sale.

(7.) *Kaschke v Gray and Hilton* [2010] EWHC 690 (QB).

(8.) *Tamiz v Google* [2013] EWCA Civ 68; *Davison v Habeeb* [2011] EWHC 3031 (QB); *L'Oréal v eBay* [2012] All ER (EC) 501.

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(9.) Compare *Metropolitan International Schools Ltd v Designtechnica Corp* [2009] EWHC 1765 (QB) where Eady J commented *obiter* that Google did not qualify as a mere conduit, cache, or host of content under the Regulations with *Google France, Google, Inc. v Louis Vuitton Malletier* [2011] All ER (EC) 411 where the ECJ held that Google is an IISP to whom the limitation of liability provisions apply.

(10.) This defence is defeated if the claimant shows: (a) the person who posted the statement is anonymous; (b) the claimant gave the operator a notice of complaint in relation to the statement; and (c) the operator failed to respond to the notice of complaint in accordance with any provision contained in regulations.

(11.) *Delfi AS v Estonia* [2013] ECHR 941.

(12.) *Twentieth Century Fox Film Corp v British Telecommunications plc* [2011] EWHC 1981 (Ch); *Twentieth Century Fox Film Corp v British Telecommunications plc (No. 2)* [2011] EWHC 2714 (Ch); *Dramatico Entertainment Ltd v British Sky Broadcasting Ltd* [2012] EWHC 268 (Ch); *Dramatico Entertainment Ltd v British Sky Broadcasting Ltd (No. 2)* [2012] EWHC 1152 (Ch); *EMI Records Ltd v British Sky Broadcasting Ltd* [2013] EWHC 379 (Ch); *Football Association Premier League Ltd v British Sky Broadcasting Ltd* [2013] EWHC 2058 (Ch); *Paramount Home Entertainment International Ltd v British Sky Broadcasting Ltd* [2013] EWHC 3479 (Ch); and *Twentieth Century Fox Film Corporation & Ors v Sky UK Ltd & Ors* [2015] EWHC 1082 (Ch).

(13.) In a test case, *Cartier International AG and others v British Sky Broadcasting and others* [2016] EWCA Civ 658 the Court of Appeal upheld the decision of the High Court ([2014] EWHC3354 (CH)) to award an injunction under s. 37(1) of the Supreme Courts Act 1981 against a group of websites which advertise and sell counterfeit goods indicating that, in certain circumstances, the courts would implement s. 97A-style blocking orders under the general powers given to the court under the Supreme Court Act to protect trademark owners.

(14.) Art. 11 of the Enforcement Directive has to be read subject to Art. 3(2).

(15.) Spotify, 'Information' <<https://press.spotify.com/uk/about/>> (information correct on 19 September 2016) accessed 19 September 2016.

(16.) Netflix, 'Overview' <<https://ir.netflix.com/>> (correct on 19 September 2016) accessed 19 September 2016.

(17.) The term enrolled, as opposed to captured, represents the enrolment of West Coast codemakers in the regulatory ambitions of East Coast codemakers. This concept draws upon Julia Black's helpful notion of enrolment as outlined in Black (2003).

(18.) Litigation in this series of cases encompasses South Korea, Japan, Germany, France, Italy, the Netherlands, Australia, England, and Wales (*Samsung Electronics (UK) Ltd v*

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Apple Inc. [2012] EWHC 1882 (Pat)) and the United States (*Apple Inc. v Samsung Electronics Co. Ltd* et al. C 11-1846 and C 12-0630, ND Calif. (2012)).

(19.) GA Tech, 'GVU's First WWW User Survey Results' (1 January 1994) http://www.cc.gatech.edu/gvu/user_surveys/survey-01-1994/ accessed 19 September 2016.

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(21.) Ed Kubaitis, 'Browser Statistics for October 1998' (*EWS Web Archive*) <<http://web.archive.org/web/20010507151253/http://www.ews.uiuc.edu/bstats/months/9810-month.html>> accessed 19 September 2016.

(22.) OneStat.com, 'Microsoft's IE 6.0 is the most popular browser on the web' (29 April 2002) <http://www.onestat.com/html/aboutus_pressbox4.html> accessed 19 September 2016.

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(24.) Commission of the European Union, 'Antitrust: Commission imposes €899 million penalty on Microsoft for non-compliance with March 2004 Decision' (27 February 2008) <http://europa.eu/rapid/press-release_IP-08-318_en.htm> accessed 25 October 2015; T-167/08 *Microsoft Corp v European Commission* [2012] 5 CMLR 15.

(25.) Commission of the European Union, 'Antitrust: Commission fines Microsoft for non-compliance with browser choice commitments' (6 March 2013) <http://europa.eu/rapid/press-release_IP-13-196_en.htm> accessed 19 September 2016.

(26.) W3C, 'August 2016 Market Share' (31 August 2016) <<https://www.w3counter.com/globalstats.php?year=2016&month=8>> accessed 19 September 2016.

(27.) Net Market Share (19 September 2016) <<https://www.netmarketshare.com/browser-market-share.aspx?qprid=2&qpcustomd=0>> accessed 19 September 2016.

(28.) Website Optimization, 'Apple iTunes Penetration Closing Gap with Microsoft—April 2011 Bandwidth Report' (April 2011) <<http://www.websiteoptimization.com/bw/1104/>> accessed 19 September 2016.

(29.) sTLDs was shorthand for sponsored TLDs, gTLDs with a sponsor applicant. ICANN, 'Correspondence from GAC Chairman to the ICANN CEO' (3 April 2005) <<https://www.icann.org/en/system/files/files/tarmizi-to-twomey-03apr05-en.pdf>> accessed 19 September 2016.

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(30.) ICANN, 'Approved Board Resolutions—Singapore' (20 June 2011) <<https://www.icann.org/resources/board-material/resolutions-2011-06-20-en>> accessed 19 September 2016.

(31.) ICANN, 'New gTLD Program Statistics' <<https://newgtlds.icann.org/en/program-status/statistics>> accessed 15 May 2017.

(32.) The full list is at ICANN, 'Delegated Strings' (2016) <<http://newgtlds.icann.org/en/program-status/delegated-strings>> accessed 19 September 2016.

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(34.) European Commission, 'Evidence for necessity of data retention in the EU' (2 March 2013) <<http://www.statewatch.org/news/2013/aug/eu-com-mand-ret-briefing.pdf>> accessed 19 September 2016.

(35.) Romanian Constitutional Court Decision no. 1258 (18 October 2009).

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(38.) BvR 370/07 and 1 BvR 595/07.

(39.) For example, a review may occur through a 'Request for Reconsideration' directed to the Board Governance Committee (Bylaws Art IX(2)) or lodging a complaint with the ICANN Ombudsman (Bylaws Art V).

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Automatic Justice?: Technology, Crime, and Social Control

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Abstract and Keywords

This chapter examines how forensic science and technology are reshaping crime investigation, prosecution, and the administration of criminal justice. It highlights the profound effect of new scientific techniques, data collection devices, and mathematical analysis on the traditional criminal justice system. These blur procedural boundaries that have hitherto been central, while automating and procedurally compressing the entire criminal justice process. Technological innovation has also resulted in mass surveillance and eroded ‘double jeopardy’ protections due to scientific advances that enable the revisiting of conclusions reached long ago. These innovations point towards a system of ‘automatic justice’ that minimizes human agency and undercuts traditional due process safeguards that have hitherto been central to the criminal justice model. To rebalance the relationship between state and citizen in a system of automatic criminal justice, we may need to accept the limitations of the existing criminal procedure framework and deploy privacy and data protection law.

Keywords: criminal justice, due process, surveillance, forensics, automation, technology, evidence, fair trial, data protection, privacy

1. Introduction

*TECHNOLOGICAL and scientific developments have profound implications for the traditional paradigm of criminal justice and for the established relationship between state and citizen. Advances in the sophistication, range and ubiquity of forensic technology are part and parcel of ‘the creeping scientization of factual inquiry’ predicted nearly 20 years ago by Mirjan Damaška (1997: 143). The goal of this chapter is to examine the implications for the traditional model of criminal justice of new technologies in the investigation and prosecution of crime (Bowling, Marks, and Murphy 2008). Our argument is that we are moving rapidly towards an increasingly automated justice system that undercuts the safeguards of the traditional criminal justice model. This system favours efficiency and effec-

tiveness over traditional due process safeguards and is taking on a life of its own as it becomes increasingly mediated by certain types of technology that minimize human agency. This, we argue, is creating a system of 'automatic justice'. In order to rebalance the relationship between state and citizen in such a system, we may need to accept the limitations of (p. 706) the existing criminal procedure framework and seek instead to unpick its core values for more effective deployment in the fields of privacy and data protection law, themselves rapidly evolving areas of law of increasing relevance to criminal justice.

The chapter proceeds as follows: first, we provide an outline sketch of the traditional paradigm of criminal justice and its significance for the relationship between state and citizen; second, we explain contemporary trends in criminal justice and explore how shifts in emphasis within the criminal justice system are facilitated and accelerated by advances in science and technology; third, we examine how technological innovations affect the internal and external stability of the traditional criminal justice model and the implications of these changes in terms of its fundamental values. We illustrate how the pressure of technological innovations has made the external and internal boundaries of the criminal justice model more porous even while becoming increasingly securitized. In the absence of any clear boundary between the criminal justice system and the outside world, the privacy and liberty of all citizens is vulnerable to arbitrary state intrusion. Fourth, and finally, we attempt to address the challenges identified by first exploring the possibility of applying criminal principles more broadly before briefly turning to privacy and data protection law which may be capable of offering an alternative and additional architecture for upholding similar values to those enshrined within it (Damaška 1997: 147).

2. The Traditional Criminal Justice Paradigm

The criminal law has traditionally embodied the most coercive powers of the state for regulating the behaviour of citizens. Although the traditional model of criminal justice is conceptually elusive, certain normative values can be identified. Herbert Packer, in his classic text, describes what he calls the 'due process' model as containing an 'obstacle course' of procedural rules which safeguard against injustice while facilitating the pursuit of truth (1968: 163). In this sense, we can speak of an 'inner morality' to criminal procedure (Duff and others 2007: 51); the criminal trial is its focal point, its main event in pursuit of legitimate dispute resolution between state and citizen. A core value of any liberal democracy is the principle of minimum state intrusion. Agents of the state are granted powers to coerce citizens, to intrude into their private lives and to deprive them of their liberty—as a means to pursue the ends of community safety and public order. The corollary to the granting of these intrusive and coercive powers to the state is that they must only be used when they are lawful, necessary, and proportionate.

(p. 707) The criminal law consists of offences, the commission of which enables the state to punish a citizen by stigmatizing them, depriving them of their liberty or inflicting some other pains upon them. At the outset, and preceding the trial stage, criminal investigation necessitates reasonable, individualized, and articulated suspicion as a prerequisite for in-

vestigation; where there is sufficient evidence against a suspect, that individual is charged with a specific criminal offence and the individual's legal status becomes that of a defendant. The trial is central in this model: investigative powers are predicated on their ability to serve the trial process by producing evidence that can be examined and tested in a court of law, the factual determination and fairness of which will determine whether punishment is justified. A fair trial, then, is a prerequisite of punishment and must take place within a reasonable time period. In the traditional model, the defendant either exits the criminal justice system at the conclusion of the process, or where punishment is justified, acquires the status of convict, and is punished by being retained within the system for a proportionate period of time.

The due process safeguards sewn into the traditional model have three overarching aims: (i) the minimization of state intrusion into the lives of citizens, (ii) the protection of human dignity, and (iii) upholding the legitimacy of state coercion and factual accuracy. Procedural propriety, concerned as it is with human dignity, is designed to 'treat the accused as thinking, feeling, human subjects of official concern and respect, who are entitled to be given the opportunity to play an active part in procedures with a direct and possibly catastrophic impact on their welfare, rather than as objects of state control to be manipulated for the greater good (or some less worthy objective)' (Roberts and Zuckerman 2010: 21). It is with this model in mind that we turn to modes of governance, trends and attendant technologies that are eroding and reshaping the criminal process.

3. Prevailing Modes of Governance and Paradigm Shifts in Criminal Justice

The criminal justice system has been subject to a great deal of change in the course of the last 40 years, often in complex and incoherent ways (O'Malley 1999). However, certain patterns and trends in criminal justice policy have tended to reflect prevailing modes of governance. A panoply of expressions have been proffered to capture the essence of the current mode of governance prevalent in Western liberal democracies: the hollowing out of the state (Rhodes 1994); the retreat of the state (Strange (p. 708) 1996); governing at a distance (Rose and Miller 1992); a state that steers rather than rows (Osborne and Gaebler 1992); 'the facilitating state, the state as partner and animator rather than provider and manager' (Rose 2000: 327). All reflect an ideology, neo-liberalism, in which the state seeks to enshrine the imperatives of economy, efficiency and effectiveness in its endeavours through the privatization of many state functions while embedding business model ideals in others. This comes in the form of the new public managerialism, which injects a commercial ethos into public provision. The reification of the market and its mechanisms and the intense auditing of public bodies are central tenets of this mode of governance (Jones 1993). As such, the language and ethos of commerce have spread throughout the criminal justice system. Police forces are now required to 'do more with less' in the face of increasingly austere budgetary constraints. The unwieldy edifice of the traditional 'due process' model of the criminal justice system, a system which prioritizes fair-

ness over efficiency, is deemed unfit for purpose. Increasingly, aided by advances in technology and science and in the interests of efficiency, individuals are investigated, judged, and punished en masse and at a distance. Co-opting Rose and Miller's 'governing at a distance', commentators now speak of a contemporary 'punishment at a distance' (Garland 2001: 179), a term which envisages a criminal justice system which regards individuals as little more than words and letters in a database.

We are witnessing a gradual movement away from the traditional, retrospective, individualized model of criminal justice, which prioritizes a deliberated and personalized approach to pursuing justice and truth, towards a prospective, aggregated model, which involves a more ostensibly efficient, yet impersonal and distanced, approach. 'Actuarial justice' is based on a 'risk management' or 'actuarial' approach to the regulation of crime and the administration of justice (Feeley and Simon 1994). Feeley and Simon have characterized this as a movement away from concern for the individual offender, towards an emphasis on aggregates and 'the development of more cost-effective forms of custody and control and ... new technologies to identify and classify risk' (1992: 457). As described by Garland, 'the individual is viewed not as a distinct, unique person, to be studied in depth and known by his or her peculiarities, but rather as a point plotted on an actuarial table' (Garland 1997: 182). A central precept of actuarial justice, therefore, is that the system should be less concerned with traditional punishment based on downstream or after-the-fact goals such as retribution and rehabilitation. It should instead manage the risk presented by the dangerous and disorderly, using upstream or pre-emptive techniques of disruption, control, and containment. The shift from retribution and rehabilitation towards prevention means that the state seeks to identify potential criminals before they commit offences. In light of such trends, Malcolm Feeley predicted the eventual emergence of a 'unified actuarial "system" that will completely transform the criminal process into an administrative system' (2006: 231).

Actuarial justice takes many and varied forms and is closely related to 'intelligence-led policing'. This is a future-oriented mode of policing in which crime data are (p. 709) collected, risks are assessed and policing strategies are formulated accordingly (Maguire 2000). This is a departure from the reactive methods of policing prevalent up to the 1970s when '[t]he main organizational requirement was to arrive, do something, and leave as quickly as possible' (Sherman 2013: 378). Intelligence-led policing aims not merely to detect, investigate, and prosecute offences, but to deter and disrupt the activities of those deemed likely to commit crime in the future. This form of policing has included the improper use of stop-and-search powers to deter and control certain types of behaviour, rather than to allay reasonable suspicions of criminal activity (Young 2008), heightened surveillance of 'high risk' residential areas (Joh 2014), the use of no-fly and other such watch list and blacklist regimes, citizenship-stripping and the use of newly created disposal alternatives to criminal prosecution in the form of civil preventive orders (such as antisocial behaviour orders (ASBOs) and Terrorism Prevention and Investigation Measures (TPIMs)) all of which result in often stigmatic and punitive repercussions for the individual involved, while obviating the procedural safeguards of the criminal trial.

Such alternatives to criminalization 'define status, impose surveillance, and enforce obligations designed variously to control, restrict or exclude' (Zedner 2010: 396).

Surveillance is a necessary correlative of risk-based actuarial criminal justice (Lyon 2003: 8). While surveillance may be deployed in a wide-ranging variety of contexts and for similarly myriad purposes, in the context of crime control its purpose is to distil knowledge from uncertainty. Accordingly, it can be claimed that '[t]he yearning for security drives the insatiable quest for more and better knowledge of risk' (Ericson and Haggerty 1997: 85). Michel Foucault's panopticon (1977) (as well as Orwell's Big Brother (1949)), conceived and abstracted in its broadest sense as unidirectional surveillance emanating from a monolithic, bureaucratic surveillance state has been a dominant and prevailing theoretical model of surveillance (Haggerty and Ericson 2000: 606). It is a model, however, that is indicative of the post-war state, cumbersome and lacking in dynamism and fluidity, which differs considerably from late modern surveillance, which traverses borders and institutions, both public and private, and expands in disparate and varied forms. At the turn of the century, Haggerty and Ericson, drawing on the influential work of Gilles Deleuze and Felix Guattari (1988), conceived of a 'surveillant assemblage', which expands upon, rather than departs from, the panoptic surveillance model (2000). This surveillant assemblage is rhizomatic in that surveillant capabilities develop and expand in a vast number of ways and in different contexts, combining to provide a complementary surveillant visage. One can also speak of different assemblages which combine and plug into each other (Haggerty and Ericson 2000: 608).

A further change in the criminal justice landscape that forms part of the backdrop to our discussion is the idea of 'simple, speedy, summary justice' (Home Office, Department of Constitutional Affairs and Attorney General's Office 2006). Referred to as a 'new form of administrative justice' (Jackson 2008: 271), it overlaps with actuarial justice to the extent that both seek to divert potential offenders from the (p. 710) full rigour of criminal proceedings with alternative disposal proceedings. Simple, speedy, summary justice seeks to do this by increasing the range and uptake of pretrial disposal procedures and its stated aim is the saving of expenditure: 'What is changing is the scale of the number of cases proposed for diversion from the courts and the punitive steps that may be taken by prosecutors against those offenders who admit their guilt' (Jackson 2008: 271). New forms of disposal include conditional cautions, reprimands, warnings for the young, fixed penalty notices, and a strengthening of administrative and financial incentives to admit offences and plead guilty early in the criminal justice process. Technology is shaped by these organizational goals, themselves moulded by prevailing modes of governance. In the case of the criminal process, incentives to ensure economy, efficiency and effectiveness embed administrative criminal processes that bypass fairness and legitimacy. The imperative of efficiency acts as an institutional incentive to adopt certain forms of technology and so '[n]ew technologies are routinely sold to criminal justice practitioners on their promised efficiency gains and cost savings' (Haggerty 2004: 493).

4. 'New Surveillance', 'New Forensics', and 'Big Data'

Three overlapping terms identify and capture what is novel and significant about the use of technology in the criminal justice field today: 'new surveillance', 'second generation' forensics, and 'big data'. Although each term could be used to describe applications of the same particular technologies—such as DNA profiling and CCTV—each term connotes its own implications for the criminal justice context. 'New surveillance' involves 'scrutiny through the use of technical means to extract or create personal or group data, whether from individuals or contexts' (Marx 2005). The term is used to convey the relative intrusiveness of technology in extending the senses and rendering 'visible much that was previously imperceptible' (Kerr and McGill 2007: 393) and enabling law enforcement to undercut procedural safeguards by obtaining more information about citizens than would be available from a traditional search or questioning (Marx 2005). Erin Murphy (2007: 728–729) has written in detail on the characteristics of what she calls 'second generation' forensics, of which the following are pertinent to this chapter:

(i) the highly specialized knowledge and expertise underlying them—which makes their workings less accessible and transparent to laypersons than traditional forensics;

(p. 711) (ii) the sophistication of the underlying science—which enables them to at least be portrayed as providing proof to a degree of scientific certainty and capable of providing conclusive proof of guilt. Whereas traditional forensics have generally played a supporting role (to eyewitness testimony and confession evidence, for example) second generation technologies are more frequently deployed as the sole piece of evidence; and

(iii) their dependence on databases and their ability to reveal a broad range of information (as opposed to being confined to the confirmation or denial of a specific question such as an identification) and their consequently deeper intrusion into privacy than traditional forensics.

'Big data' is generally accepted as an abbreviated expression for the application of artificial intelligence to the vast amount of digitized data now available and in this context much of the data will be obtained from 'new surveillance' and 'second generation' forensics. Such new methods of intelligence gathering are used to obtain more information than could be obtained from the traditional investigative techniques of questioning a suspect or subjecting them or their houses to a physical search, and facilitate the automatic analysis of the data inputted. As pithily summarized by Elizabeth E. Joh, 'the age of "big data" has come to policing' (2014: 35).

The combination of ubiquitous digital records and computer processing power has revolutionized profiling and social network analysis.¹ Every time we make a phone call, send an email, browse the Internet, or walk down the high street, our actions may be monitored and recorded; the collection and processing of personal data has become pervasive and

routine (House of Lords Select Committee on the Constitution 2009: 5). Dataveillance —‘the monitoring of citizens on the basis of their online data’ (Van Dijck 2014: 205)—is a paradigm example of new surveillance. Advances in the use of mathematically based analytical tools to detect patterns in large sets of data have facilitated profiling (a method of data mining) (Bosco and others 2015: 7) ‘whereby a set of characteristics of a particular class of person is inferred from past experience, and data-holdings are then searched for individuals with a close fit to that set of characteristics’ (Clarke 1993: 405), in order to establish and identify patterns of suspicious behaviour. There is a consensus among European data protection authorities (DPAs) that the three principal characteristics of profiling are (1) that it is based on collection, storage and/or analysis of different kinds of data and (2) on automated processing and electronic means and (3) with an objective of prediction or analysis of personal aspects or personality and creation of a profile. Additionally, a fourth key principle for some DPAs is that the profiling results in legal consequences for the data subject (Bosco and others 2015: 23). Data mining tools are used by the police to identify those who should be subjected to the growing proliferation of alternative control measures to the trial process outlined in section 2. (p. 712) New surveillance coupled with risk-based actuarial techniques and data mining technology seeks to make the best use of limited resources, and contributes to the increasing contemporary reliance on the intelligence-gathering, or absorbent, function of policing (Brodeur 1983: 513). Technology facilitates the transmission of information through space (communication) and through time (storage) (Hilbert 2012: 9). There is no physical barrier to storing all data—such as CCTV footage, facial images—indeinitely. Increasingly sophisticated means of recognition technologies and search tools will ‘one day make it possible to “Google spacetime”, to find the location of a specified individual on any particular time and date’ (Royal Academy of Engineering 2007: 7).

Unlike traditional forensic science techniques such as ink fingerprinting and handwriting analysis, ‘second generation’ forensic technologies (Murphy 2007) such as digital fingerprinting and DNA typing draw on vast digital databases and do not require the police to first identify a suspect. Whereas first-generation techniques were mainly used to confirm or deny suspicion, second-generation techniques have heightened investigative capacities. The evolution of fingerprint technology illustrates this trajectory. Once limited to the identification of fingerprint patterns in the search of individualized matches, the addition of mass spectrometry to fingerprint analysis has enabled detailed examination of these marks to reveal quite a lot about the personal and behavioural characteristics of the person who left the trace: their likely gender, the hygiene products they have used, the food ingested, whether or not they are a smoker, etc. As Alex Iszatt, writing in the *Police Oracle*, explained: ‘By analysing the constituent parts of the finger impression, we can profile the habits of the offender’ (2014). This development means that a print examination that may have failed to produce a suspect in the past can, if combined with data-mining tools, produce a larger pool of potential suspects than traditional fingerprint identification. It also makes a database of the personal habits and lifestyle of the population a potentially useful resource for crime investigators, thereby providing further fodder for those seeking to legitimize the collection of personal data en masse and in the absence of prior sus-

picion. Fingerprint technology now enables digital fingerprints to be easily collected and immediately compared on the spot with others contained in a database.

‘Big data’ analysis, ‘new surveillance’, and ‘second generation’ forensic sciences lend themselves more easily to the new ‘actuarial model’ of criminal justice—based on computerized risk prediction and purportedly objective and conclusive results—than to individualized criminalization. The streamlined forensic reporting process recently introduced in English courts has the stated aim of cutting ‘costs and speed[ing] up the production of a forensic result: to undertake just enough forensic work to support a charge or secure an early guilty plea’ (Forensic Access 2014). (p. 713) New technologies play a key role in accelerating the trend towards ‘simple, speedy, summary justice’ by encouraging and facilitating diversion and discouraging costly challenges to prosecution evidence.

This decade a whole raft of miscarriages of justice has come to light in which wrongful convictions are attributed to mistaken expert opinion or the ineptitude of the traditional criminal justice model (populated as it is by non-scientific personnel) to correctly interpret technical and scientific evidence. Several high-profile reports have been published in common law jurisdictions around the world seeking to address the problems.² The perceived crisis in the traditional criminal justice model has deepened distrust of subjective knowledge and this has now extended from distrust in the layperson to distrust in expert opinion. The push is now to more and more purportedly objective data (Fenton 2013). Methods of decision making—understood to be objective, mathematical, and scientific—are signalled as less biased than the ‘common sense’ exercised by human decision makers (Palmer 2012) and more adept at dealing with both the complexity and amount of scientific data:

[A]s the gulf widens between reality as perceived by our natural sensory apparatus and reality as revealed by prosthetic devices designed to discover the world beyond the reach of this apparatus, the importance of the human sense for factual inquiries has begun to decline.

(Damaška 1997: 143)

Forensic investigations are themselves increasingly automated (so-called ‘push-button forensics’) and this results in loss of understanding in the underlying concepts of the investigation among not only the recipients of the information (law enforcement agents, defendants, and courts) but also the scientists actually conducting the forensic investigation (James and Gladyshev 2013). Mobile handheld devices enable DNA and fingerprints to be taken from a suspect and analysed on the spot, providing an immediate—albeit potentially provisional—conclusion, and persuasive accusation. Such is the apparent superiority of automated methods to human decision-making that an increasing number of courts are aided by ‘safety assessment tools’ to reach decisions on bail applications and sentences (Leopold 2014; Dewan 2015). The reputed success of these tools calls into question the value of human decision-making with its attendant biases and lack of technical comprehension. Psychologist and academic, Mandeep Dhami doesn’t believe that the decision-makers in tomorrow’s courtroom will be human. Her research concludes that magistrates

are 'not as good as computers' at reaching decisions and claims it is conceivable that magistrates 'could be replaced by automated systems' (Dhami and Ayton 2001: 163). Other researchers suggest that data driven predictions and automated surveillance may actually reinforce prejudices and may even introduce a less readily transparent and 'unintentional, embedded prejudice' of their own (Macnish 2012: 151).

(p. 714) 5. Automatic Criminal Justice?

Reliance on databases 'that locate, identify, register, record, classify and validate or generate grounds for suspicion' (Marx 2007: 47) results in 'a broadening from the traditional targeting of a specific suspect, to categorical suspicion' (Marx 2001). The 'net-widening' of those subjected to surveillance and control in the intelligence-led model of policing is facilitated and accelerated by the present-day ubiquity of technologies of the so-called 'new surveillance'. A common criticism of mass surveillance and data retention is that it makes 'all citizens suspects' and this is frequently deemed to be objectionable in and of itself.³ A system of crime control has emerged that operates in parallel to the traditional criminal justice system. The parallel system treats all citizens as suspicious and its surveillance is not predicated on individualized suspicion but is ubiquitous. It metes out heightened surveillance, control measures and punishments and places citizens on black-lists—sometimes on the basis of secret intelligence, without even communicating with the subject, in the absence of judicial oversight, and without providing any mechanism for redress (Sullivan and Hayes 2011).

Legislative changes have already made major inroads on the principle of double jeopardy in recent years in order to take advantage of scientific advances.⁴ A steady stream of scientific and technological advances will continue to increase the likelihood that new and compelling evidence that was unknown at the time of a defendant's acquittal will be discovered. Such developments blur the boundary between the absolved and the suspect and undermine the finality inherent in the traditional model. The parallel system challenges the external boundaries of the criminal justice system at both the exit and entry points; bypassing the procedural framework of the criminal justice system and the distinctions between citizen, suspect, defendant, convict, and acquitted.

We are witnessing a simultaneous dissolution of the procedural infrastructure *within* the criminal justice system. The result of the actuarial trends described above, fortified by technological and scientific innovations, is that the traditional law enforcement regime has been 'transformed from an investigatory into an accusatory and dispositive regime' (Jackson 2008: 272). Where wrongdoing is detected and proven, justice can be meted out instantly through the use of conditional cautions, fixed penalties for disorder, etc. rather like parking or speeding tickets. Aided by technology, the investigative and probative stages of the criminal justice process—which have traditionally been kept quite separate—are now merging into a single process that may be almost devoid of human judgement or engagement.

Automation is now routine in some spheres of policing and punishment. Take, for example, the investigation of motor vehicle licence and insurance investigation. (p. 715) In the UK, it has been estimated that the police seize about 500 vehicles per day where a police officer has reasonable grounds to believe that it is being driven without insurance (McGarry 2011: 220; Motor Insurers' Bureau 2010). This intervention can arise from a routine police check, or a specialized 'crackdown' operation that are now used extensively by police forces across the United Kingdom. The process involves the use of Automatic Number Plate Recognition (ANPR) checks on vehicles that are then cross-checked against the Police National Computer (which is linked to the Motor Insurance Database (MID) and the Driver and Vehicle Licensing Agency (DVLA)) to determine whether there is a record of insurance (Kinsella and McGarry 2011). If there is not, a large sticker is placed on the windscreen stating that the vehicle has been 'seized by the police driven without insurance' and the vehicle is immediately loaded onto a car transporter and removed to the car pound. With a high degree of automation, the offence is surveilled, investigated, detected, and proven and the 'offender' punished, named, and shamed. Connecting the dots, the near future of road policing is a system in which cameras connected to computers read motor vehicle licence plates automatically, recognize the faces of the driver and front seat passenger, detect the speed of the vehicle, connect these data to licensing and criminal databases, issue penalties and deploy officers to demobilize a vehicle and remove it from the road. In the context of the idea of the 'internet of things'—wherein mechanical devices speak directly to each other through computer networks—it is possible to imagine a world in which citizens are investigated, evidence collected against them, a judgment of guilt reached and a penalty issued without the participation of a human being at any stage.

There are good reasons to anticipate that 'automatic justice' will soon be prominent in ordinary street policing. As discussed above, pre-emptive encounters inspired by technologies of risk are now permeating police activity at all levels (Hudson 2003). New devices—such as body-worn video cameras and those installed in vehicles—enable police officers to record encounters with the public in unprecedented ways. The evidence collected through these devices can be compelling and instantly reviewed by both police and suspect. The rolling out of tailored computer tablets will provide instant access to all police and other databases—both national and transnational—on all matters from criminal records of names, faces, fingerprints, DNA as well as criminal intelligence, licensing, insurance, welfare benefits, and other personal information. The vision of the leadership of the police is to 'use digital to connect the criminal justice system from the very first report of a crime through to a court appearance, an end-to-end service' (Hogan-Howe 2015). The adoption of technology within law enforcement is perceived as 'reaping the benefits of digital technology and smarter ways of working' including an improvement in 'quality of service', productivity, efficiency, and effectiveness (Hogan-Howe 2015). The Metropolitan Police Commissioner's drive towards a 'truly digital police force' points in the direction of *automatic justice*.

(p. 716) **6. Some Implications for Criminal Justice Values**

Twenty years ago Mirjan Damaška suggested that:

[T]he Anglo-American procedural environment is poorly adapted to the use of scientific information ... the scientization of proof is likely to exacerbate the presently minor frictions within traditional procedural arrangements. Their further deterioration should be considered likely on this ground alone.

(1997: 147)

The developments outlined above strain the traditional concept of the trial as ‘a climactic event’ and beg the question of whether the public trial retains its status as the focal point in criminal procedure (Damaška 1997: 145). In facilitating and accelerating dramatic changes to the architecture of the criminal justice system, these new technological developments raise urgent questions of procedural legitimacy. For example: how and at what stage will the reliability and accuracy of evidence be challenged? What is the fate of due process safeguards such as the presumption of innocence, the right to silence, the requirement of reasonable suspicion for the exercise of police powers, the right to a trial within a reasonable time, the principle of equality of arms and the right of confrontation? All are expressed in the procedural components of the traditional criminal justice model, but are rendered problematic in an automatic criminal justice system.

Unfortunately, as McGarry points out, automatic systems of policing—such as the investigation of uninsured driving—reverse the burden of proof, sometimes make errors, are experienced as heavy-handed, have few safeguards or means of correcting mistakes, and have a significant impact on innocent individuals punished and shamed in this way (McGarry 2011). The challenges posed for due process by the trends and technologies outlined above are summarized by Wigan and Clarke in an article about the unintended consequences of ‘Big Data’:

Decision making comes to be based on difficult-to-comprehend and low-quality data that is nonetheless treated as authoritative. Consequences include unclear accusations, unknown accusers, inversion of the onus of proof, and hence denial of due process. Further extension includes ex-ante discrimination and guilty prediction, and a prevailing climate of suspicion. Franz Kafka could paint the picture, but could not foresee the specifics of the enabling technology.

(2013: 52)

Implicit in this paragraph and in the criticisms made by criminal law scholars of ‘speedy justice’ is the failure to engage with the suspect as an agent and the risk of persons being treated as guilty on the basis of inaccurate and unchallenged evidence (Jackson 2008).

Thus far, data mining and profiling are not reliably accurate in their behavioural predictions. As observed by Daniel Solove, given that most citizens are subjected (p. 717) to data-mining techniques, even a very small false positive rate (1%) will result in a large number of innocent people being flagged as suspicious (Solove 2008: 353). As Valsamis Mitsilegas has pointed out, many will not have the possibility of knowing, let alone contesting, such assessments (where they result in the flagging of suspicious behaviour for example) (2014). Even where they do, the assumptions that algorithms contain may not only be incorrect, but will also be difficult to spot because they are 'hidden in the architecture of computer code' (Solove 2008: 358). Legal practitioners have expressed concern about the 'aura of infallibility' that surrounds mathematically generated information, deterring attempts to understand the process by which results are reached and inhibiting challenges to their accuracy (Eckes 2009: 31).

High levels of accuracy and certainty are required for criminal convictions (the case must be proven beyond reasonable doubt) on account of the cost of error both to the state (in terms of legitimacy and financial cost) and to the individual (in terms of stigma, financial loss, or deprivation of liberty) (Roberts and Zuckerman 2010: 17). The issue that needs to be considered in relation to profiling of suspicious behaviour is working out the cost of error to both the state and the individual. Such evaluations should consider not only the cost of being singled out for extra investigation or for inclusion on a blacklist and the service denials entailed (Ramsey 2014), but also the more abstract implications for rights such as the freedom of association and the right to privacy, given that much of the data used in generating the profile will come from the lawful exercise of such rights (Solove 2008: 358).

Law enforcement agents may not always appreciate the potential for error in new technologies and defer their judgment and decision-making to technology. The relevance (Marks 2013) and reliability (Law Commission 2011) of scientific evidence are often incorrectly evaluated by legal systems. Concerns have been expressed about the so-called 'CSI effect' in relation to misplaced police, judicial and jury deference to forensic science. Scholars have been equally concerned with vulnerability of legitimacy of the verdict if courts are seen to defer to expertise: 'The fear is spreading that courts are covertly delegating decision-making powers to an outsider [expert] without political legitimacy. Is the court's nominal servant becoming its hidden master?' (Damaška 1997: 151). According to Roberts and Zuckerman, if this fear regarding deference to science and technology turns out to be well-grounded, it would amount to a radical realignment of criminal trial procedure (2010: 489). Total reliance upon science represents 'an abdication of responsibility by law' (Alldridge 2000: 144).

It is clear that the criminal justice system will command more support from the public if its procedures, techniques, and outcomes are easily and widely comprehensible. This is undermined by a system of increasingly automatic justice that relies heavily on scientific procedures, mathematical calculations, and technical devices. The prospect of uniform data collection and permanent data retention has several implications for the criminal justice model. The criminal justice system is designed to not broadcast information about

minor offences, and in many countries criminal (p. 718) records systems actively omit old offences when performing criminal records checks. The system thus favours forgiveness and rehabilitation, rather than permanently labelling people as criminals. Indiscriminate data retention conflicts with such constructive aims (Wigan and Clarke 2013: 51).

7. Meeting the Challenge

The challenge is how to ensure that ‘automatic justice’ retains the characteristics of ‘justice’ and is in accordance with fair trial rights. On the one hand, there are the challenges to criminal justice values within the traditional model, and on the other there are those posed by the emergence of the parallel model of crime control that may entail greater state intrusion and coercion than that of the traditional criminal law. Predictive mass surveillance (as opposed to targeted reactive surveillance) is largely unregulated by criminal justice procedures and yet it is arguably more intrusive on privacy rights on account of its endurance where data is stored indefinitely. The legality of much of it is also far from clear. Judgments of the European Court of Human Rights and the European Court of Justice have made clear that the mere retention of personal data, regardless of what is consequently done with it, amounts to intrusion into privacy (*S and Marper v United Kingdom* 2009: para 67). The court has also decided that blacklisting regimes must comply with fundamental rights including the right to a defence as guaranteed by Article 6 of the European Convention on Human Rights (*Yassin Abdullah Kadi and Al Barakaat International Foundation v Council and Commission* 2008). Mirelle Hildebrandt has described the fundamental principles of criminal procedure as historical artefacts that should not be taken for granted. They should instead be acknowledged as the foundations upon which any liberal democracy—including one operated by sophisticated technology—must rest (Hildebrandt 2008).⁵ We perceive three means of addressing the challenges posed by automatic justice to the fundamental values traditionally enshrined in criminal procedure: (i) extending the procedural requirements outside of the traditional criminal justice model; (ii) incorporating criminal justice values within the rapidly evolving and heavily contested field of data protection law; (iii) incorporating lessons learned in data protection law within the criminal justice system.

7.1 Extending the Scope of the Criminal Justice Model

In light of the range of alternative disposal measures and the wide reach of new technologies it is arguable that the threat of criminal investigation, prosecution and (p. 719) conviction no longer represents the most coercive arm of the state and that the citizen/suspect and suspect/convict distinctions no longer hold water. As has been persuasively argued by Liz Campbell, ‘this may imply that some of the traditional protections that relate to the criminal trial, strictly speaking, are valuable or necessary in a wider context’ (2013: 689). Because surveillant, investigative, probative, and punitive powers have migrated out of the criminal justice system and are now more widely diffused throughout society, there is a need for the due process protections with which they are associated to follow suit. Several scholars and courts have recognized the importance of extending judi-

cial oversight and due process safeguards to the administration of potentially punitive measures such as watch lists (Ramsey 2014).

The ubiquity of new surveillance raises the question of what it means to be a suspect. Some scholars have gone so far as to claim ‘the concept of suspect is now thoroughly transformed, for we are no longer able to confine it to its juridical sense’ (Bauman and others 2014: 138). Liz Campbell argues that we should recapture the concept of suspect within its juridical sense by widening it to include an ‘interim categorisation of suspicion’ (Campbell 2010: 898) for those treated by the state in a manner that suggests they are not ‘wholly innocent’ (*S and Marper v United Kingdom* 2009: 89). This interim category is reserved for retaining information on a mass scale of certain targeted categories of people, premised on the perceived risk they pose. A status of ‘proto-suspect’ could entail a measure of suspect’s rights. As well as entailing an expansive interpretation of the presumption of innocence this reconceptualization of the suspect suggests the core of being a suspect is to be treated differently to others. There is a danger of conflating the concept of suspect with the concept of convict here however, which itself reflects a tension in the application of the presumption of innocence and the extent to which it should apply to pretrial measures as well as to the trial, let alone to the more recent debate over extending it to alternative disposal measures.

The apparent similarities between the treatment of convicts and the treatment of persons who are not even suspects gained ground for the right to privacy in *S and Marper v United Kingdom* (2009) by curtailing the retention of the DNA of persons other than those convicted of criminal offences. But the logical conclusion of applying the protection of the presumption of innocence only where persons are treated differently to those who are ‘wholly innocent’ fails to protect privacy in the long term if citizens are all subject to different forms of mass surveillance and data retention. In addition to further exploring the values underpinning the presumption of innocence—particularly in relation to its potential application to regulatory measures that *look* like criminal punishments (punishment as ‘communicative act’), it may be useful to think about what negative consequences, other than stigmatization, could be said to be at the core of being a suspect.⁶ We might look at the values underpinning the principle of double jeopardy for further guidance.⁷ An important value said to underpin the principle of double jeopardy is finality. There is value to the suspect and to society as a whole in accepting that a contested issue (i.e. the (p. 720) criminality of the suspect) has been resolved (Ashworth and Redmayne 2010: 399). In the absence of resolution one remains a suspect under permanent threat of state coercion into an indeterminate future. There are undoubtedly other important aspects to the status of suspect and this could prove useful terrain for those seeking to address the perceived injustices of mass surveillance.

7.2 Incorporating Developments in Privacy and Data Protection Law within the Criminal Justice System

Alldridge and Brants (2001: 5) argue that ‘as proactive policing increases in importance, consequently, so should attention be devoted to the claims of privacy in criminal procedure’.⁸ Evidence scholars have highlighted the threat posed to privacy by disproportionate intrusions in the form of the combined relaxation of the rules on the admissibility of bad character evidence, broad definition of such, and the wealth of personal data now accessible online. As Roberts and Zuckerman (2010: 599) put it, ‘empowering the authorities to require the accused to answer at large for his entire existence and moral character would not be compatible with liberal conceptions of limited government.’ Greater attention needs to be paid to protecting a defendant’s right to privacy within the traditional criminal justice model on account of the reach of ‘new surveillance’ and ‘second generation’ forensics.

We focus on the right to privacy on the basis that ‘privacy is to proactive policing what due process is to reactive policing’ (Alldridge and Brants 2001: 21). The *raison d’être* of laws on police searches is to protect a citizen’s personal space from arbitrary interference but new technologies bypass such safeguards by obviating the need for traditional stop and searches (*R v Dymment* 1988). New surveillance practices and technologies—such as thermal imaging and millimetre waves can investigate a person’s belongings without making physical contact and without the subject even being aware that they are being ‘searched’. The use of metadata from personal communications ‘may make it possible to create a both faithful and exhaustive map of a large portion of a person’s conduct strictly forming part of his private life, or even a complete and accurate picture of his private identity’ (*Digital Rights Ireland Ltd v Minister for Communication* [2014], Opinion of AG Villalón: para 74).

Effective metrics for balancing the effectiveness and utility of new technological means of investigation and surveillance against the intrusiveness of the privacy invasion are in their infancy. The concept of privacy, therefore, is in urgent need of clarification in order to ensure that the laws designed to protect it are applied effectively and enabled to keep pace with technological innovation (Royal Academy of Engineering 2007; Metcalfe 2011: 99). The challenge facing scholars is to clarify the concept of privacy in this context. An initial task is to develop a list of indicators of intrusiveness.⁹ Several attempts have been made to gauge the relative intrusiveness (p. 721) of various potential intrusions on privacy by conducting surveys of public attitudes.¹⁰ Another approach would be to draw on the criminal law on battery. This draws on ‘background social norms’ to delineate the boundaries of personal space and determine the extent of any intrusion (*Florida v Jardines* 2013: 7). The offence of battery does not include ‘everyday touching’ or ‘*generally acceptable standards of conduct*’, for example bumping into someone on a crowded tube train or tapping someone on the shoulder to inform them that they have dropped something (*Collins v Wilcock* 1984). In a new world of digital communication in which so much of our

personal lives are now conducted on digital formats (Roux and Falgoust 2013), these background norms are still in embryonic form.

There is an 'obvious link' between the right to privacy and the law on data protection and this relationship as well as the potential for safeguarding privacy in data protection law has been examined in detail elsewhere (Stoeva 2014).

Intelligence and law enforcement officials were largely untouched by early data protection regulation on account of broad exemptions for activities in pursuit of crime prevention and security in the Data Protection Directive 1995 (Bignami 2007) and the limited scope of the Council Framework Decision of 2008/977/JHA on the protection of personal data processed in the framework of police and judicial cooperation in criminal matters, which was restricted to the processing of personal data between member states.

The General Data Protection Regulation 2016/679 entered into force on 24 May 2016 and shall apply from 25 May 2018. Like its predecessor (the Data Protecting Direction 1995) the European Data Protection Regulation does not apply to law enforcement which is dealt with separately under the new data protection framework by Directive 2016/680. The Directive repeals Council Framework Decision 2008/977/JHA and EU Member States have until 6 May 2018 to transpose it into their national law. The new Directive does apply to national processing of data for law enforcement purposes as well as cross-border processing but scholars question 'the police and justice sector being handled differently and separately from other sectors' (Cannataci 2013). Debates about the extent to which the General Data Protection Regulation succeeds in grappling with the 'computational turn of the 21st century' and the 'large-scale, complex, and multi-purpose forms of matching and mining zettabytes of data' implied is of relevance to an increasingly automated criminal justice system (Koops 2013: 215).

There are clear parallels to be drawn between concerns expressed about police and court deference to science and technology in the criminal justice system and those exercising the drafters of Article 15(1) of the EC Data Protection Directive 1995 on the protection of individuals with regard to the processing of personal data. Article 15 granted the right to every person not to be subject to a decision which produces legal effects concerning them or significantly affects them and which is based solely on automated processing of data. It was the first attempt by data protection law to grapple directly with automated profiling.¹¹ According to Article 12(a) (p. 722) of the Data Protection Directive 1995, each data subject had the right to obtain from the controller 'knowledge of the logic involved in any automatic processing of data concerning him at least in the case of the automated decisions referred to in Article 15(1)'. That is

a decision which produces legal effects concerning him or significantly affects him and which is based solely on automated processing of data intended to evaluate certain personal aspects relating to him, such as his performance at work, credit-worthiness, reliability, conduct, etc.

(articles 12(a) and 15(1) Data Protection Directive 1995).

The drafters of Article 15 of the 1995 Directive expressed concern that the ‘increasing automation of decision-making processes engenders automatic acceptance of the validity of the decisions reached and a concomitant reduction in the investigatory and decisional responsibilities of humans’ (Bygrave 2001: 18). A similar concern in relation to ‘push button forensics’ was discussed above and the same discomfort can be detected in judicial reluctance to convict defendants on the basis of statistical evidence alone, a prospect described as abhorrent by several evidence scholars on account of it being ‘the wrong kind of evidence’ (Duff 1998: 156). There is further resonance between the concerns underlying Article 15 and those motivating the protections enshrined in criminal procedure, which can be encapsulated in the concern to preserve human dignity with the principle of humane (or even human!) treatment. Article 15 was ‘designed to protect the interest of the data subject in *participating* in the making of decisions which are of importance to them’ (Commission of the European Communities 1990: 29). The rules of criminal procedure in the traditional criminal justice model share this objective. Recent decisions on hearsay in the European Court of Justice have reinvigorated debates on the meaning and importance of the ‘right to confrontation’ (O’Brian Jr 2011; Redmayne 2012). How well does this right—the right to confront one’s accuser—sit with the prospect of the ‘automated accuser’? (Wigan and Clarke 2013: 52).

The General Data Protection Regulation 2016/679 replicates and enhances the provisions regarding decisions based solely on automated processing (Articles 13, 21 and 22).

This element of data protection legislation has been described as particularly suited to enhance outcome/decision transparency, however it has been criticized for being confined in its application to decisions that are fully automated (Koops 2013: 211). The new obligation on data controllers to provide information as to the existence of processing for an automated decision and about the significance and envisaged consequences has been described as providing a potentially ‘revolutionary’ step forwards in levelling the playing field in profiling practices (Koops 2013: 200). However, the Regulation has been criticized for confining its focus to *ex ante* process transparency and for failing to extend its reach to *ex post* outcome/event/decision transparency (Koops 2013: 200). Greater decision transparency is advocated for ‘in the form of understanding which data and which weight factors (p. 723) were responsible for the outcome’ on the basis that it is this, as opposed to the subject’s awareness of their participation in the provision of data, that would enable a decision based upon its analysis to be effectively challenged or revised (Koops 2013: 213).

Article 11 of the 2016 Directive (data protection processing by law enforcement) obliges member states to prohibit decisions based solely on automated processing including profiling, which produce and adverse or other ‘significant affect’ in the absence of lawful authorisation containing ‘appropriate safeguards’ (including ‘at least the right to obtain human intervention on the part of the controller’) and prohibits profiling that results in discrimination on the basis of certain special categories of personal data (article 11 of the 2016 Directive). It is not clear what additional appropriate safeguards will be nor whether there are any further obligatory safeguards. Should these safeguards only apply where the decision is based solely on automated processes? What about where the deci-

sion is based on semi-automated processes and human judgement? It is not clear what will be deemed to be a 'significant affect' under the Directive. Where the consequence of the processing is an increased risk of being searched by the police, will this amount to a 'significant affect'? Might the exercise of human judgment in relation to whether to act on the data and conduct a search mean that the decision is not based solely on automated processing? The Directive makes no reference to any obligation to disclose the logic of automated processing. Shouldn't citizens have a right to be informed of the logic behind decisions to flag their vehicles as suspicious? (Koops 2013)

Recent changes to the Criminal Procedure Rules on expert evidence in England and Wales (along the lines recommended by the Law Commission) seek to ensure that wherever expert opinion is admitted at trial, the basis for that opinion is laid bare in a manner comprehensible to lay persons. Where alternative disposal methods are invoked, decision transparency is obfuscated and as discussed above, particularly where the inferences drawn are based on complex algorithms, even those exercising the decision may be ignorant of the details of the inferential process used. In the absence of algorithmic transparency miscarriages of justice will be more difficult to detect.

7.3 Incorporating Criminal Justice Values within the Rapidly Evolving and Heavily Contested Field of Data Protection Law

There is widespread misunderstanding and ambiguity surrounding the extent to which data protection regulations apply to law enforcement (O'Flóinn 2013) but data protection bodies are increasingly drawing on the 'due process' values developed over many years in the theory and practice of the criminal law. The UK (p. 724) Information Commissioner recently acknowledged that the principle of fair and lawful processing of data is engaged when a public statement by the police undermines the presumption of innocence. In a statement issued by the ICO, a spokesperson explained:

The ICO spoke to Staffordshire Police following its #DrinkDriversNamedonTwitter campaign. Our concern was that naming people who have only been charged alongside the label 'drink driver' strongly implies a presumption of guilt for the offence, which we felt wouldn't fit with the Data Protection Act's fair and lawful processing principle.

(Baines 2014)

Such a development in the application of data protection principles could go some way towards addressing concerns expressed by Campbell about the procedural impediments to expanding the presumption of innocence to state practices outside of the traditional model such as inclusion on 'watch lists', and publication of civil preventative orders (Campbell 2013). Although in the case dealt with by the Information Commissioner, the persons named had been charged and were awaiting trial, the fact that the spirit of the presumption of innocence could be incorporated within the fair and lawful processing principle is a promising development.¹²

8. Conclusion

Historically, the parameters of government control over the citizen have been most clearly articulated in the rules of criminal procedure and evidence. This is largely on account of the criminal law having traditionally provided the state with its most coercive and intrusive powers and mechanisms with which to carry out surveillance, control and punishment (Bowling, Marks, and Murphy 2008). Recent technological innovations have exacerbated tensions in the traditional model of criminal justice to the point that its internal and external boundaries are on the brink of collapse. New scientific techniques, data collection devices, and mathematical analytical procedures are having a profound effect on the administration of criminal justice. They are blurring the boundary between the innocent person who should be able to expect freedom from state intrusion and coercion and the 'reasonably suspected' person for whom some rights may justifiably be curtailed. These same technologies are also blurring the boundary between the accused and the convicted. The established process that distinguishes the collection of evidence, the testing of its veracity and probative value and the adjudication of guilt are being automated and temporally and procedurally compressed. At the same time, the start and finish of the criminal justice process are now (p. 725) indefinite and indistinct as a result of the introduction of mass surveillance and the erosion of 'double jeopardy' protections caused by scientific advances that make it possible to revisit conclusions reached in the distant past. In our opinion, this drift is endangering the privacy and freedom of all citizens and most perniciously that of the 'usual suspects'. There may be scope for protection in expanding the application of criminal justice safeguards to everyone. However, it may be that the speed and depth of the technological changes occurring in this area are so great that the traditional criminal justice model—with such precepts as the presumption of innocence, the separation between the collection of evidence by the police and the testing of that evidence by a court of law, and so on—is no longer fit for the purpose of explaining criminal justice practice or constraining state power. Our deepest concern is the emergence of a potentially unfettered move towards a technologically driven process of 'automatic criminal justice'. It may be that a stronger right to privacy and enhanced data protection rights could prove a more solid foundation for building a model that will protect fundamental human rights and civil liberties in the long term. We think that in an increasingly digital world, further exposition of traditional criminal justice values is required along with a detailed examination of how these values can be combined with data protection developments to provide proper safeguards in the new technologically driven world of criminal justice.

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(1.) For a brief history of social network analysis, see Wey and others (2008).

(2.) For the UK, see: Law Commission Consultation Paper No 190, 'The admissibility of expert evidence in criminal proceedings in England and Wales: a new approach to the determination of evidentiary reliability' (2009); Law Commission Report No 325 'Expert evidence in criminal proceedings in England and Wales' (2011); House of Commons Science and Technology Committee, *Forensic Evidence on Trial, Seventh Report of Session 2004-05* p 76; *The Fingerprint Inquiry* (Scotland, 2011). For Canada, see Goudge ST. Inquiry into paediatric forensic pathology in Ontario. Toronto (ON): Ontario Ministry of the Attorney General, 2008.

(3.) See for example quotation from McCartney (2007).

(4.) Criminal Justice Act 2003, Part 10.

(5.) We have borrowed this terminology from Mirelle Hildebrandt's discussion of how to preserve the achievements of constitutional democracy in a world of ambient intelligence (2008: 167).

(6.) For a detailed unpacking of the presumption of innocence including an exploration of the basic notion of 'innocence' as well as the historical role of the presumption in shielding the accused from the hardships of the criminal process, see Stuckenberg (2014).

(7.) For accounts of the values underpinning, see for example Roberts (2002a, 2002b) and Dennis (2000).

(8.) Alldridge and Brants (2001: 5); see also Borts (2001), for an exploration of the scope there might be for accommodating privacy rights within criminal justice theory and practice.

(9.) See Alldridge and Brants (2001: 21), for an attempt to do this.

(10.) See for example Slobogin (2007).

(11.) Article 15 grants the right to every person not to be subject to a decision which produces legal effects concerning them or significantly affects them and which is based sole-

ly on automated processing of data intended to evaluate certain personal aspects relating to them.

(12.) See also Civil Rights Principles for the Era of Big Data, ACLU, 2014 available at <<http://www.civilrights.org/press/2014/civil-rights-principles-big-data.html>> (accessed 2 July 2015).

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Surveillance Theory and its Implications for Law

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Abstract and Keywords

This chapter provides an overview of key surveillance theories and their implications for law and regulation. It presents three stages of theories that characterize changes in thinking about surveillance in society and the disciplining, controlling, and entertaining functions of surveillance. Beginning with Bentham's Panopticons and Foucault's panopticism to discipline surveillees, surveillance theory then develops accounts of surveillant assemblages and networked surveillance that control consumers and their data doubles, to finally branch out to theorizing current modes of surveillance, such as sousveillance and participatory surveillance. Next, surveillance technologies and practices associated with these stages are discussed. The chapter concludes by highlighting the implications for regulators and lawmakers who face the challenge of regulating converging, hybrid surveillant infrastructures and assemblages, both in their context-dependent specificity and in their cumulative effect on citizen/consumers.

Keywords: surveillance theories, law, regulation, Panopticon, discipline, control, surveillant assemblage, sousveillance, participatory surveillance, surveillance technologies

1. Introduction

¹SURVEILLANCE is an important enough phenomenon in contemporary society to have triggered the development of a separate area of research: surveillance studies. This area brings together perspectives and findings from various disciplines, including sociology, political science, geography, computing and information science, law, and social psychology. Although law and governance studies are among the fields that inform surveillance studies, the legal and regulatory implications of surveillance are not yet an integrated part of surveillance theory. Conversely, the insights of surveillance studies, which have developed well beyond the basic notions encompassed within panoptic theory that legal and regulatory scholars mostly associate with surveillance, have not yet been well incorporated in legal and regulatory scholarship. The aim of this chapter is to provide an overview of surveillance theory and to highlight the importance of this field for the understanding and development of law and regulatory frameworks. We offer a theoretical ac-

count of surveillance in three stages (section 2), discuss some key elements of surveillance technologies and (p. 732) practices (section 3), and draw certain lessons from this for the law and regulation in general (section 4).

2. Surveillance Theory

While surveillance was still considered ‘little more than a prop for thrillers or science fiction movies’ (Petersen 2012: 7) in the mid-1990s, it has now become a household word. Yet there is considerable ambiguity as to the meaning of surveillance. Everyday uses and dictionary definitions of surveillance seem to capture only partially current realities of surveillance. Surveillance is commonly defined as ‘close observation, especially of a suspected person’ or as ‘the act of carefully watching someone or something especially in order to prevent or detect a crime’.² However, most surveillance technologies today are not especially applied to suspected persons, but rather indiscriminately and ubiquitously, to everyone and in all contexts—all places, times, networks, and groups of people (Marx 2002: 10). David Lyon, a key surveillance theorist, offers this definition: surveillance is ‘the focused, systematic and routine attention to personal details for purposes of influence, management, protection or direction’ (Lyon 2007: 14), while Haggerty and Ericson (2000: 3) define surveillance as ‘the collection and analysis of information about populations in order to govern their activities’. But to understand what surveillance actually entails, we need to look more deeply into the theoretical insights produced by the complex field of surveillance studies.

While surveillance is an ancient social process, it has become a dominant organising practice of late modernity over the past forty years (Ball, Haggerty, and Lyon 2012: 4). Alongside technological advances, significant developments in material, corporate, and governmental infrastructures, overcoming historical limitations to human senses, have produced ‘downstream social changes in the dynamics of power, identity, institutional practice and interpersonal relations’ (Ball, Haggerty, and Lyon 2012: 1; see also Lyon 2002: 4). The contribution of surveillance studies is, thus, to illuminate the nature, impact, and effects of ‘networked’ surveillance, this new fundamental social-ordering process through empirical, theoretical, and ethical research (Lyon 2002: 1). One way of acquiring insight into current surveillance is to examine historical surveillance models, paradigms, and developments. In this section, we provide a concise, chronological-thematic overview of key surveillance theories and concepts, showing their development in time and focusing on the characteristics of current surveillance practices. We do so by discerning three stages: (1) the Panopticon and panopticism; (2) post-panoptical theories; and (p. 733) (3) contemporary theories and concepts, each characterized by key features of a certain period and the technologies relevant for that time.

2.1 Stage 1: The Panopticon and Panopticism

Although piecemeal theorization of surveillance occurred before the Panopticon, for example, regarding religious surveillance that dominated in the fifteenth century or politi-

cal surveillance in the sixteenth and seventeenth centuries (Marx 2002: 17–18), we start the first stage of surveillance theory-building with Jeremy Bentham and his panoptic designs at the end of the 1700s. The Panopticon is the most widely used metaphor for surveillance, having become almost its synonym, so much so that many surveillance scholars today advocate abolishing the Panopticon when theorizing surveillance (e.g. Haggerty 2006). Less known is that Bentham actually designed at least four Panopticons. Following the classification of Brunon-Ernst (2013), besides the ‘prison-Panopticon’ (described primarily in *Panopticon; or the Inspection-House* (1786, 1790–1791)), there are also the ‘pauper-Panopticon’ (designed for the housing of indigents but also for reformation and work, it is described primarily in *Outline of a Work entitled Pauper Management Improved* (1797–1798)), the ‘chrestomatic-Panopticon’ (a Panopticon-shaped day-school, where one inspecting master could supervise pupils without being seen; it is described primarily in *Chrestomathia* (1816–1817)) and the ‘constitutional-Panopticon’ (also called the reversed, or inverted, Panopticon; this was Bentham’s idea of bottom-up surveillance where governing functionaries are monitored through the use of panoptic methods in order to ensure *good* government, and it is described primarily in *Constitutional Code* (1830)). Although the three almost-unknown Panopticons do more than merely replicate the original prison-Panopticon idea, presenting amended versions of the first project, reflecting its adaptation and reconfiguration to new contexts, and exemplifying different panoptic and even anti-panoptic features, the Panopticon that has become the synonym for surveillance is based solely on the prison-Panopticon.

The infamous prison-Panopticon is, in terms of its panoptic features, primarily an architectural idea—a ‘strategy of space’, creating an illusion of constant surveillance within that space in order to overcome the limitations of time and space through physical design. In the centre of the Panopticon is an Inspector watching over all inmates from one static point—surveillance here is static and top-down. Surveillance focuses on the ‘under-class’—the prisoners, the poor and ill, and is performed by the state and its institutions. Moreover, the goal of surveillance is to reform the individual (all aspects of the person), in order to create perfect and internalized discipline and make punishment unnecessary. As a utilitarian philosopher, Bentham employed a rationalist vision on ethics and government based on (p. 734) the principle of ‘utility’, of which the Panopticon was an integral part: if everything and everyone was always visible, people will act in accordance with the rational principle of maximizing happiness and preventing pain (Dorrestijn 2012: 30). Bentham’s panoptical arrangements should, however, be seen as a ‘panoptic paradigm’ (Brunon-Ernst 2013)—a multitude of Panopticons with a variety of panoptic and anti-panoptic features. Where the pauper-Panopticon still retains the main panoptic characteristics, they are present much less in the chrestomatic- and constitutional-Panopticon.³ As Bentham’s prison-Panopticon has become particularly famous through Foucault’s concept of panopticism, Bentham is often understood through the reading of Foucault; in light of the panoptic paradigm, however, the Panopticon should be seen as a more diverse and reversible structure than Foucault cared to admit (at least as described in Foucault 1991).

The first stage of surveillance theorization continued with Foucault's concepts of panopticism and the disciplinary society, and lasted until the end of the 1970s. Although Foucault's concept of panopticism is almost exclusively based on Bentham's prison-Panopticon, his analysis not only rehabilitated Bentham's work, but it also built upon and extended into a broader perspective on power relations and networks in modern societies (see further Galič, Timan, and Koops 2017). Foucault projected the panoptical architecture (of the prison-Panopticon) as a diagram onto other parts of society in order to highlight power relations and models of governing (Foucault 1991). In *Discipline and Punish* he offered a critique of the Enlightenment and showed that while liberation was preached on the level of ideas, in practice, people were in fact subjects of new regimes of power—disciplinary regimes of a modern society with its progressively intensive organization and institutionalization (Dorrestijn 2012: 50). Disciplinary power produced a docile individual: 'out of a formless clay, an inapt body, the machine required can be constructed; posture is gradually corrected; a calculated constraint runs slowly through each part of the body, mastering it, making it pliable, ready at all times, turning silently into the automatisms of habit' (Foucault 1991: 135). Discipline thus represents a type of power working through normation⁴ and conformity (found in the opaque fibres of daily life, in which habits, rituals, and behaviours, and therewith norms of behaviour, are condensed), leading to the internalization of morals, values, and the control exercised over the subject by specific state institutions, such as mental hospitals, schools, or the military. When everyone can be under surveillance, control, morals, and values are internalized. Due to the efficiency and rationality of the functioning of Bentham's prison-Panopticon for the purposes of surveillance, it served Foucault as the ultimate example of the disciplinary system in general (Dorrestijn 2012: 50). Foucault's concept of panopticism hence represents power relations manifesting themselves as supervision, control, and correction (see also Foucault 1980).

The characteristics of surveillance, as emanating from Foucault's concepts of discipline and panopticism, thus correspond to a great extent with Bentham's (p. 735) prison-Panopticon. In conclusion, the main characteristics of the panoptical stage in surveillance theory are:

1. surveillance is mostly physical, confined to closed physical spaces, and visible (although, because of the way disciplining power works, surveillance became more dispersed and less visible with Foucault than it was in Bentham's Panopticon);
2. the main actor of surveillance is the state with its institutions;
3. the object of surveillance is the underclass where the focus is on individuals and their physical bodies;
4. surveillance aims at discipline; and
5. surveillance is mostly perceived as negative and sinister, although certain positive or empowering aspects are also recognised.

2.2 Stage 2: Corporations, Networks, and Surveillant Assemblages

The second stage of surveillance theories begins in the late 1970s with the rise of (consumer) capitalism as a global political system and the emergence of computers and subsequently networked technology as household appliances. This stage is ‘post-panoptical’ since its representative authors tried to get away from the Panopticon as the primary model for thinking about surveillance, arguing that surveillance has transformed into something different due to changes in the socio-technical landscape. Deleuze, the founding father of post-panoptical literature, attempted to find places of surveillance analysis beyond the Panopticon already in the late 1970s and through the 1980s.⁵ Deleuze (sometimes together with Guattari) observed that Foucauldian institutions and their ways of disciplining were shifting into different models of surveillance and exercising power. He claimed that discipline is no longer the goal and driving force of governing, and that a shift occurred from a disciplinary to a control society. The driving forces of capitalism and globalization have changed (Western) societies to such an extent that corporations began to represent the primary actors in globalized society, rather than nation-states and their institutions which themselves increasingly began to act as corporations. The primary vision behind surveillance exercised by global corporations became making profit from the increasing amount of (digital) data that people generate in daily transactions, and where this new surveillance started working at a distance using networked technology (see further Galič, Timan, and Koops 2017).

The corporation is a fundamentally different being than a nation-state, since it does not strive towards progress of society as a whole (the presumed goal of the state). (p. 736) Rather, it strives towards controlling specific aspects and parts of increasingly international markets (Taekke 2011: 451–452). Corporations achieve this control through constant monitoring and assessment of markets, workforces, strategies, and so forth. An important characteristic of such a control society is modulation, meaning that its systems and institutions are changing constantly, as one set of skills, goods, and services is valuable one day but, as corporate interests and markets change, can be useless the next. These modulations happen in opaque networks so that they are often invisible to subjects of such control. Consequently, surveillance is no longer primarily physical, confined, and visible; it has become abstract, numerical, widespread, and opaque. Furthermore, it is no longer the underclass that captures the attention of surveilling actors, but ‘productive citizens’, who are increasingly being constituted as primarily or merely consumers, leading to the creation of consumer profiles with the intention of moulding their purchasing behaviour. The individual has become fragmented—Deleuze (1992) called it a *dividual* (a divided individual)—and as such it was no longer individuals as wholesome beings and their physical bodies that was of interest to surveillance, but the representation of parts of individuals from data trails: their *data doubles* (Poster 1990). As a result, surveillance now focused on the construction of consumer profiles in order to limit or control access to places and information, leading to the offering or refusal of social perks, such as credit ratings or rapid movement through an airport.

Deleuze's incredibly early insight to networks of power and the decoupling of individuals' bodies and their representations served as the main inspiration and source for more recent surveillance scholars. Haggerty and Ericson (2000) developed one of the most important and widespread contemporary conceptualizations of surveillance in their seminal paper 'The surveillant assemblage'. Although their concept of *surveillant assemblage* goes somewhat beyond post-panoptical theories and shares certain characteristics with what can be called the third stage of surveillance theories, it fits best in the second stage, as their theory is firmly rooted in a post-panoptical view of society and Deleuzian-Guattaresque concepts: *assemblage* and the *rhizome* (see Deleuze and Guattari 1987). Deleuze and Guattari defined assemblages as a 'multiplicity of heterogenous objects, whose unity comes solely from the fact that [they] (...) work together as a functional entity'. Beyond this functional entity, assemblages comprise discrete flows of an essentially limitless range of nodes in a network, such as people, institutions, all types of data and information. These fluid and mobile flows become fixed into more or less stable and asymmetrical arrangements—assemblages, visualized as devices hosting heretofore opaque flows of auditory, olfactory, chemical, visual, and informational stimuli, which then turn into systems of domination allowing someone or something to direct or govern actions of others. The inevitability of transformation is key to thinking in terms of assemblage, so that surveillant assemblages can be seen as 'recording machines', as their task is to trap, capture, or arrest flows and convert them into reproducible events. Haggerty and Ericson used this concept, because they identified new and (p. 737) different attributes of contemporary surveillance as being emergent, unstable, lacking discernible boundaries and accountable governmental departments, so that it could not be criticized by focusing on a single, confined bureaucracy or institution. Such surveillance is driven by the desire to bring systems together, leading to an increased convergence of once-discrete systems of surveillance and an exponential increase in the degree of surveillance capacity. Haggerty and Ericson also described surveillance as *rhizomatic*—rhizomes are plants that grow in surface extensions through horizontal underground root systems, a way of growing that differs from arborescent plants, which have a deep root structure and grow through branches from the trunk. This means that surveillance is growing and spreading increasingly in unlimited directions, working across state as well as non-state institutions, by rhizomatically expanding its uses (for purposes of control, governance, security, profit, and entertainment), particularly with the help of new and intensified technological capabilities, relying on machines to make and record discrete observations. Rhizomatic surveillance can consist of multiple parts, aspects, and agents that do not necessarily share similar intention or goals. Although this can have a somewhat levelling effect on hierarchies of surveillance and result in new categories of people being monitored (and even in bottom-up surveillance), surveillance continues to play an important role in establishing and reinforcing social inequalities, and the primary focus is still on creating profit for corporations and the state (see also Romein & Schuilenburg 2008). Social control within surveillant assemblage is, thus, decentralized and shape-shifting. As with Deleuze, surveillance is focused on a decorporealized 'human body', which Haggerty and Ericson understand as a hybrid composition, a flesh-technology-information amalgam (following Donna Haraway). The data double constitutes an additional self, a 'functional hybrid' serving the

purpose of being useful to corporations and institutions that allow or deny access to a multitude of domains and discriminate between people. However, they also pointed out that surveillance can be seen as a positive development, offering possibilities for entertainment, pleasure, and even (to a limited extent) resistance to top-down surveillance and power over the powerful.

The main characteristics of corporate-networked theories of surveillance are:

1. surveillance is abstract, numerical, reproductive (widespread and ever-spreading), and often invisible or opaque;
2. the main actors of surveillance are corporations; even when performed by state institutions, these act as corporations;
3. the object of surveillance is the consumer, a *dividual*—specific parts of an individual deemed useful to corporations, as discerned from their data doubles;
4. surveillance aims at controlling access; and
5. it is perceived in almost completely negatively (although Haggerty and Ericson acknowledge certain positive aspects of surveillance as well).

(p. 738) 2.3 Stage 3: Contemporary Surveillance Theories

The third and latest stage in surveillance theory, which covers contemporary concepts of surveillance, is characterized by a branching out of theories in different directions, building on the previous theories but focusing more on particular phenomena within surveillance than on building all-encompassing theories (Galič, Timan, and Koops 2017). The differentiation and particularization can be connected to a steady increase in, but also diversification of, surveillance devices, data sources, actors, use contexts, and goals, and, consequently, more and varied forms of surveillance. The surveillance industry has rapidly grown since 9/11, in size and in content. It is a fitting continuation of the trend Haggerty and Ericson started to map out. The pace of technology development and its use is now so rapid and unpredictable that surveillance theories and concepts oftentimes remain piecemeal and need to be regularly revisited. In fact, there is no attempt (or perhaps no need) to build an overarching theory, as the main surveillance theories in the first stages offered. The roles of the watcher and the watched along with power relations in society are becoming more and more diffuse, particularly as the dedicated surveillance technologies are increasingly intertwined with mundane and accessible consumer technologies. Where the first two stages clearly distinguish between surveillance objects and subjects, the third stage develops into a messier affair. On the one hand, there is an increasing blend of governmental and corporate surveillance infrastructures that make use of commercial, mundane, and accessible tools such as laptops and mobile phones to collect consumer/citizen data. This form of surveillance is less obvious and visible than the physical infrastructures of the first stage. On the other hand, an increase of citizen-instigated forms of surveillance can be witnessed, in which the same laptops and mobile phones are equipped with cameras. Consequently, with the heightened presence of cameras, the act of making pictures, movies, and other forms of capturing and recording behaviour in pub-

lic and private spaces is increasingly becoming standard practice. The recording and sharing of all kinds of human activity through digital platforms adds an entertaining and pleasurable aspect to surveillance, and challenges (but does not replace) existing power relations of surveillance in society.

The three most notable contemporary surveillance concepts, comprising contemporary piecemeal surveillance theory, are *alternative opticons*, *sousveillance*, and *participatory surveillance*. Despite the search for post-panoptical theories since the end of the 1970s, the Panopticon is still being used as a metaphor to analyse surveillance in current technological contexts. David Lyon states that ‘we cannot evade some interaction with the Panopticon, either historically, or in today’s analyses of surveillance’ (Lyon 2006: 4). The metaphor might still be valid due to an ever-growing presence of ‘watching and being watched’ mechanisms through various new (ICT) technologies. Where the second, Deleuzian, stage emphasized the virtual, representative layers of surveillance through databases, Lyon would argue that the disciplining power exercised through the Panopticon as described by Foucault (p. 739) is still present: it merely shifted from the physical architectural prison that corrected inmates, through the workplace and government for reasons of productivity and efficiency, to current, ‘softer’ forms in entertainment and marketing. Through reality shows and YouTube, ‘to be watched’ is becoming a social norm, even an asset (the more views the better). Lyon calls it ‘panopticommodity’ and Whitaker the ‘participatory Panopticon’ (Lyon 2007, Whitaker 2000). Both try to capture and project ideas of watching and being watched as a form of discipline onto current, contemporary manifestations of what basically is, they claim, the same panoptic principle. Similarly, Latour argues, with his concept of an ‘oligopticon’, that similar panoptic principles are still in place, yet dispersed via smaller sub-systems and situations—a network of multiple smaller Panopticons that all have a different disciplining power on individuals (Latour 2012: 91–93).

On the other hand, 9/11 brought about a rapid growth of (Deleuzian) surveillance as control, for example in the form of access gates or checkpoints that citizens now encounter in daily life. In an attempt to conceptualize this event and what it did to notions of control, freedom, and security, Bigo (2006) coined the concept of the BANopticon, which, instead of monitoring and tracking individuals or groups to identify misbehaviour, aims at keeping all bad subjects out: it bans all those who do not conform to the rules of entry or access in a particular society. He points out that a series of events, most prominently the 9/11 attacks, have declared a ‘state of unease’ and an American-imposed idea of global ‘in-security’ (Bigo 2006: 49), leading to what Agamben (2005) calls a permanent state of exception or emergency. This leads to a rhetoric of ‘better safe than sorry’ under which surveillance measures are expanding to what is sometimes called ‘blanket’ surveillance, in which every nook and cranny of society would seem under observation. This rhetoric is recurring when new and experimental surveillance technologies enter parts of society—in this rhetoric frame one cannot be ‘against’ surveillance.

Another development considered to have a long-term effect on surveillance structures is the Internet. New media and surveillance scholars argue that the ways in which we govern life has rigorously changed because of it. Connected to Internet infrastructures of databases, servers, and screens, other driving forces and events emerge that change the legitimacy and reach of surveillance in society. Partly through the lens of the Internet, scholars look for other than us-versus-them perspectives on surveillance. Following Hagerty (2006), more positive and empowering accounts might be found in systems of watching and being watched. If we accept that we indeed live in some form of a networked and technology-saturated society, it follows that apparatuses of surveillance, the methods, tools, and technologies already mentioned by Foucault are not solely in the hands of top-down and power-hungry governing institutions or governments. Even if we follow Deleuze's reasoning that now corporations are in charge with a surge for power and control that is even more threatening because of their opaqueness and invasiveness, it is still the individual who can resist, refuse, or find alternative ways of using technology. (p. 740) Due to an increased blending with consumer technologies, mainly through ICT, surveillance technologies become increasingly accessible to ordinary citizens.

Where the extent to which this is possible is subject of current debate, the theoretical shift this brings about is that instead of surveillance being a place or act of 'one looking at many', new media technologies follow a logic of 'many look at many', where visibility is often deliberately chosen. Mann (2004) has coined this 'sousveillance' (see also Mann and Wellman 2003), where citizens watch governing bodies from below, in order to surveil the surveillors, rather than the classic top-down perspective (*sur*-veillance). Although the logic of sharing in new media has its own economic drivers, recent developments do hint at another possibility that this democratization of (surveillance) technologies offers—namely to perform acts of counter-surveillance. Building on the idea of decentralized surveillance but going beyond Mann, Albrechtslund (2008) coined the term 'participatory surveillance'. *Sous*-veillors are not only actively engaged in surveillance as watchers, they also participate voluntarily and consciously in the role of the watched. Many online environments, especially social network sites, serve as interesting sites to study, since many beliefs, ideas, and opinions are shared here. As Boyd and Ellison (2007) describe, social networking sites are dominating online activities today and as such, these places constitute new arenas for surveillance. However, from the perspective of users and visitors of these online places, the high level of surveillance, in the form of tracking and being tracked, watching and being watched, or sharing and being shared, is not necessarily negative. The added value of this approach is a user-centred perspective on surveillance. Furthermore, this approach allows another perspective on analysing surveillance, where tracing users' steps and activities can reveal other experiences of surveillance and visibility.

Why is visibility so important to these users? Koskela (2004) explains that exhibitionism such as shown on social networking sites or in TV shows can work in an empowering way. By throwing everything into public arenas, this visibility challenges how we think about the relation between transparency and power; in rebelling against the shame associated with private things, exhibitionism becomes liberating, because people 'refuse to be humble' (Koskela 2004: 199). Similarly, in the marketing context, Dholakia and Zwick argue

that ultra-exhibitionism 'is not a negation of privacy but an attempt to *reclaim some control over the externalization of information*. As such, ultra-exhibitionism is to be understood as an act of resistance against the surreptitious modes of profiling, categorization, and identity definition that are being performed by others on the consumer whenever he or she enters the electronic "consumptionscape" ' (Dholakia and Zwick 2001: 13, emphasis in original).

The main characteristics of contemporary theories and concepts of surveillance are:

1. surveillance is physical as well as abstract and numerical, it is confined and open, stable and liquid (Bauman 2006), visible and opaque;
- (p. 741) 2. the main actors of surveillance are the state, corporations, and individuals themselves;
3. the object of surveillance is both the 'productive' citizen and the underclass, both individuals' physical bodies and *dividuals* and data doubles;
4. surveillance aims at both discipline and controlling access; and
5. it is perceived as sinister as well as beneficial and even entertaining.

3. Surveillance Technologies and Practices

The three surveillance stages described above concern different ways surveillance takes place; these different ways of watching and being watched all connect to technologies used to surveil. Technological surveillance is summarized by Petersen (2012: 10) as 'the use of technological techniques or devices to detect attributes, activities, people, trends, or events.' Detection can take place using a technology (a closed-circuit television (CCTV) camera, for instance, where a human operator decides whether or not something is deviant behaviour) or via a technology itself, i.e. through a rule or algorithm that defines something as deviant behaviour (for instance, automatically selecting 'suspicious' cars with automatic number plate recognition). Closely related to monitoring and detecting is recording, or what happens 'behind the gaze'. From Bentham's Panopticon to current digital forms of surveillance, the act of surveilling works as a threat for the object of surveillance to do good or to act according to the rules of the system, accompanied with potential consequences. This connection can only exist if there is some form of proof of recorded behaviour, or at least the idea that such proof exists. This can be the 'all-seeing' or 'god-like' watcher in the Panopticon who remembers everything all the time, the note-taking police officer in the street, or the CCTV server's memory. Current surveillance technologies, however, go beyond monitoring, detecting, and recording: their (in)visibility in itself also plays a role in exercising different types of surveillance. When we consider the Panopticon as a physical technology and architecture, it is essential that the object of surveillance sees the watchtower, but does not see the watcher. Another example can be that of CCTV in public space, where the alleged function is not only to audio-visually detect deviant behaviour, but also to act as a form of crime prevention similarly to the Panopticon: by visibility of the infrastructure and opaqueness of the watcher.

(p. 742) The number and type of surveillance technologies vary widely and depend on the intended goal and actual uses of surveillance. Petersen (2012: 12–14) discerns the following types:

- *implied*: surveillance that is mimicked or faked with a variety of devices, including non-functioning cameras or empty camera housings, or stickers falsely claiming that an area is monitored. Implied surveillance is a low-cost deterrent to theft and vandalism;
- *overt*: surveillance in which surveillees are informed of the nature and scope of surveillance or in which the surveillance devices are clearly labelled and displayed. Overt surveillance is often manifested in workplace or retail security systems that warn employees or customers they are being watched;
- *covert*: hidden surveillance, in which the surveillee is supposed to be unaware of the surveillance. In many countries, covert surveillance is unlawful without a legitimating ground, such as a legal basis, court order, or other form of permission. Covert surveillance is commonly used in law enforcement, intelligence gathering, espionage, and crime;
- *clandestine*: surveillance in which the surveilling system or its use is in the open but not obvious to the surveillee and;
- *extraliminal/superliminal* (i.e., beyond consciousness): surveillance occurs outside the consciousness of the surveillees.

These types provide one way of distinguishing between technologically mediated forms of surveillance and their connections to the subject of surveillance. The two literal explanations of surveillance—‘to watch from above’ and ‘to watch over’—associate strongly with, and can be explained by different types of, surveilling gazes. ‘To watch over’ has been interpreted from Bentham onwards as an act of watching not only in the correcting or controlling gaze, but also to make sure everything or everyone is doing well. This latter part can be witnessed in hospitals, for instance, where surveillance is explained as a medical gaze. Such surveillant gazes aim at detecting relevant changes in a system in order to intervene where necessary.

This aspect of the gaze becomes apparent in the first stage, where Bentham’s Panopticons are physical architectural infrastructures, while in Foucault’s panopticism, the focus shifts to broader systems that discipline individuals through repetitive tasks and checks, and where technologies of discipline are embedded in daily tasks and as such become part of surveillance technologies. Foucault uses examples ranging from the military (how to shoot a gun properly) to handwriting exams where students have to hold a pencil and write according to pre-defined norms in order to pass (Foucault 1991: 186–187). The institutions mentioned by Foucault are the physical places of surveillance, consisting of both places and people (a school and teacher, the factory and boss, the hospital and medical staff, the street and police officer) and the tests and norms that are the virtual layer of discipline.

(p. 743) In the second stage, we see the rise of computers and electronic networks that partially obfuscate physical infrastructures and surveillance technologies. One clear example, and often-used icon for surveillance, are CCTV cameras. The technology is aimed to 'watch over'; however, there is no longer close proximity between watcher and watched. Monitoring has evolved along with the development of different technologies that mediate the surveilling gaze. It now becomes possible to monitor behaviour at long distances and to record it for future reference. Stemming from military developments, surveillance technologies in this stage reflect globalization of 'reconnaissance' and 'intelligence' together with a rapid development in communication technologies, from satellite networks and radar systems to detect enemy movement or missiles to the first global trade markets via computer networks that monitor monetary movements. Still in the hand of large actors, surveillance technologies are used in this stage both by nation-states and multinational corporations; in contrast to the first stage, they watch not only (in)dividuals but also 'things' (e.g. stock trade, polluting waste, military objects).

In the third stage, surveillance technologies expand both in depth and in breadth. In depth, more devices and techniques of surveillance have become available and are more commonly used, such as synthetic DNA-spray used by shopkeepers to mark shoplifters, mobile surveillance via police-worn bodycameras or drones, or cameras used in airports to measure travellers' body temperature and behaviour. Most of these technologies stem from military technology development and have subsequently found their way into civil applications (Rip et al. 1995). In breadth, this third stage constitutes the use of network technologies to develop new techniques of surveillance, such as data mining and profiling, or to apply existing technologies for surveillance, such as social-media monitoring (Marwick 2012) or digital vigilantism (Trottier 2015: 209).

What distinguishes this stage from the previous ones from a technological point of view is that most if not all forms of surveillance are convergent, operating or communicating through the same network(s) (Castells 2010). These networks and their accompanied software and hardware components are the new 'glue' of all types of human activity, including surveillance. Not only does the Internet allow connecting and combining existing surveillance technologies in near-real-time across a much larger geographic scope than before (e.g. real-time matching CCTV footage with local police databases of images), it also allows stretching surveillance over longer periods of time. It expands surveillance from monitoring, detecting, and recording events in the physical world to monitoring and connecting the physical with the digital world. In the era of big data (cf. Kitchin 2014), the darkest (or, to some, brightest) scenario is to collect all possible data on all events everywhere on everyone and everything forever. Recent affairs have revealed a continuum of state-induced communications monitoring practices, an age-old practice that now, however, also involves ICT service providers facilitating such surveillance. When looking at NSA programmes such as PRISM,⁶ or large technology (p. 744) companies snooping private consumer devices,⁷ we see that the Internet has indeed allowed for new types of surveillance, changing the surveillance model of monitoring, detecting, storing, and acting to a model of pre-emptive or direct manipulation of the system, based on mainly mined digital information (e.g. being preventively arrested because of comments made on social

media⁸). It also means that new surveillance technologies not only afford a mediated gaze from a distance, but also acting, intervening, and pre-empting at a distance.

4. Discussion: Implications for Law

What lessons can we draw from the overview of surveillance theory, technologies, and practices? Given this chapter's embodiment in a handbook on technology law and regulation, we want to focus on the implications for law, providing our perspective on what lawyers—legislators, courts, practitioners, legal scholars—can learn from surveillance theory. Taking surveillance theory seriously is important for lawyers, since, by and large, the law has so far engaged with surveillance only in a superficial and piecemeal fashion, as it black-boxes surveillance without attempting to understand what is actually happening in surveillant practices and assemblages (Hier 2003; Cohen 2015: 92). Taking up Julie Cohen's challenge to foster a dialogue between surveillance studies and law, and building on her insights (Cohen 2015) as well as on our own past research into both fields, we offer the following suggestions as starting points for a more profound engagement with surveillance within the legal field.

Contemporary surveillance theories build on the Panoptic and corporate-networked stages of theory-building, but diversify and become more particularized. What these theories show is that surveillance in contemporary society is dynamic and hybrid: it combines characteristics of physical, state-oriented, and disciplining Panopticons with those of digital, enterprise-oriented, and controlling surveillant assemblages, while also achieving elements of entertainment and pleasure. Each surveillance characteristic we have identified for the third stage has, in its hybridity, implications for the law.

First, surveillance is physical and numerical, stable and liquid, visible and opaque. However, the law still tends to be based on dichotomous categories: we have laws regulating offline behaviour and laws regulating online behaviour, but not laws for behaviour that seamlessly integrates the physical and digital spaces that people nowadays inhabit as one life-space. Although legal categories are inevitably somewhat artificial, they should have at least some basis in reality, which nowadays consists of networked, non-linear surveillance of individuals that are at the same time embodied in physical space (Cohen 2015: 93). This means, for example, that (p. 745) legal frameworks need to migrate from physical spatial assumptions (e.g. in strong constitutional protection of 'private places', in particular the home, against largely physical intrusions) to new forms of protection—a metaphorical 'home 2.0' that protects an abstract space around persons as they live their lives regardless where they are (Koops 2014a). The intricate interweaving of offline and online behaviour implies a need for conceptualizing private space—i.e. a space relatively immune to undesired or uncontrolled surveillance—as incorporating both physical and digital space, where people can retain some form of control over the incessant data flows between real-space and cyberspace (Cohen 2012).

Second, the main actors of surveillance are now the state and corporations but also individuals themselves. This has two major implications for the law. While the surveillance-industrial complex is a symbiotic relationship between state surveillance and private-sector production and use of surveillance technologies and data, the law still relies heavily on the classic public-private distinction. This does not imply, of course, that the fundamental distinction between public law and private law is outdated as such, but it should lead us to question closely how the various doctrines in public law and private law interact when legal questions arise about hybrid surveillant infrastructures and assemblages. For example, the US third-party doctrine, holding there is no reasonable expectation of privacy in data voluntarily shared with third parties, is rightly criticized by scholars as outdated in a world where people daily ‘leak’ data on many more aspects of their lives than traditional financial or phone records (e.g. Ohm 2012), but the doctrine has yet to be fundamentally reviewed. Similarly, in European data-protection law, businesses must provide customer data to police or intelligence agencies when so ordered, overriding customers’ consent or contractual arrangements, which in itself is a logical exception to data being processed in consumer-business relations, but becomes questionable when the exception becomes a rule or regular practice. In short, we should ‘look beyond rote incantations about the public-private distinction and the primacy of consent to consider more carefully the patterns and practices of commercial surveillance that are reshaping everyday life’ (Cohen 2015: 95).

The other implication of hybrid actorship is to factor in the role of individuals in surveillance practices in a way that does justice to the complex dynamics of social networking and participatory surveillance. There is a risk that the participatory turn in surveillance leads to under-regulation of public/private surveillant practices (Cohen 2016), with governments and industry rhetorically invoking the ‘I have nothing to hide’ argument to claim that people should not complain because they ‘put everything online themselves’ (convincingly refuted by Solove 2007). Individuals should not be punished for playing the game while they are being—visibly and opaquely—moved as pawns in the game at the same time. Rather, we should aim at understanding how practices are shifting through phenomena such as the quantified self, digital vigilantism, and sousveillance, whether and how new (p. 746) vulnerabilities arise for participant surveillors-surveilleds, and how these vulnerabilities can be compensated by legal or other regulatory measures.

Third, the object of surveillance is not only underclasses or ‘suspect groups’, but also ‘productive’ citizens or consumers, both their physical bodies and their data doubles; in short anyone in different contexts. This makes it difficult to regulate surveillance along the lines of particular group vulnerabilities, e.g. in sectoral law, but more importantly, it implies that the individual focus underlying most forms of legal protection—human rights, data protection—is not adequate to comprehensively address the regulatory challenges of dataveillance. Attempting to regulate Big Data-based surveillance practices in individual-centric legal frameworks of data protection is attempting to fit twenty-first-century practices into twentieth-century frameworks (Koops 2014b); alternative approaches, focusing more on due process and transparency of algorithmic decisions may be more promising ways to address the regulatory challenges of profiling (Hildebrandt and De Vries 2013:

14). Regulators need to develop a concept of group privacy, since '[m]ost of us are sardines. The individual sardine may believe that the encircling net is trying to catch it. It is not. It is trying to catch the whole shoal. It is therefore the shoal that needs to be protected, if the sardine is to be saved' (Floridi 2014: 3). Moreover, there will always be particularly vulnerable groups, but who these are depends on the socio-political trends of the day, and surveillance's affordance of social sorting (Lyon 2003) needs to be scrutinized not only for its marginalization of vulnerable groups, but also for its cumulative effect on 'us-versus-them' think and an increasing polarization of society pervaded by BANOpticons.

Fourth, surveillance concerns both discipline and controlling access. The law is, in principle, equipped to deal with the implications of access control, since this involves forms of power, and the law often has legal protection in place to compensate for unequal power relationships. Nevertheless, it may need to step up legal protection where surveillance that performs access control is opaque, clandestine, or even extraliminal, and thus difficult to regulate through oversight; moreover, mechanisms for legal protection may become outdated when shifts in power relations occur (Koops 2010). To address the regulatory challenges of disciplining surveillance, the law faces even more fundamental challenges. Relying heavily on liberal political theory, the law envisions regulatees to be rational persons who (with sufficient information) make up their minds autonomously, despite a huge body of knowledge from the social sciences on bounded rationality, and despite surveillance studies having shown the multiple ways in which humans are influenced and steered by their environment (Cohen 2015: 92). The insight that technology is not neutral and co-shapes human behaviour needs to be acknowledged by law-makers and legal scholars, implying not only that the pivotal role of informed consent in the law needs to be questioned, but also that regulators' attention needs to focus on the technologies themselves that act—non-neutrally—in surveillant assemblages. Instead of blackboxing surveillance, regulators need to invest in expertise to (p. 747) understand what happens inside the assemblage if proposed regulatory approaches such as Privacy by Design or algorithmic transparency are to be effected in any meaningful way.

Lastly, surveillance is perceived as sinister as well as beneficial and even entertaining. The problem is that the perception of the surveillant gaze is in the eye of the beholder. Most beholders seem to have a rather fixed perception of surveillance as generally good or generally bad, and the surveillance optimists and surveillance pessimists seldom engage in real and open-minded dialogue. Surveillance studies does not offer much help, since their dismal pictures of surveillance 'seem to offer well-meaning policy makers little more than a prescription for despair' (Cohen 2012: 29). Legal scholars engaging with surveillance also can often be pretty neatly divided up into (mostly) surveillance critics or (more rarely) surveillance proponents, who in their efforts to convince the 'other side' risk over- or underemphasizing the sinister and beneficial aspects of particular practices of surveillance. It would be helpful to have more legal scholarship that is not primarily pro-privacy or pro-surveillance, but which views surveillance as generally good and bad at the same time, or as good or bad depending on the situation. Moreover, the fun and pleasurable element of some surveillant practices should not be overlooked: while the law

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does not usually concern itself with how people entertain themselves (bar some exceptions such as gambling and public broadcasting), it should take care not to mistake playful participatory surveillance as a sign that people do not mind being surveilled.

From these five characteristics of contemporary surveillance we can also draw some overarching lessons for law. Given that surveillance no longer falls into easy categories but is intrinsically hybrid, the law should not focus too much on one or another element of a surveillant practice, such as an actor, a technology, or a type of disciplining, since this will miss out other elements that are also at play; it particularly risks missing the broader picture of which a particular practice is part. With pervasive, broad-ranging, and interacting surveillant infrastructures and assemblages, it is vital to look at the whole rather than individual parts, and to acknowledge the cumulative effect of surveillance on society, groups, and individuals. Cohen (2012) has articulated the importance of room for play, in the sense of breathing space for people to develop and explore themselves in everyday practices, and regulators should attempt to preserve this room for play, which threatens to be diminished to nothingness as surveillant assemblages become seamlessly intertwined. The law seems to be starting to acknowledge this need for looking at the overall effect of surveillance practices, for instance, with the development of the mosaic theory⁹ that considers the cumulative effect of many minor privacy intrusions; still, a doctrine that considers the ‘whole picture’ faces considerable practical challenges yet needing to be resolved (Gray and Citron 2013). Moreover, law-makers are not particularly good at creating legal frameworks based on comprehensive assessments—legal change all too often depends on policy-makers who can do little else than keep ‘muddling through’ (Lindblom 1959).

(p. 748) At the same time, and perhaps paradoxically, the hybridity of surveillance also requires the opposite of looking at the whole: it is equally important to study concrete practices in all their specificity. Despite the homogenous and converging character of dataveillance and physical-space surveillance in a connected world, local surveillant assemblages show very different treatments and outcomes in how they ‘do’ surveillance. The context-specificity of surveillant practices implies that generic legal approaches may often fail to achieve their aim, since they can hardly account for the myriad ways in which combinations of particular surveillant actors, objects, tools, aims, and contexts will behave. But the law, of course, cannot avoid generalizing, so compromises must be struck between on the one hand, creating general rules based on solid understanding of concrete practices (and the whole picture of which these are part) and, on the other, creating compensatory mechanisms to do justice in concrete cases where the general rule will fall short of accounting for the specifics of any given case. The latter will include procedural rules for oversight, access to justice, complaints, compensation for (also non-monetary) damages, etc., but also broader regulatory approaches beyond classic command-and-control laws. It might be difficult for lawyers who, in an effort to ensure legal consistency and certainty, would prefer sticking to existing rules and doctrines over creating new and open-ended regulatory frameworks that are hard to oversee; however, it would be better for legal certainty in the longer run to adopt a flexible and forward-looking approach to law-making, based on a meticulous assessment of how technologies are changing social practices and

how this affects individuals and groups (Cockfield and Pridmore 2007), both concretely and cumulatively.

5. Conclusion

In this chapter, we have provided a concise overview of surveillance by discerning three stages of theorizing surveillance. As surveillance theories are interconnected with technologies and social contexts, these stages are almost unavoidably chronological. Yet, by defining these stages according to certain characteristics, or what surveillance ‘does’, their division has also shown thematically different characteristics and emphases between the stages. The first stage lays the foundation of surveillance theories by looking at Bentham’s different Panopticons and at Foucault using the prison-Panopticon to demonstrate how panopticism works as a driving force or power to discipline citizens in society. Where this stage is concerned with nation-states and their institutions, the second stage deals primarily with global capitalist forces. The driving force here is consumerism, and the arena of surveillance is international markets connected through network technologies. We shift from (p. 749) a disciplining society to a controlling society, where the aim is no longer to ‘educate’ citizens but to increase profit. In the third, and current, stage, surveillance has become more complex, ambiguous, and branched-out. This is an almost logical consequence of the pervasiveness and variety of technologies and technology-enabled practices in (Western) society; especially the increasing saturation of the Internet in all kinds of devices and systems has expanded—but at the same time leads to a convergence of—the places, actors, and forms of surveillance. We no longer see only multinationals and their markets as the key actors of surveillance; rather, an amalgam of governments, public-private partnerships, and citizen-consumers all engage in acts of surveillance one way or another.

For regulators, this means they should find ways of ensuring that legal and regulatory frameworks are capable of addressing the challenges of converging, hybrid surveillant infrastructures and assemblages both in their context-dependent specificity and in their cumulative effect on citizen/consumer-dividuals; to ensure that anticipatory legal frameworks are detailed enough to deal with rapidly moving technological capabilities yet broad and flexible enough to address their longer-term consequences; and to ensure that the sinister side of surveillant practices is curtailed without disregarding their positive side. This is a daunting task, for sure. But regulators, like regulatees, need breathing space, and they might find some comfort in the play that is part of doing regulation, as it is of doing surveillance. For, as Marianne, one of the more sympathetic characters in the Patrick Melrose novels, reflects (St Aubyn 2012: 193), ‘Of course it was wrong to want to change people, but what else could you possibly want to do with them?’

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Notes:

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(2.) Following Oxford and Merriam-Webster dictionaries.

(3.) For a more elaborate description of the characteristics and way of functioning of the prison-Panopticon, see Maša Galič, Tjerk Timan, and Bert-Jaap Koops, 'Bentham, Deleuze and Beyond: An Overview of Surveillance Theories from the Panopticon to Participation' (2017) 30 *Philosophy & Technology* 9. For further information on the different types of the Panopticon, see Anne Brunon-Ernst, 'Deconstructing Panopticism into the Plural Panopticons' in Anne Brunon-Ernst (ed) *Beyond Foucault: New Perspectives on Bentham's Panopticon* (Ashgate Publishing 2013); Philip Schofield, *Bentham: A guide for the perplexed* (Bloomsbury Academic 2009); Janet Semple, *Bentham's Prison: A Study of the Panopticon Penitentiary* (OUP 1993).

(4.) The term *normation* as coined by Foucault differs from normalization in the sense that the norm precedes the normal (according to Foucault). This means the individual has to be brought to the norm (for instance via teaching, instructions, or force). See <<http://>

libertaire.free.fr/3ConceptsFoucault.html> (accessed 2 May 2017) for an elaborate explanation (in French). See also Michel Foucault, *The Birth of Biopolitics: Lectures at the Collège de France, 1978–1979* (Graham Burchell tr, Palgrave Macmillan 2008).

(5.) The other key and earliest thinker associated with this stage is Jean Baudrillard, whose work on simulation (in Jean Baudrillard, *Simulacra and Simulation* (University of Michigan Press 1994)) can be nicely connected to surveillance, as was done primarily by Bogard. See William Bogard, *The Simulation of Surveillance: Hypercontrol in Telematic Societies* (CUP 1996).

(6.) See for example ‘NSA Prism program slides’ (*The Guardian*, 1 November 2013) <www.theguardian.com/world/interactive/2013/nov/01/prism-slides-nsa-document> accessed 2 May 2017.

(7.) See for instance Samuel Gibbs, ‘Google eavesdropping tool installed on computers without permission’ (*The Guardian*, 23 June 2015) <www.theguardian.com/technology/2015/jun/23/google-eavesdropping-tool-installed-computers-without-permission> accessed 2 May 2017; Samuel Gibbs, ‘Samsung’s voice-recording smart TVs breach privacy law, campaigners claim’ (*The Guardian*, 27 February 2015) <www.theguardian.com/technology/2015/feb/27/samsung-voice-recording-smart-tv-breach-privacy-law-campaigners-claim> accessed 2 May 2017. In such cases, for reasons of ‘user research’, ICT manufacturers or suppliers create backdoors to be able to collect user data without users being aware.

(8.) See Alyson Shontell, ‘7 People Who Were Arrested Because Of Something They Wrote On Facebook’ (*Business Insider*, 9 July 2013) <www.businessinsider.com/people-arrested-for-facebook-posts-2013-7?op=1&IR=T> accessed 2 May 2017; Julia Greenberg, ‘That ;) you type can and will be used against you in a court of law’ (*Wired*, 12 February 2015) <www.wired.com/2015/02/emoji-in-court-cases/> accessed 2 May 2017.

(9.) See *United States v Maynard*, 615 F.3d 544 (U.S., D.C. Circ., C.A.). Cf. Sotomayor’s concurring opinion in *United States v Jones* [2012], 132 S Ct 945.

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Data Mining as Global Governance

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Data mining technologies are increasingly prominent in development and aid initiatives in which context they may be understood to be doing work of global governance. This chapter explains how data mining may be so characterized and explores how this work may be compared to more conventional governance techniques and institutions. The chapter first provides an overview of some exemplary initiatives among international institutions in which data mining plays a crucial role. It then presents a playful, mundane analogy for a governance challenge—the sorting of a sock drawer—and compares a familiar law and policy approach and a data mining approach to this challenge. Lastly, it highlights what may be at stake in the practice of data mining on the global plane and associated shifts in regulatory technique, arguing for this practice to be regarded as a matter of broad-ranging public concern.

Keywords: data mining, global governance, international organizations, development, humanitarian aid, law, policy, regulatory technique

1. Introduction

PUTTING the terms ‘data mining’ and ‘governance’ together in a chapter heading may evoke a number of expectations of the text to follow. Perhaps one might expect to read about data mining as an instrument in the governance toolbox; something which lawyers and others are using *for* governance, with positive and negative effects (e.g. Zarsky 2011; Nissan 2013). Alternatively, one might anticipate a story of the governance *of* data mining; an overview of how laws of various jurisdictions guide and restrict the practice of data mining, or should do so (e.g. Cate 2008; Solove 2008; Schwartz 2011). One might foreshadow, instead, a tale of data mining *about* governance; recounting ways in which the practice of governance has become something that people aspire to measure globally: through the use of indicators, for instance (Davis, Kingsbury and Merry 2012; Fukuyama 2013).

Data mining as governance suggests something else. It suggests that datasets, databases, and data mining technologies and infrastructure are not just instruments for governance to be conducted otherwise on the global plane, nor practices opposable to law that await further or better governance, nor constraints that operate alongside but remain neatly distinguishable from law (contra Lessig 1998). Rather, these technologies and related infrastructure constitute a field and a style, or a number of related styles, of governance. To carry out data mining amid the kind (p. 777) of projects outlined below is to perform work that we may associate with that nebulous, ascendant term 'governance', or with 'the 'law' and 'regulation' of this book's title (Black 2002; Lobel 2004). That is, data mining operations are directive and standardizing; they constitute offices and subjectivities; they assemble information and seek to modify behaviour; they shape understanding of what is imaginable or achievable and who or what is 'right' and 'wrong' (or some proxy for those terms: efficient and inefficient; reasonable and unreasonable; just and unjust; countable and uncountable; and so forth) according to certain norms, as well as how and why those norms might change over time. They do so, moreover, in ways that purport to address a wide range of governance dilemmas on the global plane: from disaster relief to food security; pandemic control to refugee registration; anti-corruption to environmental impact assessment and beyond (see, respectively, Goetz and others 2009; Meier 2011; Wang, Tang and Cao 2012; French and Mykhalovskiy 2013; Su and Dan 2014; Jacobsen 2015).

It is the argument of this chapter that in light of the operations in which it has become crucial, data mining should be understood as a practice of global governance—both as a *technique* (or set of techniques, not internally consistent: Law and Ruppert 2013: 232) and as a *site* for the assemblage and distribution of value and authority in which the public (variously configured) has significant stakes. This argument will be developed, first, by explaining data mining in general and surveying some indicative practices of global governance in which data mining plays a crucial role. In other words, this chapter begins by considering something of *what* is being accomplished and attempted on the global plane by recourse to data mining. Second, I present a deliberately 'low-tech', mundane analogy of the sock drawer (mundane, at least for, those privileged with an array of such possessions), militating against the sense of alchemy and awe by which discussions of contemporary data mining are often characterized. By this means, I will show something of *how* data mining governance proceeds in comparison to more conventional regulatory practices. Third, and finally, I will focus on *why* data mining is something with which global publics should be concerned and engaged.

2. Mining with Models

Much has been written about the collection, mining and sharing of data by national governments and corporations, for law enforcement, welfare surveillance and intelligence purposes especially, and privacy and related normative concerns provoked thereby (e.g. Rubinstein, Lee, and Schwartz 2008; Chan and Bennett Moses 2014; (p. 778) Pasquale 2015). Far less scholarly or public attention has, however, been dedicated to data mining by international organizations and its potential ramifications for global law and policy (es-

pecially ramifications beyond considerations of privacy). Growing emphasis on data mining in global governance has, nonetheless, been heralded by the publication of several major reports by international organizations, both intergovernmental and non-governmental, highlighting the current and projected importance of data's automated analysis in their work (IFRC 2013; UN OCHA 2013; UN Global Pulse 2013; see generally Taylor and Schroeder 2014).

A sense of the expanding role of data mining in international organizations' work may be gleaned from a brief overview of three illustrative initiatives, described below: first (the UNHRC programme), a United Nations High Commissioner for Refugees (UNHRC) programme for biometric registration and de-duplication of Afghan refugees living in camps in Pakistan and applying for humanitarian assistance for repatriation following the fall of the Taliban (Jacobsen 2015); second (the UN Global Pulse study), a collaborative, United Nations (UN)-led initiative (involving the UN Global Pulse, the World Food programme, the Université Catholique de Louvain and a Belgian data analytics company, Real Impact Analytics) to use digital records of mobile phone transactions as a proxy for assessing and mapping non-monetary poverty (Decuyper and others 2015); and third (the AIDR platform), the Artificial Intelligence for Disaster Relief platform: a free and open source prototype designed to perform automatic classification of crisis-related messages posted to social media during humanitarian crises. The AIDR platform was developed by researchers at the Qatar Computing Research Institute and has been deployed in collaboration with the UN Office for the Coordination of Humanitarian Affairs (UN OCHA) (Imran and others 2014; Meier 2015). To understand exactly how data mining features in each of these initiatives, some lay explanation of that term is required.

2.1 What is Data Mining?

Data mining entails the computerized production of knowledge through the discernment of patterns and drawing of relationships within large databases or stores of digital information—typically patterns and relationships not otherwise apparent. In contrast to 'knowledge discovery in databases' (KDD), data mining does not necessarily include control over data collection. It often deals with by-products of other processes; data assembled for data mining purposes may 'not correspond to any sampling plan or experimental design' (Azzalini and Scarpa 2012: 8; Colonna 2013: 315–316).

Data that data mining deals with may be structured or unstructured, or in some combination of these two states. Structured data is organized into fixed dimensions (p. 779) or fields, each representing a specific yet generalizable characteristic or response to a generic query, such as name or date of birth. Unstructured data, in contrast, has no pre-defined organization and often combines many different data forms; data constituted by a video stream is an example. The concern of data mining is 'the extraction of interesting (nontrivial, implicit, previously unknown, and potentially useful) information or patterns from data in *large* databases', however that data may be assembled or structured (Han and Kamber 2001: 5). The scope of what might be 'potentially useful' in this context need not be determined a priori; that is, data mining itself may generate a sense of what merits

interest, as described below (Azzalini and Scarpa 2012: 5). A database that is so mined need not, moreover, be centralized. Much contemporary data mining concerns data that are decentralized or ‘distributed’—that is, gleaned from many different, uncoordinated sites and sources (Kargupta and Sivakumar 2004; Leskovec, Rajaraman, and Ullman 2014).

Crucially for governance purposes, data mining may take supervised or unsupervised forms (or semi-supervised hybrids of the two). Supervised data mining proceeds from a training set of data known to have certain features: a record of past successes and failures, or pre-identified instances of the type of norm-deviating event of interest to the human (or non-human) supervisor(s). The goal is for data mining software to learn the signature, or generate a number of possible signatures, of points of interest in the training data and classify other unlabelled data employing that or those signature(s). Unsupervised data mining, on the other hand, commences without an initial model, hypothesis, or norm from which deviation must be sought. The aim is to generate and explore regularities and anomalies; to infer the properties of some function capable of predicting phenomena in the data; to create a model on that basis; and to continuously refine those inferences and the ensuing model (see generally Leskovec, Rajaraman, and Ullman 2014: 415–417). Supervised mining offers a clear measure of success and failure (or degree of error) and a basis for redressing the latter; learning takes place through the detection and correction of errors. Unsupervised mining offers no ready way of evaluating the validity or usefulness of inferences generated; part of the process is continually revisiting and discarding hypotheses which the data mining practice itself will have generated (Hastie, Tibshirani, and Friedman 2009). Even when unsupervised, however, data mining comprises part of a complex ‘socio-technical system’ in which humans and non-humans interact in a myriad of ways, as is apparent in the accounts of data mining endeavours set out below (Nissenbaum 2009: 4–5; Colonna 2013: 335; see generally Suchman 2006).

One might expect the design and deployment of data mining tools in relation to existential matters—disaster relief and the like—to be reflective of the human stakes at play in that work. However, because of the way data mining code and tools often get bolted together in a piecemeal fashion, customized, reused, and repurposed away from the settings in which they were originally developed, this will not necessarily be the case (Clements and Northrop 2001). Google’s famous PageRank (p. 780) algorithm, for example, was developed as the core product of a commercial enterprise, but has been retooled for a wide range of data mining purposes outside that setting, including poverty mapping (Leber 2014; Pokhriyal, Dong, and Govindaraju 2015). Each of the initiatives outlined in the next section exhibits precisely this kind of software and hardware retooling.

2.2 Three Illustrations of Data Mining as Global Governance

The UNHCR programme was initiated after the fall of the Taliban in 2001 in the context of the mass-repatriation of Afghan nationals from refugee camps in Pakistan back to Afghanistan. Between 2001 and 2005, the UNHCR facilitated the return of over three million refugees to Afghanistan (Kronenfeld 2008). As part of this process, the UNHCR pro-

vided for every returnee to receive ‘transport assistance ranging from \$5 to \$30—depending on his [or her] final destination—a UNHCR family kit with plastic tarpaulin, soap and hygiene items, as well as wheat flour from the World Food Programme’ (UNHCR 2002). In distributing these resources, the UNHCR used traditional identification methods to try to distinguish ‘genuine’ first-time claimants from ‘recyclers’ claiming multiple assistance packages, but found these methods wanting (UNHCR 2002; UNHCR 2003a, 2003b). At the UNHCR’s request, commercial technology vendor BioID Technologies (BioID), in cooperation with Iridian Technologies, developed a biometric registration facility and mobile registration units for the organization’s deployment of pre-existing iris recognition technology, the operation of which was described as follows:

All centers have a network of Iris Recognition cameras (ranging from 2–9 depending on the required capacity). The individual is asked to sit down in front of one of the cameras and is briefed by the operator. A series of enrollment images are taken and sent to the server in the network. This system converts the appropriate image into an Iriscode (a digital representation of the information that the iris pattern constitutes) and checks the entire database whether that IrisCode matches with one already stored. If that is not the case, the individual is enrolled, the IrisCode stored in the database and a Customer Information Number (CIN) is returned to the particular workstation confirming that the enrollment has been successful...If the individual is found in the database, the system returns an alarm to the workstation with the message that a recycler has been found and also returns the CIN number that individual was originally enrolled with. The whole process from the moment the person sits down, is briefed, up to completion of enrollment takes less than 20 seconds

(BioID 2015).

The techniques used to extract (demodulate), analyse and classify phase information (a numeric expression—in the form of a ‘bit stream’—of a pattern extracted from a set of iris images) have not been described publicly by either BioID or the UNHCR (see generally Daugman 2004). Nonetheless, published descriptions of iris (p. 781) recognition techniques suggest that this may involve a type of data mining model known as a neural network, employing machine learning (Lye and others 2002; Cao and others 2005; Bowyer and others 2008; Sibai and others 2011; Burge and Bowyer 2013: 79–80). While neural networks vary widely, they are all predicated on the processing of numeric input through a series of interconnected nodes (some layers of which are hidden) and the attribution to connections among those nodes of associated weightings, with each layer of these nodes being comprised of the weighted sum of values in the preceding layer. In many instances, the weighting attributed to nodal connections is ‘learned’ through the processing of, and verification of performance against, a training set of input data (Roiger and Geatz 2002: 45–47, 245–264). Alternatively, it may be that this iris recognition is carried out using a decision tree: another type of predictive data mining model used for classification, again employing machine learning (Kalka and others 2006; Burge and Bowyer 2013: 275). Decision trees are ‘[t]ree-shaped structures’ that represent sets of binary tests on the basis of

which data is divided and classified at each 'branch'; after training and validation of outputs, the tree can be used to 'generate rules for the classification of a dataset' without supervision (Roiger and Geatz 2002: 9–11; Sumathi and Sivanandam 2006: 402).

After a year of this system's operation, and the processing of just over 200,000 refugees, the UNHCR reported that approximately 1000 people trying to claim multiple assistance packages had been detected 'in addition to more than 70,000 families ...rejected [during the same period] ...under other screening methods' (UNHCR 2003b, 2003c). Those other screening methods—maintained alongside iris recognition—included 'interviewing potential returnees and examining their family photos' (UNHCR 2002). The relationship between these various screenings tactics is not explained in UNHCR literature, but that literature does suggest that the biometric screening was treated as dispositive. Indicatively, the iris recognition system was said to have performed 'flawlessly' despite the risk of data corruption posed by 'the heat and dust of Pakistan's border territories with Afghanistan', without reference to error rates associated with factors such as image compression; contact lens use; pupil dilation; corneal bleaching, scarring, inflammation, and other pathologies (UNHCR 2003b; on error rates, see Al-Raisi and Al-Khouri 2008; Vatsa, Singh, and Noore 2008; Bowyer, Hollingsworth, and Flynn 2013). Similarly, according to the UNHCR, concerns that use of the technology might intimidate, raise traditional objections to women being photographed, or compromise privacy proved unfounded: 'only the eye is seen onscreen'; '[t]ests on women and children are done by female refugee agency workers'; and 'the code describing the iris has no link to the name, age, destination or anything else about the refugee' (UNHCR 2003c). Commentators have, however, been critical of the organization's failure to disclose the risk of false matches likely to arise in large-scale applications of biometric technology, or to put in place measures 'to detect and correct for such false matches', especially in view of the fact that data anonymization might hinder their (p. 782) detection (Jacobsen 2015: 151–152). Even if the prospect of undetected error could be adequately and publicly addressed (not the focus of this chapter), the UNHCR programme still raises issues of changing regulatory style and shifting distributions of authority to which we will return below.

The UN Global Pulse study represents another example of predictive data mining being used to address a perceived paucity of reliable data in developing countries. In this instance, however, a traditional 'verification-driven' approach was used, employing statistical analysis, rather than a 'discovery-driven' or machine learning approach (Colonna 2013: 337–340). The starting point of the study was the thesis—drawn from a series of prior studies—that 'phone usage data represent a clear barometer of a user's socio-economic conditions in the absence or difficulty of collecting official statistics' (Decuyper and others 2015: 1). On this basis, the study sought to test the further hypothesis that 'metrics derived from mobile phone data', specifically CDRs (or call detail records, including caller and callee identification data, cell tower identification data, dates, and times of calls) 'and airtime credit purchases' (data comprised of the relevant user's identifier, the top-up amount, dates, and times of top-ups) might serve as a 'real-time proxy' for 'food

security and poverty indicators in a low-income country context' (Decuyper and others 2015: 1).

The method used to test this hypothesis entailed calculation of mathematical relationships across two data sets, both aggregated by geographical areas home to between 10,000 and 50,000 inhabitants in 'a country in central Africa' (Decuyper and others 2015: 2–3). The first data set—drawn from mobile phone company records maintained for billing purposes—was comprised of caller home location data, measures of caller 'top-up' (or airtime credit purchase) behaviour, and measures of caller 'social diversity' (how equally a caller's communication time is shared among that caller's contacts): the latter having been shown otherwise to be a 'good proxy' for variation in poverty levels (Eagle and others 2010; Decuyper and others 2015: 2–3). The second data set—drawn from a 2012 survey of 7500 households across the country in question, made up of 486 questions, including questions related to food access and consumption—was comprised of a 'set of numerical metrics related to food security', some of which were question-specific measures and some composite measures related to several questions (Decuyper and others 2015: 3–4). The second data set was designed to provide 'ground truth' data by which to validate the first (Decuyper and others 2015: 2).

Correlations (numeric representations of the interdependence of variables) were computed among thirteen mobile phone variables and 232 food consumption and poverty indicators. Relationships among those variables were then modelled using regression analysis (that is, modelling around a dependent variable of interest to explore its predicted or possible relationship to one or more independent variables and the contribution that the latter may make to variation in the former) (Decuyper and others 2015: 4). The results of these analyses were taken to support (p. 783) 'a new hypothesis' that 'expenditure in mobile phone top up is proportional to the expenditure [on] food in the markets' (Decuyper and others 2015: 5).

These results from the UN Global Pulse study encouraged the authors to envision that governments and other 'partners' running 'programs and interventions' concerned with food security and poverty could collaborate with mobile carriers to generate 'an early warning system' of 'sudden changes in food access' and have their policy 'guide[d]' accordingly, including using this 'early warning' as a prompt to gather further information, through in-depth surveys for example (Decuyper and others 2015: 6–7). Although the authors of the UN Global Pulse study did not address how such targeted, follow-up surveys might be conducted, it is conceivable that any such survey methodology might employ a further set of data mining techniques. Because the use of mobile phones as platforms for survey data collection in developing countries has risen, so research on data mining techniques designed to automate data quality control during mobile survey data collection is also growing (Chen and others 2011; Birnbaum and others 2012). Using training sets known to contain both fabricated and 'relatively accurate' survey responses, machine learning data mining for this purpose seeks to 'find anomalous patterns in data' on the basis of which one might detect 'fake data' (such as data relating to home visits that malingering data-gatherers never conducted) or 'bad data' (emanating from 'fieldworker[s]

acting in good faith' but subject to some 'misunderstanding or miscommunication') (Birnbbaum and others 2012). Thus, the sort of in-depth inquiry that the UN Global Pulse study anticipates following from its 'early warning' mechanism may itself take the form of data mining, at least in part, aimed at purging flawed data.

Misinformation and superfluous data are also targeted by the AIDR platform, which 'tackles the overwhelming amount of information generated by mobile phones, satellites, and social media' in the midst and aftermath of a humanitarian disaster to 'help aid workers locate victims, identify relief needs, and... navigate dangerous terrain' (Meier 2015). To do so, the AIDR platform 'collects crisis-related messages from Twitter ('tweets'), asks a crowd to label a subset of those messages, and trains an automatic classifier based on the labels' as well as 'improv[ing] the classifier as more labels become available'. This approach, combining human and automated classification, is designed to train 'new classifiers using fresh training data every time a disaster strikes' ensuring 'higher accuracy than labels from past disasters' and meeting the changing informational needs of disaster victims and responders (Imran and others 2014: 159–160; Vieweg and Hodges 2014).

Data collection in this context—that is, the secondary data collection associated with organizing messages on the AIDR, not the primary data collection associated with Twitter users determining about what, when and how to write a message—is initiated by an individual or collective AIDR user entering a series of keywords and/or a geographical region for purposes of filtering the Twitter stream. On this basis, a 'crowd' of annotators provides training examples—each example comprised of a (p. 784) system-generated message with a human-assigned label—to train for classification of incoming items. Training examples may be obtained from the collection initiator or 'owner' using AIDR's 'internal web-based interface' or by calling on an external crowdsourcing platform: AIDR makes use of the open source platform PyBossa. This interactive training process generates output—made available, through output adapters, as application programming interfaces (APIs)—in the form of messages sorted into categories that may be collected and used to create crisis maps and other types of reports and visualizations, using the APIs (Imran and others 2014: 160–161).

The mining of data collected through AIDR is effected by the 'AIDR Tagger' and the 'AIDR Trainer'. The AIDR Tagger, responsible for each Tweet's classification, is comprised of three modules: a feature extractor (which extracts certain features from a Tweet); a machine learning module; and a classifier (which assigns one of the user-defined labels to the Tweet). The AIDR Trainer feeds the learning module of the AIDR Tagger, using 'trusted' training examples sourced from the collection owner or crowd-sourced examples processed via PyBossa (Imran and others 2014: 161–162). The learning module adopts a 'random forest' data classification methodology: an aggregation of several, successively split decision trees (Boulesteix and others 2014: 341; Imran and others 2015). Once trained to compute proximities between pairs of cases, random forest classification may be extended to unlabelled data to enable unsupervised clustering of data 'into different piles, each of which can be assigned some meaning' (Breiman and Cutler 2015). Clustering entails automated gathering of data into groups of records or 'objects' that exhibit

similarities among them, and dissimilarities to objects assembled in other groups. In unsupervised clustering, the likenesses or associations that comprise a particular group's relatedness are not known or predicted in advance; rather, these emerge through machine learning (Berkhin 2006). The AIDR platform has been tested in relation to Typhoon Yolanda in the Philippines and the earthquake in Pakistan in 2013, as well as in the Nepal earthquake in 2015 and elsewhere (Vieweg, Castillo, and Imran 2014; Imran and others 2014; Meier 2015).

Each of these initiatives brings slightly different data mining techniques to bear upon a perceived dilemma, for intergovernmental and non-governmental organizations, of a lack, overload, or chronic unreliability of data likely to be useful for governance, primarily in developing countries. Critics have raised concerns that are salient for these types of initiatives, including worries with regard to the technological circumscription of choice, the overestimation of technologies' reliability, and their propensity for non-transparency and 'function creep': that is, using data collected for unanticipated and unannounced purposes (Brownsword 2005; Mordini and Massari 2008; Jacobsen 2015). Also circulating in scholarly literature are worries about the economic and political logics said to be 'underlying' these measures (Sarkar 2014; Pero and Smith 2014). The aim of this chapter is not to reproduce or appease these concerns. Rather, this chapter focuses on shifts in global regulatory style or governance practice that these examples may (p. 785) signify, not as a matter of underlying logic, but rather on their surface (on the critical richness of the surface, see Hacking 1979: 43). In order to track some of these surface shifts, let us turn away from the technical language of data mining towards a mundane analogy, to compare some conventional approaches to knowledge-production and ordering in law and regulation with a data mining approach to the same.

3. The Sock Drawer

Let us imagine a banal 'regulatory' challenge: the need to order a messy sock drawer in a way that renders it usable and acceptable to a number of people likely to access it. There are various ways one might approach this task, and a range of considerations that might come up throughout, as described below. Each of the tactics or considerations detailed in the first part of this section is roughly analogous to a strategy or possibility that might emerge in the course of some traditional global governance practice: perhaps, say, in the course of multilateral treaty drafting and negotiation, or treaty modification after adoption (whether through later amendment; subsequent, more specialized agreement; or some parties' entry of reservations—opt-outs or qualifications to derogable treaty provisions) or in the process of treaty ratification and implementation by parties. The second part of this section seeks to represent, by admittedly obtuse analogy, how the same regulatory challenge might be approached through one particular type of data mining practice.

3.1 Conventional Governance of the Sock Drawer

If one were to set about trying to ‘govern’ a messy sock drawer using conventional legal and regulatory techniques prevalent globally, one might begin by setting out a general principle or preambular aim: say, in order to promote timely, comfortable, and aesthetically pleasing dressing, socks in the drawer shall be sorted into pairs and single socks discarded. Already, this principle contains a condition: that of availability in the particular drawer (and household) in question. It also includes a clear, question-begging omission: *whose* timeliness, comfort and pleasure should be at issue; a particular individual’s, those of the members of a certain household or group, or a population’s at large? In other words, what is the scale and scope of the pair-or-discard imperative and who has a stake in it?

Alternatively, one might begin the process of governance by confronting the initial framing of the exercise. Should socks be kept in a closed drawer at all? (p. 786) Would an open tub, or a series of pigeonholes on a wall, work better as a storage mechanism? In what ways and for whom would one or the other of these options be ‘better’? Are matching socks actually more aesthetically pleasing or comfortable than unmatched socks? According to which criteria or for whom?

Having confronted these questions (and answered them—however provisionally), it may be considered timely to get stuck in to the task of human sorting. The experience of doing so would likely lead to the consideration and adoption of further rules, conditions, and exceptions. Perhaps only available socks in reasonable condition should be sorted into pairs and holey ones discarded (raising a further question: how and by whom should ‘reasonable condition’ be assessed)? Accordingly, one might add a rule allocating that responsibility and explaining how it should be exercised: a rule limiting the sorting imperative, for instance, to available socks judged to be in reasonable condition by their owner, taking into consideration any holes or other signs of wear and tear. The issue of sock ownership then rears its medusa head; perhaps ‘possession’ is a preferable alternative?

Even after ownership or possession is established to the satisfaction of the constituency at hand, other concerns may arise, either from the outset or as one encounters socks of different kinds and conditions. Should socks made of high quality, expensive material—cashmere socks, for example—or socks manufactured using an environmentally costly process—polyester socks, for instance—be recycled instead of discarded, to minimize waste and maximize sustainability? Should socks to which the possessor has an emotional attachment—those originally hand-knitted as a gift, perhaps—be exempted from the pair-or-discard imperative, to prevent emotional harm? Should especially woolly socks be retained in a cold climate setting—even when odd—and more readily discarded in a temperate or tropical location? Should socks be sniffed in the process of their evaluation and smelly socks thrown away? If so, by whom should this smell test be conducted, and what happens if that person comes down with a cold, obstructing their nose? Considerations such as these may encourage further exceptions or more detailed directives to be adopted and responsibilities assigned.

Issues of participation, equity, and compliance will also arise. Who has access to the sock drawer in question and how might they regard the sorting scheme adopted? What of those who do not have access to this drawer, or to socks at all? Are either or both of these ‘constituencies’ likely to take an interest in, support, and adhere to the sock-sorting arrangements developed? If not, and if their support is considered necessary or desirable, how might they be encouraged to do so? This may be partly a matter of cultivating or reflecting prevailing tastes: are the sock pairings proposed likely to strike the sock wearers in question as intuitively ‘right’?

One could represent the sorting process so developed as a decision tree: a series of binary choices building on one another. Alternatively, one could understand this sorting process in terms of clustering: it will be acceptable to some to gather roughly the same category of sock—say, all *blackish* socks—and to form pairs from among (p. 787) that cluster. How one chooses to represent the process will likely have an effect on how its overall acceptability may be viewed. Yet the method of sorting—however represented—is unlikely to displace the recurrent demand for dialogue around the sorts of questions raised so far.

To guard against misapplication or misinterpretation of such rules as are adopted, one might introduce a review possibility by, say, inviting some trusted third party to judge the suitability of the pairings for wearing in public and to rule some pairings in and out. One might also opt to try on a pair of socks, or a succession of pairs, in front of an audience from which opinions as to their stylishness may be ‘crowd-sourced’, electorally or by consensus resolution of a representative body. These are both familiar techniques in conventional governance practice on the global plane (see generally Kingsbury, Krisch, and Stewart 2005; Best and Gheciu 2014). Others may conduct selective, trial outings in certain pairs of socks, to determine how comfortable or likely to fall down they may be when worn. Some might prefer to delegate the sock-sorting process altogether, asking someone to undertake the task on the basis of guidelines provided or with untrammelled discretion. Others might seek external input while retaining ultimate sock-sorting responsibility: expert advice, for example, as to the optimum number of socks required to ensure one has a clean pair available each day, given a specified number of launderings per week; a cost-benefit analysis on sock retention versus sock renewal, after an audit of the socks in stock; or scientific input as to the projected loss of body heat from the foot and ankle under different climatic conditions and its effect on the body. Again, these are analogous to regulatory techniques widely used in global law and policy.

Regardless of the process adopted or outcomes ultimately realized, ‘governing’ a sock drawer using some or all of these familiar regulatory strategies places the practice of governance itself in the front and centre of deliberation. It is apparent that different methods will satisfy different constituencies and that continual reconsideration and/or review as to both method and outcome may be required to settle unforeseen questions, concerns and dilemmas as they arise. This iterative revisitation seems, moreover, likely to be multi-directional: potentially running up and down the hierarchy of rules, from overarching principle to the most nuanced of exceptions and back again, and involving horizontal

comparison across different rule and sock categories and different subsets of the sock wearing constituency.

Even where delegation is involved, the regulatory strategies caricatured above are immersive in that they are likely to be predicated on, or referable to, some individualized and collective human experience of wearing socks (or not) and observing sock-wearing in others (or not). That is not to say that those devising the sock-sorting strategy will have worn all the socks in question. Nonetheless, at least in a democratic setting, they would probably be exposed to some representation of the views, tastes, and experiences of those who have worn or tested many different sorts of socks: by receiving delegations or petitions from sock manufacturers', sock wearers' or sock enthusiasts' associations, for example, or occasional submissions from (p. 788) different members of the relevant household. Certain accounts of the 'authentic' sock-wearing experience might surface in the course of this interaction, or a sense of the sock as a 'social construction'. Such accounts are, however, unlikely to prove dispositive for those for whom sorting the sock drawer is a daily matter of concern (Latour 2005).

Each of these conventional strategies is also, quite patently, relative and vulnerable to counterclaim. Speculation about sock sorting may seem irrelevant, even indulgent, to someone who does not possess socks; does not regularly sleep inside, or in a room in which a chest of drawers or other storage vessel is available; or is guided most by religious or cultural teachings concerning the covering of the foot (which could be differentiated by gender and age). Moreover, questions of authority and interest—who bears authority for what purposes, how this authority should be exercised, and in whose interest—seem to remain alive throughout this inquiry, however trivial the subject matter.

3.2 Data Mining the Sock Drawer

Let us now try to envisage approaching the governance challenge posed by the messy sock drawer through data mining. In this section, possibilities for sock sorting will be examined through the lens of just one mode of data mining: an often unsupervised or semi-supervised descriptive data mining technique known as *k*-means cluster analysis. Data mining is termed 'descriptive' when its aim is not merely to divide and classify data according to known attributes or factors, but rather to represent data in unforeseen ways, disclosing 'hidden traits and trends' within a data set (Zarsky 2011: 292; Colonna 2013: 345).

Recall that the AIDR platform discussed previously makes use of the technique of clustering. Data mining may produce clusters in a range of ways: using statistical methods; genetic algorithms (search techniques based on ideas from evolutionary biology that seek to 'evolve' a 'population' of data states based on their 'fitness'); or neural networks, among others (Adriaans and Zantinge 1996: 8; Hand, Mannila, and Smyth 2001: 266). Nonetheless, a *k*-means algorithm, first published in the 1950s, remains one of the most popular clustering tools (Jain 2010).

K-means clustering algorithms organize data around a set of data points, each known as a centroid, with the distance of data from a centroid representative of the degree of discrepancy or dissimilarity between them. Centroids are not predetermined; after a guess as to the appropriate number of clusters for the task at hand, and an initial, random positioning of centroids, centroid positions are recomputed and clusters reassembled iteratively with a view to minimizing the distance of data to centroids across all clusters (and, if agglomerative methods are also employed, between clusters). Often, multiple cluster optimization sequences will be run, using (p. 789) different, randomly selected starting points, to mitigate the likelihood of the clustering algorithm converging on ‘local’ rather than ‘global’ affinities, or making too much of outliers, and thereby missing potentially significant relationships and patterns (Hand, Mannila, and Smyth 2001: 293–326; Berkhin 2006: 15–18).

In order to sort a sock drawer using *k*-means clustering techniques, one would begin with a decision about the *k*, or the number of clusters to identify. If the aim remains sorting into matched pairs, this might be based on an estimate of the number of pairs likely to be in the drawer. Two further parameters would also require initial, subjective specification: the process by which the initial partitioning of clusters will be effected (by one or other method of randomization), and the choice of metric, or similarity measure, to determine the distance between items in the cluster (which will in turn often depend on the choice of scale used, if variables in the data have been standardized prior to clustering; see Mohamad and Usman 2013). The latter will include a decision as to what intrinsic features of the data should be considered when assessing similarity and dissimilarity, or how the data should be represented (Jain 2010: 654–656). This could be based on some probabilistic calculation of the mixture of socks, or some other initial premise concerning how socks’ ‘pairness’ might best be determined. In any event, the choice of algorithm(s)—both for initial partitioning and subsequent cluster optimization—will have a significant bearing on the way socks are sorted, as ‘[d]ifferent clustering algorithms often result in entirely different partitions even on the same data’ (Jain 2010: 658).

For those, like the author, lacking information technology and statistical expertise, governing a sock draw by *k*-means clustering will involve employment, consultancy, or delegation. Because of the likelihood that authority to make parameter-defining decisions will presumptively rest with those most familiar with data mining techniques, it is probable that the initial, parameter-defining decisions described above would be taken by the data mining specialists charged with their execution, without much by way of directive input from ‘clients’, sock-wearers, or third parties. As Bendoly observed, drawing on semi-structured interviews with ‘representatives from different facets of the data mining community’, ‘[t]he [data] analyst is ultimately charged with the responsibility of transferring as much of relevant analytical knowledge..., or... [at] least the informational rules and relationships derived by the algorithm to the decision maker’, a process that tends often to fall prey to ‘black box internalization of consulting prowess’ (Bendoly 2003: 646).

The clusters of socks that result from this data mining process might not correspond closely, if at all, to pre-existing presumptions about or perceptions of ‘pairness’. Depending on the data or data collection technologies to which it has access, an unsupervised clustering algorithm could find ‘dense’ relationships between socks based on factors non-detectable by humans or otherwise insignificant to most wearers of socks. It could, for instance, group socks into pairs based on similarity (and dissimilarity from others) in terms of their weight; their snag or pilling resistance; the elongation or air permeability of the fibres of which they are made; (p. 790) their lint content; their flammability, and so on. As Jain remarks, ‘[c]lustering algorithms tend to find clusters in the data irrespective of whether or not any clusters are [“natural[ly]”] present’ (Jain 2010: 656).

Data mining outcomes departing wildly from expectations might prompt the sock sorters in question to have recourse to semi-supervised clustering. One could, for instance, introduce one or more ‘must-link constraints’ specifying that certain socks must be assembled within the same cluster (all blue socks, or socks of similar size, for example). Alternatively, one could ‘seed’ the algorithm with some ‘correctly’ labelled data (that is, correctly paired socks), the soundness of which has been extrinsically determined. Such constraints or seeding data might be provided by a ‘domain expert’—someone who knows socks in general, or this sock drawer in particular—or derived from externally sourced information about the ontology of the data domain (that is, the ontology of socks) (Jain 2010: 660–661). These measures parallel, somewhat, the effect of exceptions, detailed directives, and review opportunities described in the narrative of ‘conventional’ regulation presented in the preceding section. Alternatively, outcomes that initially seem unsatisfactory might come to be accepted as tolerable—and actionable for legal, policy or sock-wearing purposes—under the influence of technological determinism (Bimber 1994).

Irrespective of its outcomes in any one instance, the process of ‘governing’ a sock drawer through data mining, along the lines just envisaged, exhibits some crucial differences as compared to ‘conventional’ governance described above. First, the responsiveness of data mining techniques to concerns emanating from different constituencies tends to be ‘back-ended’ or postponed to the stage of outcome evaluation (at least as far as unsupervised or semi-supervised data mining techniques are concerned). Conventional governance techniques encourage attention to, and debate around, procedure and participation from their earliest stages, because of those factors’ prominence in prevailing narratives about the legitimacy of legal and political institutions: rule of law narratives, for instance. Legitimacy concerns in the data mining context seem, in contrast, to revolve mostly around the validity and scalability of results (e.g. Berkhin 2006: 17). There seems no comparable imperative in data mining governance to ask the sorts of early stage ‘who’ or ‘in whose interest’ questions that are routinely asked in conventional governance practice, at least in democratic settings.

Second, any revisitation of early stage choices made in data mining—whether in the supervision of machine learning or otherwise—seems likely to be structured around field-specific considerations and options to a greater degree than in conventional governance practice. In the literature on *k*-means clustering, for example, ‘cross-validation’ tends to

entail one or more of the following: comparing structures generated by the same algorithm (or the same combination of algorithms) under different parameters; comparing structures generated by different algorithms from the same data; or comparing one or more of those structures with so called ‘ground truth’ data, often obtained and represented through some other combination of (p. 791) data collection and mining techniques (Jain 2010: 656–658). Consider, for example, the way the UN Global Pulse study compared the outputs of different data collection exercises, treating survey data as ‘ground truth’ data, without elaborating much on how the latter were collected or represented. Whereas conventional governance practice, since the late nineteenth century at least, has tended to encourage openness to quite robust and penetrating cross-disciplinary forays from a range of fields (exemplified by the Brandeis brief), opportunities along these lines seem far more limited in the field of data mining (on the Brandeis brief, see Doro 1958). Describing data mining as ‘interdisciplinary’, one popular data mining textbook explained as follows the discipline’s narrow sense of that term: ‘Statistics, database technology, machine learning, pattern recognition, artificial intelligence, and visualization, all play a role’ (Hand, Mannila, and Smyth 2001: 4).

Third, the influence of taste, disposition, culture, style, faith, education, class, race, gender, sexuality and experience—and the recognition of contingencies and loyalties framed in one of these modes, or otherwise—seems more submerged, or dependent on representation-by-proxy, in the data mining context than in ‘conventional’ governance settings (on the difficulty of detecting mechanized reliance on proxies for race and gender, see Chan and Bennett Moses 2014: 672). Questions of identity and allegiance do not seem as likely to surface during sock sorting by data mining as they might in a ‘conventional’ dialogue around how socks should be sorted and which ones discarded. In the face of some data mining process judging a particular sock worthless due to its loss of elasticity, it might seem difficult—excessively emotional perhaps—to recall that one’s grandmother knitted it, whereas conventional governance practice quite regularly invites human input more or less of this kind. In data mining (as in some other modes of quantitative knowledge practice), contingencies and attachments tend to be transposed onto numeric attributes, weightings and randomization mechanisms, and worked through experimentally: by tweaking parameters and running the process again, to see what eventuates.

Moreover, it is significant that neither subjects nor objects are necessary features of a data set for data mining purposes. A sock may be disaggregated and dispersed into any number of data points for purposes of relating it to another sock; no reassembly of those data points into something recognizable as a sock need ever occur for the directives yielded by that data mining to seem actionable. Similarly, it is the relationship of numbers representative of intervals in an iris image to those processed from another iris image (both deliberately anonymized) that authorizes someone to be ruled a ‘recycler’—and both discredited and disentitled accordingly—in the UNHCR programme. The data mining practice operating in both these settings need never engage a subject or object as such in order to yield an actionable predicate. As Louise Amoore has written, with respect

to the dispensability of subjects, 'the digital alter ego becomes the de facto person' (2009: 22; see also Clarke 1994).

(p. 792) In the same vein, whereas conventional governance has been accompanied by several centuries' worth of anxious reflection on 'bias' in decision making and attempts to mitigate human shortcomings in this regard, accounts of 'bias' in data mining literature seem to articulate quite poorly with this tradition. Barocas, Hood, and Ziewitz have observed that '[t]here is a history of diagnosing "bias" in computer systems', but that key questions remain: 'what is it to say that an algorithm is biased—and how would we know? What counts as "unbiased"?' (2013). Crawford has advocated approaching these questions agonistically (Crawford 2015). Yet, data mining practice and literature seem to proceed in an entirely different, decidedly non-agonistic register when considering bias. One influential data mining textbook observed, for instance: 'different clustering algorithms will be biased toward finding different types of cluster structures (or "shapes") in the data, and it is not always easy to ascertain precisely what this bias is from the description of the clustering algorithm' (Hand, Mannila, and Smyth 2001: 295). Despite this, a finding of usefulness tends to subsume and displace all other concerns: '[T]he validity of a cluster is often in the eye of the beholder... if a cluster produces an interesting scientific insight, we can judge it to be useful' and put it to work, irrespective of bias (Hand, Mannila, and Smyth 2001: 295).

Fourth, and finally, questions of authority or jurisdiction seem more difficult to tackle, or even raise, in relation to data mining governance than in conventional governance practice. The UN's mining of data lawfully obtained from telephone companies in 'a country in central Africa' in the UN Global Pulse study, and the AIDR's labelling of data mined from Twitter, do not seem to call the relevant institutions' jurisdiction into question to the same degree as if those institutions had sought involvement in conventional governance practice in the countries in question. A claim that data mining entails some assumption or redistribution of power to 'give judgment' and pronounce the law (or pronounce something having law-like effects) for others seems alien and overblown when set against standard representations of the discipline (on jurisdiction understood in these terms, see Dorsett and McVeigh 2012: 4). Data mining tends, instead, to be cast diminutively as a practice of 'self-learning': 'Data mining is, in essence, a set of techniques that allows you to access data which is hidden in your database' (Adriaans and Zantinge 1996: 127).

4. Conclusion: Data Mining as a Matter of Concern

Approaching data mining as a practice of governance reveals that its operations are not altogether unlike those of some other, more familiar practices of global governance.

(p. 793) Many conventional techniques of global law and policy are pattern creating and knowledge extracting. Think how defined terms, lists, and multi-part tests, of the sort reg-

ularly enshrined in legal instruments and policy directives, tend to create pathways for governance decision (on lists, for example, see Johns 2015).

Other techniques of governance typically expressed as institutions or entities might equally be understood as classifying, predictive or knowledge producing. States and corporations could be thought of as ordering devices: ways of drawing phenomena into and out of relation and generating maps, regularities and patterns not otherwise obvious. Yet, we tend to think of these entities as much more than that; they tend to be anthropomorphized and treated as articles of faith or agents of reason. Though created by law and policy, these institutions are commonly understood to confer, distribute and embody authority, generate and dispense value, and evoke allegiance in ways that the former—names, lists and tests—are typically not.

Some legal and policy devices start off being thought of in the first, more diminutive, technical register (as lists are conceived), then migrate to the category of value-creating, power-producing, identity-defining institutions in which the public has a stake (as corporations are conceived). For example, think of how securitization practices came to be conceived after the 2007–2008 global financial crisis; no longer are collateralized debt obligations, credit default swaps, and other financial products thought of as benign instruments of concern to only a limited, savvy group (Swan 2009; Erturk and others 2013). Some institutions travel the opposite route, becoming more technique than authoritative entity over time. Consider, for instance, the way that a national stock exchange has changed from being a location considered pivotal to national and global economies—a place where people went to work, engaged in quirky rituals, and maintained, together, a significant institutional presence and identity—to being a moniker for an array of computer and telephone networks engaged in largely automated interaction around a common set of symbols and pricing metrics (Michie 2001: 596).

This chapter argues for a reclassification of data mining akin to that which securitization has lately undergone: from the ‘merely’ technical category—the concern of a highly specialized few—to the category of governance institutions and practices of global public concern. It does so, in part, because of the material and political significance of the decisions that data mining is called upon to support and guide globally, as made clear in Part 1: decisions about how to distribute limited aid resources; about how to prioritize and target anti-poverty measures and investigations; about how to locate, evaluate, and address humanitarian need in emergencies. It does so, also, because of the way that data mining ‘decision support’ transforms experiences and possibilities of governance, as shown in Part 2. Data mining makes many governance-related tasks easier. In so doing, however, it makes some questions routinely raised in and around conventional governance practice harder to put forward, consider, or address. One need not claim privileged access to some (p. 794) underlying logic to recognize this (although privileged access may be necessary for certain modes of action on this recognition); material shifts in global governance are taking place on the surface of data mining practice all around.

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Solar Climate Engineering, Law, and Regulation

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Abstract and Keywords

Solar climate engineering—intentional modification of the planet’s reflectivity—is coming under increasing consideration as a means to counter climate change. At present, it offers the possibility of greatly reducing climate risks, but would pose physical and social risks of its own. This chapter offers an introduction to solar climate engineering, and explores its potential, risks, and legal and regulatory challenges. It also contextualizes these proposals with respect to other emerging technologies and the broader socio-political milieu. The chapter discusses the contours of existing and potential regulation, particularly at the international level. These aspects include regulatory rationales, diverse characteristics of proposed regulatory regimes, difficulties in defining the regulatory target, and the management of uncertainty through precaution. The chapter closes with suggested future research directions in the law and regulation of solar climate engineering.

Keywords: climate engineering, geoengineering, climate change, global warming, environment

1. Introduction

IN 1965, as the modern environmental movement was taking shape between the publication of *Silent Spring* (Carson 1962)—a landmark book that helped raise concern regarding environmental degradation—and the first Earth Day in 1970, an authoritative report on pollution was delivered to the office of US President Lyndon Johnson. It contained a chapter on the rising concentration of atmospheric carbon dioxide due to human activities—the first such reporting by a government agency. Although its esteemed authors concluded that this increase could be ‘deleterious from the point of view of human beings’, their proposed response did not refer to abating anthropogenic greenhouse gas (GHG) emissions. Instead,

The possibilities of deliberately bringing about countervailing climatic changes therefore need to be thoroughly explored. A change in the radiation balance in the opposite direction to that which might result from the increase of atmospheric CO₂ could be produced by raising the albedo, or reflectivity, of the earth ... Thus a

1% change in reflectivity might be brought about for about 500 million dollars a year ... Considering the extraordinary economic and human importance of climate, costs of this magnitude do not seem excessive

(Environmental Pollution Panel, President's Science Advisory Committee 1965: 127).

(p. 800) Such a suggestion might now be dismissed as a relic of mid-century, high modernist technological optimism, captured in slogans of the time such as 'Better Living through Chemistry' and proposals to dam the Grand Canyon. Indeed, the idea of changing the albedo in order to counter climate change was barely discussed for the subsequent four decades.

By 1992, the risks of climate change were recognized as great enough that a treaty—the United Nations Framework Convention on Climate Change (UNFCCC)—was globally ratified in order to facilitate emissions abatement and adaptation to a changed climate. Since then, actual abatement has been very disappointing, with the continued GHG emissions committing the planet to a likely future of dangerous climate change. Yet the proposal to modify the planet's albedo was merely dormant, not dead. After years of infrequent papers and muted conversations at scientific conferences, an atmospheric scientist who had been awarded the Nobel Prize for his work on ozone depletion reluctantly yet forcefully revived the idea, due to what he claimed was 'little reason to be optimistic' about emissions abatement (Crutzen 2006: 217).

Such 'solar climate engineering' (SCE, elsewhere often 'solar radiation management') poses challenges to law and regulation. Its research, and possibly its development, are arguably justified given the rising climate risks and insufficient GHG emissions abatement. Yet its large-scale field research and implementation would pose environmental and social risks of their own, some of which remain highly uncertain or perhaps still unknown. Furthermore, considering the risks of climate change, the divergence of states' interests, the generally protected position of scientific research, and the absence of SCE-specific law, it remains unclear how SCE could be effectively regulated.

This chapter offers an overview of some of the legal and regulatory challenges. Section 2 introduces SCE, and Section 3 places it in the context of other emerging technologies. Because the actual law and regulation of SCE is at present minimal, some attention must then be given to the embryonic politics of SCE. From there, the chapter briefly reviews some relevant existing law and regulation, with a focus on international law. The subsequent section discusses future potential regulation of SCE, including justifications for regulations as well as a review of proposals. The particular challenge of uncertainty and precautionary responses are then considered. The chapter concludes with suggestions for future research in the law and regulation of SCE.

2. Solar Climate Engineering

Climate change is perhaps the world's greatest environmental challenge and an extremely difficult problem to address. The accumulation of anthropogenic (p. 801) GHGs will increase temperatures, change precipitation patterns, cause more extreme weather, and acidify the oceans. Emissions abatement has been the leading policy response to climate risks, but there are reasons to believe that this will continue to be inadequate. For one thing, emissions abatement presents a global intergenerational collective action problem whose enactment requires each country to undertake locally costly actions in order to prevent future damage throughout the world—including in distant locations. Such steps are generally politically unpopular and the temptation to free-ride is great. Another reason is that countries greatly diverge in their interests in, and commitments to, abatement. Industrial countries are wealthy enough that their residents appear willing to pay—albeit to a limited degree—to reduce such future and distant environmental damage. In contrast, in developing countries, widespread access to reliable, affordable energy based on fossil sources remains the only known viable route to economic development with its concomitant improvements in living conditions. Understandably, residents and political leaders there insist on it. Thus, abatement measures that are affordable from the perspective of a wealthy country may pose unacceptably high opportunity costs for developing ones. Notably, the majority of current total GHG emissions, and the vast majority of future emissions, come from developing countries, further muddying the international political dynamic.

Given this bleak outlook, some scientists and others who are concerned about climate change have proposed researching intentional, large-scale interventions in earth systems in order to reduce climate change and its risks. These proposals for 'climate engineering' or 'geoengineering' often include two distinct categories: SCE, and 'carbon dioxide removal' (sometimes called 'negative emissions technologies'). There is a growing sense that these are more productively considered separately, as they present distinct benefits, capacities, risks, limitations, costs, speeds, and uncertainties (Committee on Geoengineering Climate: Technical Evaluation and Discussion of Impacts 2015a; 2015b). Therefore, suggestions for carbon dioxide removal via methods such as direct air capture, bioenergy with carbon capture and storage, and ocean fertilization are not examined in this chapter.

As noted, SCE would slightly increase the planet's reflectivity in order to counter climate change. Two methods presently appear to have the most potential and receive the most attention. First, evidence from volcanoes and air pollution indicates that small airborne particles of some substances, such as sulphur dioxide, reflect incoming sunlight and consequently cool the planet. Some scientists have proposed that aerosols of this or other substances could be injected into the stratosphere—a layer of the upper atmosphere—in order for this cooling effect to be global. In the second widely-discussed proposed method, seawater sprayed as a fine mist into the lower atmosphere would, upon the drops' evaporation, leave behind small salt particles. In turn, these would function as cloud condensation nuclei, making clouds brighter. There are other ideas for SCE (Com-

mittee on Geoengineering Climate: Technical (p. 802) Evaluation and Discussion of Impacts 2015b), and the future may bring techniques quite different from those that we presently imagine.

Several characteristics of SCE are important for the purpose of this chapter. First, it appears that some methods would work, in the sense of being able to return global average temperature and precipitation (that is, rain- and snowfall) to levels closer to preindustrial conditions. The Intergovernmental Panel on Climate Change concluded in its most recent Assessment Report that ‘Models consistently suggest that SRM would generally reduce climate differences compared to a world with elevated greenhouse gas concentrations and no SRM’ (Boucher and others 2013: 575).¹ Second, these proposals seem to be technically feasible. Third, SCE would have transboundary impacts. Stratospheric aerosol injection would be global in effect, although partial variation by latitude may be possible, whereas marine cloud brightening may have some degree of regional applicability. Fourth, SCE would be imperfect. It would reduce temperatures more near the equator, yet global warming will be most severe near the poles. Moreover, both climate change and SCE would change precipitation patterns, perhaps in unpredictable ways. In other words, in a world of elevated GHG concentrations and SCE, some regions would experience residual climatic anomalies of temperature and especially precipitation. There are other environmental risks. For example, sulphur dioxide is expected to contribute to the destruction of stratospheric ozone. The diffuse sunlight under SCE would increase plant productivity, resulting in improved agriculture and altered ecosystems. Fifth, SCE would be rapidly effective after implementation, and its direct climate effects appear to be reversible on short timescales. In contrast, the desired results of emissions abatement are delayed. Sixth, these techniques are presently believed to have very low direct financial costs of implementation, on the order of tens of billions of US dollars annually. In climate economics, where the costs of damages and emissions abatement are given in trillions of dollars, this is a nearly insignificant amount. Finally, SCE’s potential and risks remain to some degree uncertain and unknown, and the actual technologies are at very early stages of development. Some uncertainties can be reduced through modelling and experiments, but others are likely irreducible.

These characteristics lead to several opportunities and difficulties. SCE’s apparent technical feasibility and low direct financial costs imply that many actors—state and perhaps even non-state—could implement it. In contrast to emissions abatement, for several countries the economic and environmental benefits from SCE’s reduction of climate change appear to outweigh the expected implementation costs. Thus, this inverts the collective action problem and concomitant free-riders of emissions abatement into a single best effort problem with potential ‘free-drivers,’ i.e. actors who provide a public good but often in excessive quantities (Barrett 2008; Bodansky 2012; Weitzman 2015). The challenge would thus be transformed from one of getting all states to do enough of something that is costly to each of them into one of preventing them from doing too much of something inexpensive. The latter problem of (p. 803) collective restraint has an easier structure to resolve (Barrett 2007; Bodansky 2012). At the same time, it is unclear how countries would decide whether, when, and how to implement SCE, and how they would settle po-

tential disputes. This is even more difficult because they may have divergent preferences as to their ideal climate. Indeed, although scientists currently speak of using SCE to counter climate change, future political leaders may desire otherwise.

Likewise, the speed with which SCE could be effective and be reversed has both advantages and disadvantages. It could be implemented on a relatively short timescale if abatement and adaptation efforts remain insufficient, or if climate impacts are much greater than expected. Thus, its development could serve as a sort of insurance policy against climate change risks. In fact, given the delayed effects of emissions abatement, SCE is the only known means to reduce climate risks in the short term. On the other hand, if SCE were to be implemented under conditions of greatly elevated GHG concentrations and then stopped for some reason, the climate change that had theretofore been suppressed would manifest rapidly, with severe impacts.²

Finally, the relationship between SCE and other responses to climate change risks is a highly contested matter of great salience. Indeed, the belief that its consideration, research, or development would undermine the already inadequate and fragile efforts to abate emissions has been the leading concern regarding SCE. Advocates of SCE research often envision it as complementing abatement, adaptation, and carbon dioxide removal, with each approach filling different functions in a portfolio of responses to climate change. Of course, the incentives facing the decision makers of tomorrow will be different from those of today's researchers. These future politicians—with their short time horizons—might pursue SCE in socially suboptimal and normatively undesirable ways. Nevertheless, this common fear has gone mostly assumed yet inadequately examined as to whether emissions abatement would actually be reduced by considering SCE, whether this would cause net harm, and what regulation could do to prevent it (Lin 2013; Parson 2013; Reynolds 2015a).

3. Solar Climate Engineering as an Emerging Technology

The contemporary discourse of technology, law, and regulation arguably grew and matured largely in response to anxieties and perceived regulatory gaps concerning new practices in the life sciences. Chief among these practices were genetically modified organisms and new human reproductive technologies. In recent years, (p. 804) synthetic biology, nanotechnology, information technology, robotics, and applied cognitive science have been added to the array of so-called 'emerging technologies' (see Allenby 2011).

In some ways, SCE fits this set. Technological developments can outpace law's ability to adapt (Bennett Moses 2017). Expertise—often from those who themselves develop the technologies and would be regulatory targets—is often needed in order to craft effective regulation. Yet this reliance on expertise also raises the risk of actual or perceived elite technocracy, which could potentially undermine regulatory legitimacy. Development and implementation of these technologies can pose both physical and social risks that may be

of large scale, of great magnitude, and highly uncertain. These can take the form of risks to human health and safety, to the environment, to rights (see Goodwin 2017; Sartor 2017; Murphy 2017), to dignity (see Düwell 2017), to identity (see Baldwin 2017), to social structures and institutions (see Sorell and Guelke 2017), and to widely held values.

At the same time, SCE is somewhat incongruous with these ‘traditional’ emerging technologies in three key ways. Together, these differences imply that SCE may warrant a distinct approach to its regulation and law, or at the very least, should give rise to a dissimilar political landscape. First, the development of most other emerging technologies is driven by benefits that are (or are expected to be) captured by their producers and consumers, while their controversy arises from negative effects to third parties. For example, genetically modified crops may increase profits for the biotechnology companies that produce them and the farmers who use them, but they are sometimes seen as posing risks to ecosystems, consumers, and other farmers. As noted in the previous paragraph, this harm need not be physical: advanced human reproductive technologies can give prospective parents a healthy child and enable the growth of a profitable assisted reproduction industry, but morally harm those people who hold dignitarian ethics. In other words, these emerging technologies can usually be framed as what economists call a negative externality. In contrast, those who are presently researching SCE—scientists in North America and Europe—appear to have little to gain directly and personally, relative to the stakes of climate change. Obviously, career advancement, greater income, fame, and personal satisfaction are possible and presumably desired. Yet assuming that SCE will function as is currently believed, public benefits would exceed private ones by several orders of magnitude, and most benefits would accrue to those in the regions that are especially vulnerable to climate change, such as sub-Saharan African and south Asia. This gap between private and public benefits would be particularly great in the absence of extensive and enforced intellectual property claims. Indeed, open publication of results and limitations on or full rejection of SCE patents is an emerging norm of SCE research (Bipartisan Policy Center’s Task Force on Climate Remediation 2011; Leinen 2011; Solar Radiation Management Governance Initiative 2011; Mulkern 2012; Rayner and others 2013; Reynolds, Contreras, and Sarnoff (p. 805) 2017). Under these circumstances, SCE would be a more public endeavour when compared to other emerging technologies.

Second, most emerging technologies have promised or offered new, additional benefits relative to the present. For example, robots could reduce the need for humans to perform dangerous work that the latter presently perform. On the other hand, SCE is intended to reduce the as-yet unfelt negative impacts of expected future changes. It would not offer benefits relative to today, but instead only may provide a ‘less bad’ tomorrow. In fact, relative to the present, most people find it generally unappealing. Although from a rational perspective this distinction between a positive and the prevention of a negative should not be relevant, people exhibit a preference for status quo, and baselines are subsequently important.

Third, as a consequence of the latter, or perhaps both, of the above, the rhetoric of the technologies' proponents greatly differs. The drivers of 'traditional' emerging technologies, such as genetically modified crops and new human reproductive techniques, include a fair number of boosters, who exuberantly tout the wonderful benefits of their products. Meanwhile, supporters of SCE research are a rather dour lot. Some of the most prominent of them have said: 'Only fools find joy in the prospect of climate engineering' (Caldeira 2008) and 'It is a healthy sign that a common first response to geo-engineering is revulsion' (Keith, Parson, and Morgan 2010: 427).

4. Political Dynamics

Yet, as with the 'traditional' emerging technologies, there is more at play in the growing climate engineering discourse than mere benefits and risks. SCE appears to hold the potential to greatly reduce climate change's grave risks to vulnerable people and ecosystems, threats that cannot be prevented by any realistic level of emissions abatement and adaptation. Nevertheless, reactions to SCE have been very diverse, including visceral criticism by some of those who are most concerned about the environment. Here, I posit three reasons for this wide range of reactions. These three reasons are mutually consistent, and may simply be multiple ways of perceiving the same phenomenon.

The first suggested way to understand such a wide range of reactions lies at the intersection of psychology and culture. Climate change has become much more than mere environmental risks or market failure. It brings forth our underlying worldviews, reinforcing and shaping how we see ourselves, the groups to which we belong, society, and the natural world (Hulme 2009). The cultural theory of risk can provide a (p. 806) useful lens to help comprehend various worldviews (Thompson, Ellis, and Wildavsky 1990; Verweij and others 2006), organizing them on two axes (Figure 33.1). The horizontal axis concerns the value placed on solidarity of the social group. The vertical axis depicts the person's sense of constraint from social rules and ranking. Positions along these two axes, sometimes called 'group' and 'grid' respectively, define general worldviews in the four resulting quadrants. Of these, the two that highly value groups' solidarity (high group) generally emphasize the importance of socially organized action for environmental protection.³ Indeed, these 'hierarchists' and 'egalitarians' are often able to cooperate, calling for GHG emissions abatement and adaptation (Leiserowitz 2006; see also Nisbet 2014). However, these two groups' different senses of constraint from social rules lead to diverging perceptions of social relations and of nature. Consequently, their preferences of specifically how to address environmental problems differ, including starkly contrasting positions regarding SCE (Heyward and (p. 807) Rayner 2016; see also Kahan and others 2015). 'Hierarchists' (high group, high grid) consider individuals to be circumscribed by their role in society, and nature to be fairly robust if it is well managed. They will mostly be comfortable with the consideration of SCE. In contrast, 'egalitarians' (high group, low grid) see people (ideally) as members of horizontal networks of equals, and nature as

fragile. They will generally reject SCE as dangerous meddling with a vulnerable natural world and as necessitating undesirable hierarchical social structures.



Figure 33.1 The four worldviews of the cultural theory of risk (after Thompson, Ellis, and Wildavsky, 1990; Verweij and others, 2006)

The second means of understanding focuses on diverse goals of climate policy. Those political actors who call for strong and early emissions abatement and adaptation include at least three primary groups: those whose primary goal is to reduce climate change risks to people and to ecosystems, deeper green environmentalists who consider emissions abatement to have the major co-benefit (if not primary benefit) of reducing humanity's footprint upon nature, and those to whom climate policies are means to challenge the dominant economic order and to redistribute wealth.⁴ These three primary constituencies are neither exhaustive nor mutually exclusive, and motivations are often mixed or remain subconscious. Regardless, SCE may be able to reduce net climate risks, furthering the goals of the first group. In contrast, it would do nothing toward efforts to reduce intervention in the natural world and inequalities of power and wealth. In fact, given the fact that SCE threatens to divide a fragile political coalition operating in a contested setting, its consideration could undermine the efforts of the latter two groups.

The third and final proposed means to understand various reactions to SCE is historical. The contemporary environmental movement arose in the 1960s. It was a response to the recognition that we humans were failing to take into account all of our actions' impacts, particularly on the nonhuman world and on the future. This failure seemed most evident in large-scale and technological endeavours. The dominant reaction in environmentalism was a call for a less intrusive, more humble relationship with the natural world. In contrast, SCE would be more intrusive and—by most definitions—not humble. Notably, the gestational decades of the environmental movement were also a time of heightened anxiety.

eties concerning nuclear war, and the environmental and anti-nuclear movements share common roots.⁵ Contemporary environmentalism has subsequently charted a path dominated by scepticism—and sometimes outright rejection—of proposals for technological interventions into nature, especially those that would be large-scale and centralized, instead preferring decentralized and more ‘natural’ responses. This scepticism or hostility is evident in the rhetoric that condemns SCE as a ‘techno-fix’ (for example, Hulme 2014). The term is almost always left undefined, but what is implied is an indictment that SCE would be an unduly inexpensive and fast means to address merely climate change’s symptoms, not its causes, with an inappropriate bias toward the artificial and away from the natural (see Flatt 2017, especially subsection ‘Technology is Not ‘Natural’: Critiques from the Left’).⁶ On the other hand, there has always been an (p. 808) undercurrent—one that is arguably growing—within environmentalism that views new technologies as essential to reducing our net impact on nature. This complex, intertwined relationship between environmentalism and technology is reflected in the contemporary SCE discourse.

5. Existing Law and Regulation

There is presently no binding law specific to SCE. Of course, SCE is developing in the context of applicable existing law, some of which is briefly reviewed here.⁷ This interpretation is somewhat speculative, because future law specific or applicable to SCE may be implemented, because SCE will unfold in ways that are uncertain and perhaps presently unknown, and because judges, regulators, and other decision makers may interpret this body of law differently. Furthermore, existing law can appear to be contradictory when attempting to apply it to a domain for which it was not designed. Perhaps the greatest challenge in interpreting extant environmental law is that both SCE and climate change—which SCE is intended to counteract—each pose risks to humans and the environment. For example, in the international domain, SCE often satisfies the definition of ‘pollution’ or other phenomenon that the law was intended to reduce.⁸ Because SCE would have transboundary, if not global, impacts, the summary here is limited to the most pertinent international law (see Rayfuse 2017).

As a starting point, state action (and inaction) is presumed to be permitted in the absence a violation of a particular legally binding international agreement or custom, provided that the state practices due diligence if there is a risk of significant transboundary harm arising from activities within its territory or under its jurisdiction. The customary due diligence includes appropriate measures to prevent or reduce potential harm; review by competent national authorities; prior environmental impact assessment; notification of, consultation with, and cooperation with the public and the countries likely to be affected; emergency plans; and ongoing monitoring.

The international agreement that appears to be most pertinent to SCE is the UNFCCC. After all, it is the foundational climate treaty, with global participation. However, closer inspection reveals an ambiguous legal setting. Its objective is the ‘stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous an-

thropogenic interference with the climate system' (UNFCCC: Art. 2) SCE could reduce climate risks without directly affecting GHG concentrations. However, it may indirectly reduce them by, for example, increasing terrestrial plant productivity (Keller and others 2014). This might justify including (p. 809) SCE within the scope of the UNFCCC. Regardless, some commitments and hortatory statements in the agreement implicitly favour at least the consideration of SCE, perhaps through research. For example, states commit to undertake research, and to develop and transfer technologies, related to climate change (UNFCCC 1992: Arts 4.3, 4.7, 4.8, 4.9, and 11.1). Furthermore, under the recent Paris Agreement of the UNFCCC, states commit to limit global warming to low levels that likely cannot be satisfied through emissions abatement alone. SCE could contribute to staying within these limits.

A more directly applicable (but less well known) treaty is the 1976 Environmental Modification Convention (ENMOD). It prohibits the hostile use of 'environmental modification techniques ... having widespread, long-lasting or severe effects' (ENMOD 1976: Art I). Although the term 'environmental modification' was intended to address weather modification, its definition clearly includes SCE (ENMOD 1976: Art II). The agreement explicitly does not impede environmental modification for peaceful purposes; in fact, it encourages their development (ENMOD 1976: Art. III). The Convention's 77 current parties include most states with industrialized or emerging economies. However, it has no standing institutional support and its parties have met only twice, with a proposed third review conference rejected in 2013. ENMOD is thus considered dormant and poorly able to adapt to changing circumstances.

The Convention on Biological Diversity, agreed upon in 1992, is a multilateral environmental agreement whose broad scope, strong institutional support, and near-universal participation have led its parties to take interest in a wide variety of large-scale activities that pose environmental risks. In recent years, they have issued four statements on climate engineering. The most relevant one—and the only such statement from an international legal forum with such broad participation—is a nonbinding statement of caution, asking the Convention's parties to refrain from climate engineering that may affect biodiversity until there is sufficient scientific basis and consideration of its risks, or until there is 'science based, global, transparent and effective' regulation (Conference of the Parties to the Convention on Biological Diversity 2010).

If a state's actions were contrary to an international binding agreement or to customary law, then the *ex post* law of state responsibility would come into play. This calls for the cessation of the activity; assurances of non-recurrence; reparations through restitution, compensation, and satisfaction; and victims' access to legal remedies. The matter of compensation and possible liability for harm from SCE is extremely complex both because of its widely distributed effects, and because of the difficulty in attributing specific weather events and climatic trends to a particular SCE activity (see Horton, Parker, and Keith 2015; Reynolds 2015b; Saxler, Siegfried, and Proelss 2015).

From this and more extensive reviews, it is clear that even though some extant international law is applicable to SCE, these provisions either have imprecise (p. 810) obligations (customary law), are of uncertain scope (UNFCCC 1992), pertain to limited circumstances (ENMOD 1976), have only indirect applicability (CBD), or govern particular geographic domains (UNCLOS 1982). The result is a heterogeneous, fragmented patchwork of international law that contains numerous gaps and overlaps. Of course, an assessment of international law is not merely a matter of scope and applicability, but should also consider a wider array of indicators for the potential effective regulation of SCE (Armeni and Redgwell 2015).

6. Future Regulation

6.1 Regulatory Rationale

The previous section indicated that existing international law offers inadequate regulation of SCE. Before considering proposals for potential future regulation, we must first examine why SCE should be regulated in the first place, contrasting two general approaches for simplicity. More economically oriented legal scholars such as Cass Sunstein (1993) and Richard Posner (2014) point toward various market failures as justifications, many of which can be applied to the SCE setting. For example, the generation of knowledge through research and the implementation of SCE—if it might offer net benefits—would be public goods that should be encouraged. The costs of carrying out these activities would represent a collective action problem, wherein those who would benefit may fail to contribute in the absence of law.⁹ Likewise, harmful impacts from SCE field research or implementation would be negative externalities that should be reduced through regulation. Furthermore, different groups of people would have unequal ability to influence SCE decision making processes, even though they could all be affected. Policies to promote their inclusion and to minimize principal-agent problems would thus be warranted. Similarly, certain actors who could benefit from SCE policy may be tempted to influence it, a form of rent-seeking behaviour, which should be discouraged through law. Widespread beliefs regarding SCE may not align with the best evidence, and information campaigns—a form of regulation—may then be appropriate. Finally, the coordination of SCE research and implementation by public bodies would be needed in order to maximize the efficiency of expenditures, to prevent SCE activities from interfering with each other, and to reduce conflicts.

In contrast, some writers such as Roger Brownsword (2008) and Tony Prosser (2010) also include more social rationales for regulation, such as the need to protect (p. 811) rights and to maintain solidarity. Here, a rights-based approach emphasizes that certain minimal standards for all persons (and potentially other rights holders) should be satisfied, and that these standards must not be sacrificed in the name of greater net social welfare.¹⁰ In the international context, this implies that SCE regulation should strive to not violate—and perhaps even to further—fundamental human rights. A goal of maintaining social solidarity would call for SCE regulation to avoid undermining existing social re-

lations that foster cohesive communities at multiple scales. Here, matters of preventing international tensions might come to the fore.

6.2 Challenges for Regulation

It is encouraging to observe the emergence of a diverse, thoughtful discourse regarding how SCE could and should be regulated well before any field experiments and (hopefully) even longer before any implementation has taken place. Nevertheless, the ‘what’ and ‘how’ of SCE regulation remain unclear. This is an example of the Collingridge Dilemma (Bennett Moses 2017). In this, technology regulators face a double bind, in which early on they know too little of a technology and its risks to effectively craft policy, yet once the technology is more familiar, then the social and economic costs of changing policy are great.

A particular challenge lies in defining the regulatory target, in terms of what behaviours are to be regulated. This can be considered along two dimensions. The ‘vertical’ one concerns the developmental stage or the scale at which SCE should be specially regulated. Global SCE implementation would represent a *sui generis* intervention into the environment, and there is essentially unanimity that it should be subject to some sort of legitimate, international, and preferably legal decision making process. Thus, one of the five influential Oxford Principles of climate engineering is ‘governance before deployment’ (Rayner and others 2013). It remains contested, however, whether SCE research should also be subject to particular regulation. If one were to adopt a strictly economic orientation, described above, then concerns specific to SCE begin to arise primarily with large-scale field trials that would alter the albedo (or more accurately stated, radiative forcing) at a magnitude that would pose novel risk of significant harm to humans or ecosystems.¹¹ Here, one could propose a quantitative threshold of the intervention’s magnitude (Parson and Keith 2013) or a qualitative definition akin to the ‘widespread, long-lasting or severe effects’ seen in ENMOD and elsewhere. However, some commentators have called for some form of governance even before any small-scale outdoor tests with negligible environmental impact (see Parker 2014). Yet this may place potentially unneeded but burdensome requirements on physically innocuous activities. Two researchers rhetorically illustrated this by asking: ‘If I paint a (p. 812) one metre square with white paint on my dark asphalt driveway and measure the reflected sunlight, is that a field test of solar climate engineering?’ (Caldeira and Ricke 2013).

The other, ‘horizontal’ dimension of defining the regulatory target is that of distinguishing SCE from similar activities. This is especially pertinent in the research domain. Let us assume that outdoor SCE research projects should be subject to some sort of particular governance beyond what is required for other scientific projects. Most definitions of SCE proposed thus far rely on intent, which is difficult to determine and demonstrate reliably. As the regulatory requirements increase, researchers would face stronger incentives to portray their activities as something other than SCE. Yet removing intent from the definition poses a mirror image problem. That is, relying solely the physical nature of the research activity and its expected effects could impose additional regulatory burdens on too

broad of a swath of scientific activities. This is particularly worrisome because the knowledge and research relevant to SCE and climate change often overlap. For example, consider that aerosols and clouds are key lingering uncertainties in understanding climate change. A recent research project injected small particles into the lower atmosphere above the ocean and monitored their impact on clouds (Russell and others 2013). Although this was (purportedly) to improve knowledge of climate change, it has implications for SCE, particularly marine cloud brightening. This is not to imply any specific motivation among the researchers, but only to demonstrate the gradual spectrum between SCE and non-SCE research activities and the resulting difficulty in balancing regulatory precision and effectiveness.

An example in the implementation domain highlights further difficulties with ‘horizontally’ delineating SCE activities. The leading candidate material for stratospheric aerosol injection—sulphur dioxide—is presently a hazardous pollutant in the lower atmosphere, and masks a sizeable portion of climate change (Boucher and others 2013). Anti-pollution policies have been reducing sulphur emission and the resulting atmospheric concentrations. (In fact, total global sulphur emissions appear to be peaking.) Although by an ordinary meaning these anti-pollution policies are not SCE activities, they will alter the climate by changing the earth’s albedo. Somewhat akin to the above issue of researchers’ intent, here the stated goal is the reduction of lower atmospheric pollution, but climate modification is a predictable, foreseen consequence. Furthermore, the policies’ effect will be to warm the planet, raising the question as to whether SCE regulation should be limited to efforts to counter global warming, or whether it should include all deliberate climatic alterations (Somsen 2017). A principle of technological neutrality in regulation supports the latter.

A final challenge when crafting regulation for SCE is legitimacy. This is not necessarily limited to SCE per se, but instead is largely due to the extant circumstances of climate change. As described above, the reduction of climate change risks through emissions abatement presents a global collective action problem. Overcoming this (p. 813) may call for some sort of global governance, an endeavour that itself faces legitimacy challenges (Buchanan and Keohane 2006). Thus, a prospective international agency deciding whether the global climate should be intentionally altered, or a scientific panel assessing the safety of intentional climatic interventions may not fundamentally differ from an international agency setting a price on carbon to keep global warming below a certain target, or a scientific panel assessing the safety of unintentional climatic interventions.

6.3 Proposals for Regulation

Therefore, international regulation of SCE is warranted, at least at some stage in the technologies’ development, yet there presently are significant gaps. Much of the discourse concerning SCE within legal scholarship has considered potential regulatory regimes.¹² Some of their characteristics will be contrasted here, the first of which is authors’ regulatory objectives. Most explicitly or implicitly emphasize minimizing uni- or mini-lateral action contrary to the desires of the international community as well as the neg-

ative environmental impacts of SCE implementation. The former is typically achieved through an international decision-making process that would aim to be legitimate. Many regulation proposals seek to maintain some degree of alignment between policy and public opinion, often via public deliberative or participatory processes. Other common desiderata include avoiding the reduction of emissions abatement, preventing a dangerous 'slippery slope' from research to implementation, minimizing the chance of abrupt termination of SCE, and compensating victims of negative environmental impacts. Some authors suggest means to promote responsible research by facilitating and coordinating it, by encouraging international collaboration, by requiring transparency, and by calling for independent assessment of results.

These diverse regulatory objectives imply a second manner in which proposals for SCE regulation vary: most focus on implementation, whereas some look also to its research. Similarly, although most speak only of an optimal endpoint, a minority of scholars describe potential next steps towards regulation in order to chart a policy path forward. For example, some writers have produced a detailed code of conduct for climate engineering research that would begin to operationalize existing norms for climate engineering, such those seen in the Oxford Principles, in a manner consistent with international law (Humbert and Reichwein 2015).

A third variable is the 'depth' of commitment of suggested regulatory regimes. Some observers foresee states relinquishing their authority over SCE decision making to an international institution, whereas others are more modest and emphasize principles, best practices, information exchange, independent assessment, consultation, and other limited forms of cooperation. Related to this, the degree of legalization envisioned ranges from bottom-up cooperation among state and non-state (p. 814) actors to binding multilateral agreements. Finally, the proposals also differ in their projected 'breadth' of participation, from only those states with the capacity to implement SCE to all countries.

7. Uncertainty and Precaution

Managing uncertainty is a central challenge to law and regulation, and especially that for new and emerging technologies (Bennett Moses 2017). In the case of SCE, uncertainty is compounded because the technologies' justification—climate change—itself remains highly uncertain. Specifically, there are wide-ranging estimates of GHG emissions pathways (which in turn are functions of *inter alia* population, economic activity, technological developments, politics, and law), of climate change's magnitude per increase in GHG atmospheric concentrations, of damages per unit of climate change, and of societies' and ecosystems' adaptive capacities. SCE would be a set of additional uncertain factors, with its expected effects only now beginning to be systematically modelled.

A guiding principle for managing uncertainty in international environmental law, and in some specific national jurisdictions, is precaution, which arose in part as a response to new technologies' uncertain risks. In the international domain, a principle such as precaution is not legally binding or enforceable on its own, but must instead be operational-

ized in a specific context, such as a multilateral agreement. For example, the UNFCCC reflects a common formulation of precaution:

The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost

(UNFCCC 1992: Art. 3.3).

How might SCE regulation be guided by precaution? At the very least, there is sufficient diversity in both SCE scenarios and in the formulations of the precautionary principle that the relationship between them is not simple (Tedsen and Homann 2013). Philosopher Lauren Hartzell-Nichols asserts that SCE is contrary to precaution because it might pose the risk of catastrophe, and because emissions abatement and adaptation are available as alternatives (Hartzell-Nichols 2012). This, though, requires an inflexible version of the precautionary principle that rejects all measures such as SCE that pose a risk of catastrophe but may prevent a more severe catastrophe. Instead, the language of the UNFCCC provides some guidance, at least in (p. 815) the short term: responsibly researching SCE would be a measure that may mitigate the adverse effects of climate change, and 'lack of full scientific certainty should not be used as a reason for postponing such measures' (UNFCCC 1992: Art 3). This is particularly the case, given the low projected costs of SCE and the high projected costs—as well as the unlikelihood—of preventing dangerous climate change through emissions abatement (see Reynolds and Fleurke 2013).

8. Future Directions

The scholarship on the law and regulation of SCE has grown to the point where it can be characterized as a genuine body of literature. Within a few years, writers have extensively considered some aspects, such as the role of international law and potential future regulation of SCE implementation, and began to address others, such as the potential for liability for harm. Here, I suggest a handful of important issues that remain underexplored. The first of these is the capacity for existing national and European law to regulate SCE (but see Hester 2011). It is true that if SCE is implemented, then regulation would ultimately need to be international. However, national and European law are more detailed, better enforced, and more adaptable than international law, and the risk and impacts of field trials will most likely be intranational before they are transboundary. In addition, the law of subnational units, such as US states, should not be overlooked.

Second, the relationship between rights and SCE remains unclear. Above, I offered initial thoughts as to how rights might provide a regulatory rationale. This warrants exploration, particularly regarding how SCE can be understood within a human rights framework. If

climate change threatens human rights, and SCE may be able to prevent its worst impacts, then could a human right to SCE research or implementation be derived? Or conversely, is there a right to an environment that is free of manipulation by others?

Third, the possible roles of developing countries with respect to SCE must be researched and, where possible, clarified. Until now, the consideration of SCE has originated almost entirely from industrialized countries. Because these countries are responsible for the majority of historical GHG emissions, some observers implicitly or explicitly see potential SCE implementation as motivated by these powerful states' desires to avoid emissions abatement. Yet, if developing countries are at greater risk from climate change, then they may become drivers of SCE research and development. For example, Scott Barrett asserts that India is a likely candidate for implementing SCE unilaterally (Barrett 2014). A scenario in which small island (p. 816) states use threats of SCE implementation as a lever in international climate negotiations also seems feasible. What are the implications for SCE law and regulation of 'common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances' with respect to states' commitments to reduce climate change risks (UNFCCC 1992: Art 4.1)?

Fourth, in recent years, scholars of technology law and regulation have taken interest in not only the regulation of technology, but also regulation by technology. SCE could operate as such a regulating technology. In particular, its potential development and implementation could shape emissions abatement and adaptation policies and actions by, for example, providing a 'low cost backstop' to these actions or by serving as a threat, encouraging abatement and adaptation (Reynolds 2015a).

Finally, the literature on SCE has largely assumed that it would be used only to reduce climate change risks. However, there is no reason to assume that this would always be the case. States and other actors might use SCE technologies to alter the climate to suit human desires. Moreover, some proposed SCE methods may have non-climatic purposes, such as weakening hurricanes, that could improve human well-being. Future environmental law could acknowledge, anticipate, integrate, and even centre upon environmental enhancement (Somsen 2017). Such a reorientation may occur sooner than expected.

9. Conclusion

The prospect of deliberately altering the global climate in order to counter the risks of climate change recalls a classic exchange of papers beginning with Martin Krieger's 'What's Wrong with Plastic Trees?' (Krieger 1973). There, he noted that 'the demand for rare environments is a learned one', and asserted that, 'If the forgery provides us with the same kind of experience we might have had with the original, except that we know it is a forgery, then we are snobbish to demand the original' (Krieger 1973: 451, 450). Are reservations about SCE, in the face of climate risks, a sort of snobbery? This is striking, given that the vast majority of SCE critics (as well as proponents) are from countries that are not at the greatest risks from climate change.

The response by legal scholar Laurence Tribe, 'Ways not to Think about Plastic Trees', is a founding essay of contemporary environmental law, and is remembered for arguing that environmental law should incorporate non-anthropocentric values of nature (Tribe 1974). The core of his objection to substituting artificial environments for natural ones—even if this reflects people's desires—was that the new (p. 817) environments will shape the preferences of current and future generations. Ultimately, Tribe charted a moderate path, arguing that the necessary synthesis of the 'ideals of immanence with those of transcendence [should] embody a sense of reverence for whatever stands beyond human manipulation and its willed consequences, as well as a stance of criticism toward all that is given and a commitment to the conscious improvement of the world' (Tribe 1974: 1340). Among his cited shortcomings of relying solely on anthropocentric values is the probable 'fluidity' of means and ends. In the context of the article, his concern was that that artificial environments as a means to people's desired ends would subsequently reshape those ends.

More than forty years later, we may have witnessed a similar fluidity with regard to responses to climate change, albeit with the role of artificial and natural reversed. Those who are most concerned about climate change have struggled for a quarter century, usually in a defensive posture, advocating for emissions abatement as *the* means to reduce climate risks, and have found only limited—and insufficient—success. This may have caused them to experience means-ends fluidity. After all, in circumstances such as these, the means (emissions abatement) and the ends (presumably reducing climate change risks) seem to be highly congruous, if not synonymous. The prospect of SCE forces us to reconsider the actual goals of climate policy, and environmental law more generally. From my perspective, this is a welcome development.

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Notes:

- (1.) More specifically, recent modelling indicates that SCE could counter the vast majority of climate change's expected temperature and precipitation anomalies at the regional scale (Kravitz and others, 2014).
- (2.) Note that the probability of a scenario in which (i) SCE is implemented at a great intensity, (ii) it is terminated, (iii) no other actor can assume its implementation, and (iv) humanity does not have more pressing problems than climate change is uncertain, and perhaps quite low. See Reynolds, Parker and Irvine 2016.

(3.) The others are individualists (low group, low grid), who see nature as resilient, and fatalists (low group, high grid), who consider it to be ephemeral and generally do not engage in political discourses. These two worldviews are thus sceptical of or uninterested in action to reduce climate change risks.

(4.) Effective international emissions abatement and adaptation policies would result in large transfers of wealth from rich countries to poor.

(5.) *Silent Spring*, for example, was the 'Book of the Month' in the US during the Cuban missile crisis, and Carson drew on fears of nuclear war and especially radiation to bolster her case. See also Rothman 1998.

(6.) The utility of the term 'techno-fix' is even less clear than its definition (Scott 2012). Note that the term 'technological fix' arose in the era of high modernism as a positive descriptor of a technology that can address a problem that is intractable to social responses (Weinberg 1966).

(7.) For a more thorough treatment, see Bodle and others 2014.

(8.) Consider this definition of pollution (with minor variation) found in several environmental agreements, such as the UN Convention on the Law of the Sea (Art. 1.1.4) and the Convention on Long-Range Transboundary Air Pollution (Art. 1), as well as in other international legal documents: 'pollution means the introduction by man, directly or indirectly, of substances or energy into the environment resulting in deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems, and impair or interfere with amenities and other legitimate uses of the environment.'

(9.) As described above, the expected costs of SCE implementation are low enough, and the expected benefits great enough, that free riding would probably not be a problem in the international arena. Yet research and implementation costs would still need to be met. Moreover, SCE activities may present a nonpecuniary collective action problem. If SCE research (or even implementation) were unpopular among leaders' constituents but expected by experts to be potential, then decision makers might need some form of international cooperation so that they each would contribute the necessary political capital.

(10.) Without engaging in debates unsuited for this chapter, this is compatible with an economic approach through considerations of welfare distribution based upon equity weighting.

(11.) Other rationales from an economic perspective for regulation of SCE may arise at an earlier stage, such as the need to publicly fund and coordinate research. However, these are not particular to SCE.

(12.) See Barrett 2008; Victor 2008; Lin 2009; Virgoe 2009; Benedick 2011; Redgwell 2011; Abelkop and Carlson 2013; Bodansky 2013; Dilling and Hauser 2013; Hester 2013; Honegger, Sugathapala, and Michaelowa 2013; Kuokkanen and Yamineva 2013; Parson

and Ernst 2013; Scott 2013; Zürn and Schäfer 2013; Barrett 2014; Bodle and others 2014; Reynolds 2014; Reynolds 2015b; Chavez 2016; Larson 2016; Lin 2016.

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Are Human Biomedical Interventions Legitimate Regulatory Policy Instruments?

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Abstract and Keywords

This chapter examines the legitimacy of utilizing human biomedical interventions for regulatory purposes, drawing on regulatory governance scholarship, bioethical debates about human enhancement, and constitutional scholarship concerning fundamental rights. It considers whether the use of biomedical techniques to pursue regulatory and other public policy purposes is ethically equivalent to the use of traditional techniques that target the design of the social environment, including the alleged ethical ‘parity’ between social and biological interventions into the human mind. It argues when contemplating these techniques, we must consider who is seeking to utilize them, for whom, for what purpose, for whose benefit, and at what cost (and to whom). In wrestling with these questions, we must also attend to the social meanings associated with particular ends-means relationships, what is it that we value in human nature, and different understanding of ideas of human flourishing and the good life.

Keywords: human enhancement, legitimacy, regulatory governance, regulatory instruments, design, choice architecture, biomedical interventions, human rights, mind control, right to cognitive liberty

If a medicine can neutralise a danger, why not use it instead of shackles?

(Michael Shapiro)

1. Introduction

DESIGN has long been used to influence and constrain how people behave and to modify the effects of the designed object on the environment and those encountering it. Thus, streets can be designed to prevent vehicles from entering pedestrian zones through the installation of concrete bollards, and motor vehicles can be designed to enhance the safety of occupants through the use of airbags: in both cases, design can be understood as a regulatory technique. These ‘design-based’ regulatory techniques, broadly understood as the purposeful shaping of the environment and the things and beings within it in order to

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manage behaviour or risk, (p. 824) have remained a much neglected focus of regulatory scholarship, in contrast with other regulatory modalities (Yeung 2008). Design (or architecture) as a regulatory technique has not, however, escaped attention completely. 'Nudge' techniques aimed at deliberately reconfiguring the social choice context in ways that encourage behaviours deemed desirable by policymakers while nevertheless formally preserving individual choice have acquired recent prominence in policy and academic circles (Thaler and Sunstein 2008). Cyberlawyers have highlighted how the design of software code regulates behaviour in cyberspace (Lessig 1999) and criminologists have demonstrated how 'situational crime prevention techniques' which use situational stimuli to guide conduct towards lawful outcomes (preferably in ways that are unobtrusive and invisible to those whose conduct is affected) can be employed to reduce opportunities for criminal wrongdoing (Garland 2000).

Yet, by focusing almost exclusively on the design of *social choice contexts*, existing scholarship has failed to appreciate that the use of design to achieve regulatory purposes is no longer confined to products, places, and processes: it is increasingly aimed at biological organisms, including *human beings*. Recent advances in the neuro, bio, computing, and engineering sciences have significantly extended the possibilities for harnessing our understanding of human biology, or altering human biological functioning, raising the prospect of directly observing or intervening in the human mind and body to achieve regulatory purposes. Far from falling within the realm of science fiction along the lines so powerfully and disturbingly portrayed in Aldous Huxley's *Brave New World*, many of these techniques are already in use. For example, the penal policy of several jurisdictions makes provision for the 'chemical castration' of convicted sex offenders to reduce the risk to public safety which they are adjudged to pose on release from prison (Peters 1993; Harrison and Rainey 2009), some employers reportedly encourage employees who are required to engage in work involving periods of extended concentration (such as surgeons and long-haul vehicle drivers) to take cognitive enhancing drugs (Academy of Medical Sciences 2012), and American courts have ordered the forced medication of accused persons with recognized mental illness to render them competent to stand trial on criminal charges (*Sell v US* 539 US 166). Other proposed applications are more speculative, such as the use of transcranial magnetic stimulation to improve the accuracy and reliability of eyewitness testimony in court proceedings (Klaming and Vedder 2009), the use of exoskeletons to supplement the physical capacities of soldiers and others engaged in demanding physical labour such as nurses when lifting patients (Pons, Ceres, and Calderón 2008), the use of brain receptor blockers to prevent or reduce the incidence of addiction to harmful substances ranging from cocaine to tobacco and alcohol (Boire 2004–2005; Greely 2008), and the use of psychoactive substances to make the subjective experience of punishment longer and more severe in the minds of those convicted of heinous crimes (Roache 2013).¹

Yet the use of design to shape social activities and human action has a long history: both the door lock, believed to have been first designed by ancient Egyptians (p. 825) around 4,000 years ago, and the chemical castration of sexually aggressive individuals, deliberately employ design to reduce the occurrence of unwanted activities. But attempts to in-

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fluence social outcomes through the direct design of human physiological functioning may be regarded as a radical and potentially worrying development. How should we evaluate these techniques? In particular, how do biological approaches to control compare with time-honoured techniques that seek to shape human action and experience through the design of the social environment? Although intuitively we are likely to regard biological approaches as raising more acute legal, ethical, and social concerns, this intuition might not withstand critical scrutiny, particularly given that genomic science has clearly demonstrated that an individual's genetic endowment and social environment *both* have important effects on how those genetic traits are expressed (Dupras, Ravitsky, and Williams-Jones 2014) and neuroscientific research has shown how the composition and function of an individual's brain is directly shaped by the social stimulus and environment to which the individual is exposed (Dodge 2007). As our understanding of, and capacity to intervene in, the brain rapidly advances, this generates opportunities to manipulate the human mind in more precise, powerful, and pervasive ways than at any time in human history, making such interventions especially attractive to those with a stake in influencing the behaviour of others (Academy of Medical Sciences 2012). The urgency of this inquiry lies in the expanding reach of design as a regulatory technique as state and non-state actors actively seek to harness the possibilities of design as a means for achieving their goals, particularly in the absence of systematic scholarly analysis of design-based regulatory interventions to control social activities generally, or the use of techniques that utilize or alter the functioning of the human mind and/or body.

This chapter proceeds in four parts. I begin by reflecting upon whether design-based approaches to shaping social outcomes constitute 'regulatory' techniques, pointing to contestation and evolution in scholarly definitions of regulation. Second, I consider whether concerns about the legitimacy of biological approaches to regulation should be regarded as broadly similar to those raised by more traditional interventions targeted at the design of the social environment, particularly in light of the assertion that there is no ethical difference between social and biological interventions into the human mind. I argue that these although these critiques rightly highlight the importance of attending to the legitimacy of traditional means for altering human thought and behaviour, this so-called 'parity principle', is potentially misleading and therefore unhelpful. Third, I open up inquiries about the legitimacy of biological approaches to regulating human decision-making by examining multi-party situations in which one party (the 'regulator') utilizes such techniques with the aim of directly affecting the behaviour or functioning of the targeted community (the 'regulatory targets'). Much of the literature concerning human enhancement has focused largely on the ethics of utilizing biomedical techniques by individuals in pursuit of personal projects of self-creation. But more (p. 826) recent discussions have highlighted the possibility of utilizing biomedical interventions to elicit the 'moral enhancement' of individuals as a means for securing public policy goals (see for example Douglas (2008, 2013, 2014); Harris (2011, 2012); De Grazia (2013); Kahane and Savulescu (2015)). Perhaps the most striking example of this 'public policy turn' (Murphy 2015) within debates about human enhancement is the radical suggestion by Persson and Savalusecu that we must administer moral biomedical enhancements on a universal and compulsory

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basis (assuming that they are safe and effective) in order to counter the threat of catastrophic harm that might be occasioned by the act of a single morally corrupt individual armed with weapons of mass destruction (Persson and Savalusecu 2008; cf Beck 2015). One striking feature of this literature is its failure to attend to the *relational context* in which such interventions are proposed. I will argue that when such interventions are contemplated in regulatory contexts, our evaluation of their legitimacy is critically framed by how we understand the scope and limits of *relational authority*. Hence, as a starting point for evaluation, we must consider who is seeking to utilize these techniques, for whom, for what purpose, for whose benefit and at what cost (and to whom)? Accordingly, I suggest that it is helpful to distinguish between the use of such techniques by the state in seeking to pursue regulatory purposes, on the one hand, and use by non-state actors for both regulatory and self-interested purposes on the other. These ideas are developed through a brief sketch of the kinds of legitimacy concerns that are likely to arise in each context, drawing on existing critiques of social design as a regulatory strategy. Fourth, I suggest that there are common concerns that implicate our understanding of human values and social meaning that apply in both regulatory and non-regulatory contexts, briefly commenting upon the difficulties we face in wrestling with the implications of these techniques for human flourishing. Finally, I draw some tentative conclusions, emphasizing that my reflections on these issues are formative and require development and revision. Hence although I attempt here to sketch the beginnings of a framework for analysis, I open up more questions than offer definitive answers, in the hope of attracting and provoking much more extensive interdisciplinary debate and reflection from scholars of regulatory governance studies, bioethics, and beyond.

2. Design as a Regulatory Technique?

To identify whether design-based approaches to shaping social activity and human action constitute ‘regulatory’ techniques we need to define what we mean by ‘regulation’. Although the study of regulation has a long history in North American legal and political scholarship, it was the rise of the so-called ‘regulatory state’ following (p. 827) the collapse of the post-war welfare state consensus that spawned academic interest in other western industrialized economies, particularly following the privatization of utilities and their subsequent regulation by independent regulatory agencies (Majone 1994; Moran 2002). Within this literature, the concept of regulation has attracted considerable contestation by scholars of regulation studies (or ‘regulatory governance’ studies) yet its meaning remains unsettled. Earlier writings drew heavily on Philip Selznick’s work, who identified the ‘central meaning’ of regulation as the ‘sustained and focused control by a public agency over activities that are valued by the community’ (Selznick 1985; Ogus 1994). Yet the notion of regulation as a purposeful activity undertaken by an agency of the *state* was singled out for attack by scholars, who emphasized that non-state actors engaged in a significant amount of activity aimed at intentionally controlling and ordering social activity in ways that could be understood as promoting the public interest, often in unexpected places (Baldwin, Cave, and Lodge 2010). Hence the definition proposed by Julia Black in her seminal work on ‘decentring’ approaches to regulation in 2001 has become a widely

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cited reference point in scholarly analysis in which she defines regulation as the ‘a process involving the sustained and focused attempt to alter the behaviour of others according to defined standards or purposes with the intention of producing a broadly defined outcome or outcomes’ (2001: 142).

Black’s 2001 definition has several strengths: it includes the purposive activities of non-state actors, it avoids a definition that is so extraordinarily broad that it essentially encompasses the whole of social science yet is sufficiently broad to facilitate analysis of normative concerns about regulation and its legitimacy. Although her definition substantially broadens that offered by Selznick 16 years earlier to include actions by non-state actors, Black narrows Selznick’s definition in one important, but little noticed, respect by defining regulation in terms of attempts to control the *behaviour of others*.² Unlike Selznick’s definition, which focuses on the subject of regulatory action (i.e. ‘activities that are valued by the community’), Black’s definition focuses on the regulator’s purpose in seeking to exert control (i.e. ‘to change the behaviour of others’). Many design-based techniques of social control will satisfy Black’s definition, such as the chemical castration of sexually aggressive individuals and the installation of speed humps to prompt drivers to reduce their speed, because they are intended to provoke a change in individual behaviour in order to secure social outcomes deemed desirable. But Black’s definition excludes techniques that operate by seeking to mitigate the harm associated with particular activities rather than with seeking to provoke a change in user behaviour, such as the installation of airbags in motor vehicles to reduce the impact of a collision on vehicle occupants, the installation of shatter-proof glass in buildings that might be vulnerable to intentional or accidental damage or the fluoridation of community water supplies to reduce the incidence and severity of dental caries. If we bear in mind that regulation is, at its core, a form of systematic control over a sphere of social action and activity, these harm-mitigation techniques are, in my view, properly regarded (p. 828) as regulatory interventions. However, Black has more recently revised her definition of regulation (or regulatory governance) as ‘the organised attempt to manage risk or behaviour in order to achieve a publicly stated objective or set of objectives’ (2014: 2). The focus of this definition on either managing behaviour or risk retains the benefits identified by Black in support of her 2001 definition, but—by extending the analytical purview to encompass both behaviour management and risk management, it thereby allows harm-mitigation strategies of control to be understood as regulatory techniques and brought directly within the regulatory governance scholar’s analytical purview. Yet the reference to ‘publicly stated objectives or set of objectives’ in Black’s 2014 definition requires further interrogation: a task I undertake in section 4.³

3. Are Social and Biological Approaches to Regulatory Design Ethically Equivalent?

By arguing that design-based approaches aimed at managing behaviour or risks may properly be regarded as regulatory techniques, I am not implying that design-based ap-

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proaches that are intended to work by operating directly on human physiological functioning are ontologically, legally, or ethically equivalent to design-based techniques that involve reshaping the social environment. Although contestation about the relative contributions of ‘nature and nurture’ in shaping human traits is unlikely to be conclusively resolved, we have—until relatively recently—been largely limited to manipulating the social environment in seeking to influence human traits and behaviour. But advances in the bio and neurosciences create new possibilities for intervening directly into human physiology in highly targeted ways, which helps to account for the recent resurgence of interest in the use of biological approaches to public policy.

3.1 The Parity Thesis

In some respects, the use of biological approaches to shape social outcomes is far from new, at least in so far as biological interventions are well established in modern public health practice as a tool for promoting population health, such as mass vaccination programmes, food fortification, and water fluoridation schemes.⁴ Yet (p. 829) these programmes have often attracted considerable controversy, and we can therefore anticipate that proposals to utilize biological techniques to pursue non-health-related ends will be similarly controversial. Unlike design-based approaches that target the social environment (including, but not limited to nudge strategies), design-based approaches that seek directly to harness or affect human biological function appear to raise much more acute legal, ethical, and social concerns. Yet philosopher Neil Levy asserts that changing one’s mind directly through the use of psychopharmacological means should be regarded as ethically equivalent to more traditional means to change one’s mind (such as traditional talking therapies) (2007a). Legal scholar Hank Greely not only supports this so-called ‘parity principle’ (assuming that the biological technique is proved safe and effective), but seeks to extend its application to the means used by the state to exert control over its subjects, at least where those subjects are convicted criminals serving time in state penal institutions (Greely 2008). What are we to make of this so-called ‘parity principle’ and in what circumstances, if any, does it apply? In order to interrogate the foundations of this proposed principle, it is helpful to bear in mind what Levy describes as two basic ways to go about changing someone’s mind: the traditional way, involving the presentation of evidence and arguments, and through direct manipulation of the brain (2007a: 70–71). These two techniques differ in a highly significant way: whereas the presentation of evidence and argument manipulates the brain via rational capacities of the mind, direct manipulation bypasses the agent’s rational capacities altogether by working directly on the neurons or on the larger structures of the brain. Despite this, Levy argues that, leaving aside understandable safety concerns associated with the use of new direct brain manipulation technologies (such as brain–machine interfaces and psychopharmacological techniques), the widely held intuition that direct means of changing minds are always ethically dubious, reflecting a widespread presumption in favour of traditional techniques of changing minds, does not withstand critical scrutiny.⁵

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Academic reflection about proposed interventions into human physiological functioning to pursue non-therapeutic goals arises within a broadly defined debate concerning the morality of individuals employing new technological means to alter their own mental and physical capacities (for example Harris 2007; Sandel 2007; Buchanan 2011). Much of this 'human enhancement' literature (which has been largely colonized by bioethicists relative to scholars from other disciplinary perspectives) tends to focus on the proposed application of the technology in question by individuals largely abstracted from their social and political context and relationships, even when these technologies are advocated as a means for securing the achievement of public policy goals (for example Douglas (2008, 2013, 2014); De Grazia (2013); Harris (2011, 2012) Persson and Savulescu (2008); Kahane and Savulescu (2015) cf De Melo-Martin and Salles (2015); Murphy (2015)). Not only is this technique of abstraction from context utilized in support of the parity principle, but it also enables technophiles to invoke what I call the 'argument from (p. 830) analogy' (see Chapter 25 in this volume). This form of argument is often employed in debates about the legitimacy of new technologies to support the alleged ethical equivalence of social and biological interventions aimed at achieving a designated end. An example of this argument is reflected in Greely's discussion of existing and proposed pharmacological 'treatment' of criminal offenders, stating that:

We should not view the fact that these interventions operate directly on the subject's brain as necessarily disqualifying them...Many of the actions of the criminal justice system takes act through physical changes in criminals' brains. Hence I see no qualitative difference between acting directly to change a criminal's brain—through drugs, surgery, DBS (deep brain stimulation) or vaccines—if proven safe and effective—and indirectly—through punishment, rehabilitation, cognitive therapy, parole conditions—to achieve similar ends. It is true that we understand better the likely effects of traditional methods of trying to change criminals' behaviour, including their strong likelihood of failure ... if an intervention is proven safe and effective, direct and indirect interventions seem to me not importantly different.

(2008)

Underlying Greely's assertion is an assumption that the state's authority to incarcerate convicted criminals as a form of punishment not only provides an adequate basis for subjecting them to various forms of psychopharmacological 'treatment', but also that compulsory treatment of this kind properly falls within proper authority of a liberal democratic state in the establishment and maintenance of its criminal justice system. Yet these are bold assumptions which demand critical and exacting scrutiny: the mere assertion of equivalence is insufficient. Once we move beyond the realm of individual self-administration to regulatory contexts in which one party ('the regulator') seeks intentionally to achieve the regulator's designated ends through action which directly affects the rights, interests, or legitimate expectations of others, this immediately provokes questions concerning whether such actions fall within the proper scope of the regulator's authority in relation to those affected.⁶ In other words, in regulatory contexts our central concern is not with individual authenticity, but with the exercise of *authority* within the context of a

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particular set of social and political relations and institutions. Accordingly, in order to evaluate the legitimacy of such techniques in regulatory contexts, we must consider:

- who is seeking to employ the technique?;
- in relation to whom;
- for what purpose;
- for whose benefit;
- at what cost; and
- how are those costs and benefits distributed?

It is therefore helpful to distinguish three different contexts in which design-based techniques to secure desired social outcomes might be employed:

(p. 831)

- (a) self-administration by *individuals* to pursue personal projects of self-creation;
- (b) use by the *state* in pursuit of regulatory purposes; and
- (c) use by *non-state* actors for the pursuit of regulatory or other purposes.

Each of these contexts is discussed in turn, with the aim of sketching the kinds of legitimacy concerns that might arise from the use of design-based techniques of control.

3.2 Self-administration: The Ethics of Individual Enhancement

Unlike Greely, Levy's formulation of the parity principle does not expressly assert that it applies to circumstances in which the state seeks to utilize biomedical interventions to alter the minds and bodies of its citizens. Levy's arguments in favour of an ethical parity principle draw upon issues that are often raised within the broader literature concerning human enhancement referred to above, notably concerns about individual authenticity, self-knowledge and personal growth, and the mechanization of self. For present purposes, I will not engage at length with debates about the moral legitimacy of individual biomedical self-enhancement. Rather, I wish to interrogate two lines of argument employed by scholars in bioethical debates about human enhancement that *might* be applied to regulatory contexts and beyond and which deserve much more critical attention: first, the use of analogical reasoning in evaluating the ethical dimensions of new as opposed to traditional means of intervening in the human mind and secondly, the argument that the penetration of skin-skull barrier is not ethically significant (which I discuss at section 4.1.2).

According to the argument from analogy, new technologies should be regarded as morally and ethically neutral: they simply provide us with new ways of achieving old ends (Hood 1983). Hence, just as an axe can serve both as a murder weapon or to help save a child from a burning building, so too are new technologies often used in the service of multiple ends, both good and evil alike. Our evaluation of the legitimacy of such technologies should, so the argument runs, be made by reference to the *purpose* for which they employed, rather than by reference to the means through which we seek to achieve that pur-

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pose. Such arguments are often found in the bioethical literature concerned with individual enhancement. For example, those in favour of human enhancement often argue that parents have always sought ways to provide educational advantages for their children, and the capacity to do so through newly developed technological means such as the administration of psychopharmacological substances should be regarded as no different (and hence no more ethically questionable) from traditional techniques used to advance children's (p. 832) educational performance, such as the improvement of staff-student ratios, or the provision of extracurricular activities and private individual tuition.

As seductive as this argument appears, it rests on an artificial and arbitrarily narrow formulation of social purposes, fatally undermining its analytical power. As Ibo Van der Poel has persuasively argued, technological artefacts do not simply fulfil their function, but also produce all kinds of valuable and harmful side effects beyond the goals for which they have been designed or for which they are used. As a result, values enter into our evaluation of these technologies, such as values concerning safety, sustainability, human health, welfare, human freedom or autonomy, user-friendliness, and privacy—all of which are valuable for moral reasons, often because they enable or contribute to people's ability to live a good life. He observes that, given a certain user end, there are usually alternative ways to achieve that function. Although these alternatives usually differ with respect to how efficiently and effectively they meet the formulated end or function, they also typically differ with respect to side effects, and hence with respect to the values from which we can evaluate these side effects (Van de Poel 2009). Hence in evaluating different techniques aimed at enhancing children's educational performance (whether psychopharmacological or otherwise), we cannot ignore their side effects.

Yet in debates about the ethics of individual enhancement technologies, the unavoidable technological 'imperfection' arising from the empirical inevitability of side effects and the (dis)value they create, is often overlooked. At the same time, this is often combined with a tendency to formulate the relevant 'ends' or functions of a particular technological intervention as narrowly as possible. But the more narrowly a particular technological application's function is formulated, the more readily the new technology can be understood as a direct (and by analogy, unproblematic) substitute for more traditional means. This point is made powerfully by theologian and ethicist Ronald Cole-Turner in contrasting antidepressant drugs and prayer as alternative means for achieving the 'same' end:

If we define what we mean by 'alteration' narrowly as a specific, measurable end, it may be possible to achieve the same end through technology as through traditional means. But if we agree to such a narrow definition, then we have already made an important decision about the relationship between a specific end to be achieved and the full range of effects that result from use of one means as opposed to another. The decision to focus on a narrow definition of an end is consistent with a broad tendency in moral thought towards that which is specific, measurable, abstracted from its full context and meaning, and therefore 'thin'. This

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tendency of thought contains a built-in prejudice for technology—for by defining the ends narrowly, it allows us to think that technology achieves them.

The alternative to such ‘thin’ descriptions is recognition of the essential ‘thickness’ of human experience, even when it is described strictly at the genetic or neurological level. For example, although the pill and prayer might make us feel the same way, or bring about the same level of serotonin or other key neurotransmitters to the same parameters, we can criticise this claim at the psychological level—prayer and the pill do not really make us feel the same way, for even if the effects are experienced as the same *in some respects* (e.g. relaxation, confidence, self-assurance) in other respects (an awareness of the obligations imposed by God, for example) they are hardly the same. We can also criticise this claim at the molecular and cellular level—prayer and the pill do not really achieve the same neurological effects, for even if the serotonin levels look the same, prayer is a robust mental activity with countless other neurological correlates, all occurring in a markedly different sequence of neural events, from the effects of a pill. By persisting in the tendency to choose a narrow or ‘thin’ account of change, and point to how the two means attain the same end, we prejudice the matter in favour of technology in particular, and substitute means in general. Any means, any human activity, has a rich array of effects, some of which we are aware, some of which we are not, some of which are intended and some of which may be regretted. When we consider the full array of effects, we see that significantly different means can (and often do) have significantly different effects.

(157–158)

Seen in this light, the broadly defined parity principle advocated by Greely, asserting the ethical equivalence of social and biological interventions when used by the state to affect the minds of others, becomes untenable. But might the parity principle be of value in guiding individuals in making choices about biological or social-design-based interventions aimed at changing one’s own mind? Levy constructs his proposed ethical principle by considering the position of an individual suffering from moderate depression, who has the option of taking antidepressants to lift her mood, or to pursue more traditional non-biological techniques that are likely to have a positive effect on her mental state, such as talking therapies or a programme of regular exercise (Levy 2007b). Levy concedes that although talking therapies may foster self-knowledge in ways that antidepressants do not and that self-knowledge is a great good, individuals may nonetheless accord priority to other values, particularly given the time and costs associated with traditional means such as psychotherapy. In so doing, Levy acknowledges that biological and traditional means for changing our minds produce different side effects, to which an individual may attach value (or disvalue) and thereby acknowledges that the ethical dimensions of the two forms of intervention are *not* equivalent. Choices about means must be made, even in the context of individual self-administration, by reference to the individual’s own personal hierarchy of values. Levy therefore fights shy of arguing for a universal parity principle applicable to the use of social and biological techniques in both self-regarding and regulato-

ry contexts in favour of a more modest, limited argument: that the widespread *presumption* in favour of traditional techniques for changing our minds does not withstand critical scrutiny. In other words, he argues that in pursuing mental health and the creation of self, we need to assess each intervention, whether direct or indirect, in context and evaluate the details of their application before we accept or reject them (Levy 2007a: 131). On this more subtle account, the parity principle amounts to a claim that our self-regarding decisions ought not to be made on the basis of unexamined prejudice against technological forms of intervention. While there is little basis for questioning the validity of this claim, invoking the language of ethical parity seems (p. 834) to offer little by way of individual guidance or assistance and is more likely to confuse rather than clarify and therefore in my view best avoided.

4. Evaluating the Legitimacy of Design-Based Regulatory Techniques

Once our focus shifts away from self-directed use of design-based interventions by individuals to their targeting of others in regulatory contexts, further clarification of what we mean by regulation is required, drawing upon my earlier discussion.⁷ If we think about the kinds of activities, institutions, and concerns that have occupied scholars of regulatory governance, Black's 2001 definition of regulation as 'the sustained and focused attempt to alter the behaviour of others according to defined standards or purposes with the intention of producing a broadly defined outcome or outcomes' seems unduly wide. Applied literally, it would encompass a plethora of activities and relationships that would not typically be regarded as regulatory either by regulatory governance scholars or in ordinary usage, such as attempts by parents to encourage their children to eat more fruit and vegetables, or the marketing techniques of commercial firms to boost sales. While both these examples entail the use of power by one party to influence the behaviour of others, thus provoking concerns about the use and abuse of power and have been the focus of considerable academic examination, they are not issues which many regulatory scholars would regard as typically falling within the scope of their inquiry or expertise. Black's most recent definition of regulation describes the aims of regulation in terms of seeking to achieve a 'publicly stated objective or set of objectives' (2014: 2) yet it is unclear why the *public* articulation of a set of objectives transforms an organized attempt to exert influence over a particular set of social activities into a *regulatory* objective, particularly given how easy it is for individuals to publicize their activities, aims, and ambitions on publicly accessible websites. Rather, the reformulated definition adopted by Black in 2008 provides a more fruitful approach, in which she defines the aim of regulation in terms of seeking 'to address a *collective issue or resolve a collective problem* or attain an identified end or ends, usually through a combination of rules or norms and some means for their implementation and enforcement, which can be legal or non-legal' (2008a: 139). If we restrict our understanding of regulation to organized attempts to manage behaviour or risks order to address a collective issue or problem, this more accurately captures the kinds of concerns that (p. 835) are typically thought to arise in debates about regulatory

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accountability and legitimacy.⁸ Given that interventions aimed at addressing collective issues affect many individuals and groups within society, establishing their legitimacy is a matter of considerable importance. Because regulatory decisions affect multiple groups and persons, rather than isolated individuals, academic reflection has often sought to locate the basis for regulatory legitimacy in democratic procedures or in the possession of expertise by the regulator because their legitimacy cannot in practice be grounded in the direct and explicit informed consent of each affected individual. Accordingly, the source of legitimacy (assuming that the decisions in question are legitimate) must be located elsewhere, typically in the institutional processes and practices through which regulatory decision-making occurs. The following discussion understands regulation (or regulatory governance) as organized attempts to manage risks or behaviour to address a collective problem or concern.

4.1 Regulation by the State over Its Subjects: Effective Outcomes, Democratic Principles, and Constitutional Values

One core insight emerging from regulatory scholarship lies in emphasizing the inescapable political dimensions of regulatory decisions, arising from their differential impact on the lives of citizens and groups, despite the portrayal by regulators of their decisions as neutral exercises of professional judgement. It is therefore important, at least within liberal democratic societies, that regulators and their decisions are accountable and legitimate. For state regulators, there is a set of normative (and to an extent cognitive) legitimacy criteria which is generally accepted, although expressed differently between different writers and which vary with constitutional traditions (Black 2008a: 145–146). In addition to the effectiveness of any given intervention, these criteria broadly coalesce around principles of democracy, constitutional validity (including correspondence with values typically associated with due process and the rule of law), and morality and justice (Morgan and Yeung 2007: ch 6). The legitimacy of design-based regulation will be explored in the following discussion, focusing on their use by the state for regulatory purposes and also briefly sketching the kinds of concerns that might arise when employed by non-state actors for both regulatory and self-interested ends.

As regulation is a purposive activity aimed at managing risks or behaviour to address a collective concern, the legitimacy of regulatory techniques should be assessed primarily by reference to their effectiveness and efficiency (Yeung 2004). Although design-based techniques, whether social or biological, often score highly in terms of performance, their effectiveness and efficiency cannot be assumed. (p. 836) On the contrary, various critics have observed that design-based techniques aimed at reducing or eliminating unwanted behaviour in specific contexts are often ineffective, either due to poor design, because individuals engage in avoidance and circumvention strategies, or because design ‘displaces’ rather than eliminates the unwanted activity. The success of digital hackers in devising techniques to overcome digital devices intended to lock access to digital media content is a prime example, but more mundane workarounds are equally ubiquitous. So for example, during in a short-lived episode of mandatory seat-belt ignition locking systems installed in motor vehicles the US in the early 1970s, it is reported that vehicle oc-

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cupants who wished to avoid wearing seatbelts would either identify which wires to cut and disable the system or simply lock the seatbelt and then sit on top of it, rather than wearing the seatbelt as a safety restraint (Stern 2014). Worse still, some critics of situational crime prevention techniques claim that such approaches can generate perverse effects, provoking an overall increase in crime as individuals become more inclined to engage in criminal activity wherever they encounter social contexts where the design-based constraints are absent (Morozov 2013: 194). Critics also point out that design may be an exceptionally blunt instrument, particularly where it eliminates human discretion, unintentionally discouraging benign or even socially desirable activity in the course of seeking to reduce the incidence of unwanted behaviour: thus, single use medical devices may reduce the risks of infection associated with reuse, but this outcome may be achieved in an environmentally unsustainable and excessively costly manner, particularly if medical devices can be rendered safe and hygienic through proper sterilization techniques (Yeung and Dixon-Woods 2010).

4.1.1 Design-based approaches to shaping social environments

Scholars from a range of disciplinary backgrounds also highlight concerns about the democratic and constitutional legitimacy of design-based regulatory techniques that operate through reshaping the social environment. For example, in their analysis of the use of software code to restrict, channel, and otherwise control the behaviour of Internet users, cyberscholars claim that when employed by the state, code-based regulation undermines several constitutional principles: its operation may be opaque and difficult (if not impossible) to detect, thereby seriously undermining the transparency of regulatory policy (Lessig 1999). The resulting lack of transparency diminishes the accountability of those responsible for installing and operating code-based controls, as is the extent to which affected individuals may participate in the setting of such controls before they are installed, or to challenge or appeal against such policies after they have been imposed (Citron 2008). As a result, both authoritarian and libertarian governments alike can enforce their wills easily and often without the knowledge, consent, or cooperation of those they govern. Moreover, 'digital pre-emption' strategies, which employ software code to force (p. 837) a particular set of user actions (such as password protected entry to web content) to prevent or pre-empt unwanted behaviour, may eliminate valuable avenues of legal change such as civil disobedience and conscientious objection which depend on law-breaking and traditional law enforcement mechanisms that have historically been an important site of political protest against unjust state laws and policies (Rosenthal 2011).

'Nudge' and other like techniques through which policymakers can seek to encourage individuals to engage in behaviours which are deemed desirable through the deliberate design of social 'choice architecture' have provoked similar objections. One of the most serious objections to these techniques, which seek to harness the findings of experimental psychology which demonstrate that individuals systematically make subrational (and hence suboptimal) decisions owing to pervasive reliance on 'cognitive heuristics' when making decisions, lies in the unobtrusive character of many nudges which work best when they are not consciously perceived by those whose behaviour the nudger seeks to

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change. The resulting lack of transparency diminishes the accountability of those responsible for the use of these techniques, limiting the practical likelihood that citizens will recognize them and take action to challenge their validity, thereby generating considerable scope for abuse (Bovens 2008; Yeung 2012). These concerns about the lack of ex post accountability associated with social design-based techniques link directly to concerns about the lack of democratic participation associated with their installation. As Morozov puts it, in a truly democratic society, choice architecture employed by the state should first be subject to public scrutiny and debate (Morozov 2013: 199)—a feature strikingly absent from the previous UK's administration's enthusiastic encouragement of nudge strategies across all policy sectors (Burgess 2012). While concerns about the lack of transparency and public participation might, in principle, be overcome through institutional mechanisms, other objections to nudge strategies are not so easily overcome. For example, specific nudge strategies might not only entail a violation of fundamental rights (such as a reversal of the presumption of innocence) but could also be regarded as expressing and reinforcing particular perceptions of the good life in ways that are directly contrary to the liberal commitment to state neutrality towards competing but equally valid conceptions of the good (Raz 1986; Waldron 1987). While it is arguable that there is no 'neutral' form of architecture (cf White 2010), including choice architecture, perhaps some forms of architecture might be regarded as more or less neutral relative to others (Winner 1980; Burgess 2012).

4.1.2 Biological design as a regulatory instrument

How are concerns about effectiveness, constitutional values and democratic principles implicated when design-based regulation is targeted directly at human physiological functioning? Although I can only scratch the surface of these questions here, (p. 838) I will suggest that they raise similar legitimacy concerns but in a much more acute fashion while also raising new legitimacy concerns (particularly in relation to efficacy and effectiveness) which we are ill-prepared to grapple with.

Turning first to questions of effectiveness and efficacy, we immediately encounter serious concerns, particularly when targeted at the human mind and body, not only about whether such biologically targeted interventions will generate their desired effects but also about the potentially serious adverse side effects on human health. As pharmaceutical companies are acutely aware, proving the efficacy and safety of pharmacological substances is time-consuming, expensive, and fraught with practical difficulties (Goldacre 2012). But because contemporary legal and regulatory frameworks were established primarily to ensure that substances and devices intended for medical and therapeutic use are subject to appropriate safeguards, these might not provide adequate safeguards when utilized for non-therapeutic purposes.⁹ For example, Hank Greely points out that because medroxyprogesterone acetate (MDA), a synthetic progesterone marketed under the trade name 'Depo-Provera', when administered to a man lowers his testosterone level resulting in difficulty having erections or ejaculations and (apparently more importantly for crime control) a sharp decline in sexual thoughts and impulses, it is used by several American states to chemically castrate selected convicted sex offenders. Yet MDA has on-

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ly been approved by the Food and Drug Administration (the FDA) as a method of birth control for women, and at doses which are 8 to 40 times lower than the dosage currently used for the purposes of chemical castration (Greely 2008). Not only is such 'off-label' sale and use of the drug legally permissible (provided that a physician is willing to prescribe the drug), but there are also significant incentives to avoid undertaking *research* on human subjects into the drug's use for non-therapeutic purposes because this would attract intensive regulatory scrutiny by the FDA. Somewhat perversely, the off-label use of MDA for non-therapeutic purposes (including chemical castration) is not subject to regulatory supervision by the FDA. The current situation is therefore deeply troubling, allowing chemical castration by state penal institutions to take place even though it is known that, even at lower doses for women, the use of MDA has been linked to bone demineralization so that a 'black box' warning was added to the Depo-Provera label in 2004 indicating that the drug should not be used for more than two years unless the patient had no alternatives. Whether it has this effect on men (at any dose) remains unknown (Greely 2008).

Human biological approaches to design-based regulatory techniques also implicate constitutional and democratic concerns that arise in relation to traditional design-based techniques, although the extent to which particular values are threatened by such techniques will depend very much on the particular application in question. For example, effective chemical castration currently relies upon ongoing, regulator administration of MDA so that it would be difficult to administer without the subject's explicit awareness of its use. However, in future, nano-sized drug (p. 839) delivery systems might be developed that could be unobtrusively inserted into the body of an individual that deliver specified drug dosages at predetermined intervals. In such cases, the transparency of the intervention might be considerably weakened and it might be possible to occur without the recipient's conscious awareness of the intervention.

Yet constitutional concerns arising from the use of human biological approaches to public policy seem considerably more worrying than their socially directed counterparts for at least two reasons. First, it is plausible that values of certainty and predictability, which are typically regarded as central elements of the rule of law (Fuller 1964; Raz 1977), may be placed under greater strain. Even Levy accepts that, when it comes to matters of social policy, we should prefer policies which shape our social environments over pharmacological or technological modifications of our on-board capacities (affective, moral, or narrowly cognitive) to achieve the same end because biomedical enhancements of function regularly cause decrements in other function (for example, memory enhancement in mice via genetic modification also results in much higher sensitivity to pain) (Levy 2012).

Second, human biological interventions invariably implicate fundamental rights. In section 4.1.1, I noted that Neil Levy's suggestion that the skin-skull barrier should not be regarded as significant in ethical evaluation of different means for changing one's mind. This proposition is a corollary of his belief that the human mind is not confined to activity taking place within the brain, but includes the external scaffolding and cognitive resources that we employ for the purposes of mental processing (referred to in the neu-

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roethical literature as the 'extended mind thesis' but which need not be unpacked further for the limited purposes of this chapter).¹⁰ Note that Levy is *not* seeking to argue that direct interventions into the mind are not ethically problematic—but rather, that they are not *especially* problematic relative to other more traditional forms of intervention that utilize indirect means to change people's mind through changes to the social environment. My current (fairly undeveloped) view is that we need to take seriously the claim that the skin-skull barrier may not be, in and of itself, a critical ethical boundary (Anderson 2008; Buller 2013). At one level, this is an extraordinary claim, in light of the significance of bodily integrity in shaping the content and contours of legal rights and duties and which is accorded legal protection in many human rights instruments such as Article 8(1) of the European Convention on Human Rights (ECHR) which confers a right to respect for private and family life and has been judicially interpreted to encompass a person's physical and psychological integrity so that the state can only justifiably interfere in very limited, carefully specified circumstances (per Art 8(2) ECHR). Instinctively, the constitutional concerns arising from the use of human biological approaches to public policy seem significantly more acute than those associated with more traditional design-based approaches directed at the social environment. Direct interventions in the minds of others immediately raise the disturbing spectre of mind control, vividly portrayed in the routine consumption of 'soma' in Huxley's (p. 840) *Brave New World*. As Justice Marshall stated in *Stanley v Georgia*, 'Our whole constitutional heritage rebels at the thought of giving government the power to control men's minds'.¹¹ Yet articulating these objections in more precise, rights-based terms has proved surprisingly difficult, at least judging from the relatively sparse legal and constitutional literature that I have identified to date which currently seeks to wrestle with these issues in relation to particular kinds of intervention in specific contexts including chemical castration (Greely 2008; Harrison and Rainey 2009), the forced medication of mentally incompetent individuals to render them fit for trial (Deaton 2006; Likavec 2006), the use of truth serum as an interrogation technique (Keller 2005), the use of lie-detection technologies in court proceedings (Fox 2011) and psychotropic memory dampening (Kolber 2006). Legal scholars have identified a range of possible rights that may be jeopardized by the use of such techniques for specific, non-therapeutic purposes, including the right to freedom of speech, the right to privacy, the right to freedom from inhuman and degrading treatment, the right to bodily integrity, the right to silence, the right to privilege against self-incrimination and the right to freedom of thought. Yet the arguments made in support of such rights are often somewhat strained and largely speculative.¹²

These difficulties in articulating precisely how biomedical interventions for non-therapeutic purposes implicate fundamental rights stem from the *genuine novelty* associated with the current and potential uses of human biological techniques of control. As Michael Shapiro has perceptively argued, life processes as we know them are going to be increasingly carved up and reorganized into other forms involving physiological functions, including those bearing on thought, behaviour, physical structure and appearance in ways that may be viewed as falling far outside the material abstractions we currently use as tools of thinking and feeling (2011: 394). Our tools for behavioural control were long lim-

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ited to the uncertain and unreliable effects of moral suasion, disablement via confinement, deterrence, and coercion, and perhaps to the blunt effects of intoxicating liquors, sleeping potions, coffee, tobacco, or 'just plain knocks on the head'. Changes in how people think and feel via persuasion and education are ordinarily characterized by gradual and at least partly resistible changes and provide the socio-technological context around which our current constitutional and legal norms have evolved. But inducing such changes in mental functioning by altering the chemistry and structure of the brain seems qualitatively different in legally and morally significant ways. As Shapiro points out, mind intrusions vary immensely and yet we do not have a large palette of descriptive terms to help describe and evaluate them, partly because of our relatively limited experience in technologically directing such mental incursions. For Shapiro, what needs to be assessed within a constitutional framework, then, is not so much the physical impingements entailed by swallowing pills or receiving injections, but 'mind assault'—and for this, he suggests, there are no clear precedents (Shapiro 2011: 427; Bublitz and Merkel 2014). Seen in this light, it is not difficult to imagine ways in which assaults on the mind could occur through the manipulation of the (p. 841) social environment that we inhabit, rather than through direct interventions into individual neurological functioning, of which subliminal advertising is perhaps a paradigmatic example. In particular, advances in our understanding of human cognition has demonstrated how the social context can be manipulated, often in remarkably simple ways, in order to produce systematically irrational responses from mentally competent adult individuals—and these findings have provided the basis upon which various regulatory design strategies, particularly in the form of 'nudge' have been proposed (Thaler and Sunstein 2008).

Hence it may be that the skin-skull barrier is not a critical ethical boundary-marker, but serves as a proxy encapsulating more specific, ethically relevant considerations that bear upon the moral legitimacy of different techniques for changing people's minds, such as their transparency, their reversibility, the extent to which they engage with an individual's rational decision-making capacities, whether or not they operate on an individual or collective basis so as to allow practicable opportunities for free and informed consent, and so on. Whether or not it is a reasonably reliable and accurate and useful proxy for capturing significant ethical differences, or whether it is an excessively blunt proxy which is likely to confuse rather than clarify, requires further analysis and reflection. In short, while I am not persuaded by the value of, or need for, a general parity principle, I suspect that Levy is right in highlighting the need for us to attend to both social and neurological forms of intervention, rather than presuming that the latter are *necessarily* more suspect than the former (Dupras, Ravitsky, and Williams-Jones 2014).

Although neurotechnological forms of control are relatively novel, in other respects we are on familiar and shameful ground: many current and proposed biological interventions aimed at securing non-therapeutic regulatory purposes have echoes in the thinking associated with state sponsored eugenics programmes aimed at breeding a 'superior species'. From 1890 to the 1930s, various eugenics movements appeared in over 30 countries, mostly in the form of sterilization programmes and continuing in some American states, Alberta Canada and in Scandinavia well into the 1970s (Romero-Bosch 2007: 94). We

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must bear in mind the inglorious history of contemporary eugenic practices: what we now regard as appalling abuses by the state were once actively supported by courts. In the notorious case of *Buck v Bell* the US Supreme Court upheld the Virginian Eugenic Sterilization Act which had been passed in 1924 as a solution to the state's tax burden which was attributed to insane and 'feeble-minded' persons and as a protection against medical malpractice for physicians already conducting forced sterilization.¹³ In approving the legislation under which it was proposed to sterilize 17-year-old Carrie Buck, Justice Oliver Wendell Holmes, the US Supreme Court judge widely revered for championing the cause of freedom of expression in democratic societies, declared that:

We have seen more than once that the public welfare may call upon the best citizens for their lives. It would be strange if it could not call upon those who already sap the strength of (p. 842) the State for these lesser sacrifices, often not felt to be such by those concerned, to prevent our being swamped with incompetence. It is better for all the world, if instead of waiting to execute degenerate offspring for crime, or to let them starve for their imbecility, society can prevent those who are manifestly unfit from continuing their kind.

(*Buck v Bell*, 207)

Such programmes and the scale of abuses which they perpetrated in the name of the common good are a sobering reminder of the need for vigilance, particularly when it is vulnerable (and often unpopular or despised) minorities, such as criminals, the mentally ill, children, the poor, the uneducated, and the disabled, who are singled out as regulatory targets.

4.2 Non-state Actors and Design-Based Techniques: Safeguarding against the Abuse of Power

The preceding discussion highlights the various bases for evaluating the legitimacy of social and biological approaches to regulatory design when employed by the state to address collective concerns. How then should we evaluate the legitimacy of such techniques when employed by non-state actors? To answer this question, we must ask 'by whom, upon whom, and for whom?' such techniques are being used, and 'for what purpose'? If regulatory activity includes the organized attempts by non-state actors to manage behaviour or risks to address collective concerns, care is needed to avoid analytical confusion. This is partly because the techniques through which one party seeks to manage behaviour or risks may be employed within a wide range of relationships and to secure a broad and varied array of purposes. Accordingly, the criteria against which we judge the legitimacy of any particular design-based intervention is likely to vary, depending upon the nature and character of relationship between those who seek to exert control over others and those whom they seek to influence and in light of the purpose which they seek to pursue. Consider, for example, parents who install stair-gates to prevent their infants from proceeding up or down staircases to enhance their children's safety. Although the installation of stair-gates clearly qualifies as a design-based strategy of control that relies upon

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intentional shaping of the social environment, the purpose of the intervention is not to address a collective concern, and nor are multiple groups or individuals affected by it—so it is not an intervention that would qualify as ‘regulatory’ as I have defined the term.¹⁴

Likewise, supermarket chains may design the layout and display of products intentionally to encourage shoppers to spend more money in store (such as the placement of sweets and crisps adjacent to pay points to provoke impulse buying). In these instances, design-based techniques are used by firms to pursue their own self-interested commercial purposes rather than to address a (p. 843) collective problem, even though many individuals and groups may be affected by such intentional action.

The characterization of a particular design-based intervention for purposes that do not plausibly qualify as ‘regulatory’ does not, however, imply that they do not give rise to concerns about their legitimacy. Rather, my claim is merely that the criteria that apply to design-based regulatory interventions utilized by the state in pursuit of regulatory purposes do not directly read across to non-state contexts, especially when the purposes which underpin their use are not regulatory ones. Consider, for example, the use of ‘nudge’ techniques by supermarkets to encourage consumer spending in light of constitutional values and democratic principles which are central to an assessment of the legitimacy of the state’s use of design-based regulatory strategies: in liberal-democratic market economies, commercial firms are not subject to the constitutional obligations that apply to governmental actors in exercising their powers, however powerful and wealthy they might be; they are not subject to constitutional obligations to account for their actions to the public or to ensure that those affected by their decisions have an opportunity to participate in the decision making process—corporate management’s obligations to account are owed to their shareholders and to their customers via the competitive processes of the market, not to citizens *qua* citizens; and nor are they required to demonstrate impartiality and neutrality in expressing their viewpoints or in the design of their retail outlets—rather, they are free to pursue their own self-interested purposes and express whatever opinion or support whatever lifestyle they wish, provided that their actions and activities do not involve any breach of the law. This is not to say, however, that there are no legitimacy concerns raised by their activities generally, or by their use of design-based strategies of control in particular. On the contrary, there is considerable cause for concern about the techniques utilized by powerful transnational firms in ways that might constitute an abuse of power—but the analytical frame that is used to express and interrogate these concerns rests more firmly in scholarship from other fields of social scientific inquiry concerned with understanding the character and activities of the actors or organizations in question and their relations with other social and political institutions. So, if we wish to understand the legitimacy of nudge techniques employed by supermarket chains to encourage consumer spending, it is likely to be more fruitful to draw on the insights arising from studies of corporate social responsibility, business/management ethics, marketing, corporate law and competition law rather than from regulatory governance scholarship which has hitherto focused on performance-based, constitutional, democratic, and moral legitimacy claims primarily, but by no means exclusively, in relation to regulators which operate under a formal legal mandate at the state or international level.

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It follows that our evaluation of the legitimacy of biological, as opposed to social, design-based approaches to control by non-state actors will also depend very much on who is seeking to use the biological intervention, upon whom, for what end, at (p. 844) what cost, and how those costs and benefits distributed. For example, some parents administer over-the-counter antihistamine to their young children in order to help them sleep more soundly, especially on long-haul flights, a practice that has attracted both praise and consternation.¹⁵ Our evaluation of the legitimacy of this practice depends not just on its safety and efficacy, but also on how we understand the nature of the parent-child relationship, particularly the moral and legal rights, obligations, and interests of both parents and children in relation to each other, in light of the particular context and purpose for which the intervention is administered, including the rights and obligations of airline passengers in relation to each other, particularly those lacking full moral and physical agency. Hence while there might be reasonable grounds for questioning the wisdom of the technique when employed by parents to help their children sleep soundly through long-haul flights (and those who claim that parents of young children have a duty to administer them), it would be difficult to criticize Syrians fleeing the ongoing violence in their country who have reportedly been sedating their children to keep them quiet as they escape.¹⁶

The preceding examples concern the use of design-based techniques by private actors, but there are also a wide array of non-state actors within civil society that are neither institutions of the state or commercial profit-seeking enterprises, and which engage in activities that satisfy our definition of regulation in undertaking intentional activities aimed at addressing a collective concern with the aim of managing behaviour or risk. Black describes these regulators, such as social and environmental bodies such as the Fair Trade International or the Forest Stewardship Council (FSC) or financial regulators such as the International Accounting Standards Committee Foundation (IASC) or the Basle Committee on Banking Supervision (BCBS) as providing the 'hard case' for legitimacy, authority, and accountability in that their activities are not based on or mandated by national, supranational, or international law, and there are no clear existing institutional bodies to whom recourse can be made to render them accountable, and no easily identifiable set of potential democratic participants in their processes (Black 2008a: 138). Yet because the activities and purposes which they seek to pursue are sufficiently analogous to those of state regulators who possess formal legal authority, the legitimacy criteria that are typically applied to state regulators discussed in the preceding section can be meaningfully applied to them (Black 2008a: 145–146). It is difficult to imagine a wide range of circumstances in which regulators of this kind might wish to utilize design-based techniques, particularly those which act directly on human biological functioning, to pursue their regulatory purposes. Nevertheless, the use of media campaigning by social and environmental bodies to raise awareness and mobilize support for socially and environmentally responsible behaviour can be understood as a design-based regulatory technique that operates on the sociocultural environment. In such circumstances, it is appropriate to question whether such activities are effective, consistent with constitutional values including transparency, accountability, and (p. 845) respect for the rule of law and are supported by meaningful democratic participation although these criteria might not apply in a simple

or straightforward manner when the activities concerned have not been formally authorized by democratically elected legislatures.¹⁷

5. Moral Legitimacy: Social Meaning and Human Values

Having examined the legitimacy of design-based techniques of control for regulatory purposes by reference to their effects and effectiveness, constitutional values and democratic principles, I will now turn to the final set of claims against which the legitimacy of regulatory decisions are often asserted: that of morality and justice. Although I have argued that different legitimacy criteria apply when seeking to evaluate the use of design-based control techniques by state and non-state actors, depending upon the purpose of the intervention, the nature and character of the relationship between those seeking to employ such techniques and those directly affected by them, there are some *common* legitimacy concerns, grounded in morality and justice, that apply generally to both state and non-state actors whenever design-based interventions are utilized or in contemplation, for any purpose, whether regulatory or otherwise.

The first of these moral concerns is rooted in the basic moral duty to demonstrate respect for persons. Some design-based techniques, both social and biological, may violate this obligation, depending upon the technique in question and the particular context in which it is employed. For example, as I have argued elsewhere, some forms of nudge (notably those which deliberately seek to bypass the individual's rational decision-making processes) entail a subtle form of manipulation by intentionally seeking to take advantage of the human tendency to act unreflectively, applies to the use of such nudges by state and non-state actors alike and may thus be regarded as violating the moral obligation to treat others with dignity and respect (Yeung 2012: 136). Even within familial relationships, such as that between parent and young child, in which we generally regard it as morally, legally, and socially appropriate to accord parents considerable freedom in the way in which they treat their children, this freedom is not unlimited: it would not, for example, be morally acceptable to sell one's children into slavery or even to refuse to provide them with a basic education. To do so would fail to demonstrate respect for the dignity of persons and violate what is often referred to as a child's right to an open future (Feinberg 1992: 76–97). Likewise, even though we might accept that laying out grocery items (p. 846) in supermarkets to maximize consumer spending is an acceptable business practice, we might draw then line at restaurants and other food establishments spraying of ghrelin into the air to stimulate the appetites of patrons to encourage greater food consumption even if ghrelin can be scientifically proven to have no adverse side effects on human health (Bublitz and Merkel 2014). In short, the administration of design-based techniques involving the treatment of other individuals as objects or things, rather than as moral agents capable of rational reflection and deliberation, is objectionable it fails to demonstrate respect for persons. Accordingly, there is considerable force in Bublitz and Merkel's claim that interventions that act directly on the mind and body of others should

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be presumed morally suspect, unlike indirect interventions that operate on the social environment to achieve the desired behavioural change: because the former necessarily entail treating others primarily as objects rather than things, they therefore constitute a *prima facie* violation of the Kantian injunction to treat others with dignity and respect (Bublitz and Merkel 2014). In addition, ‘action-forcing’ forms of design-based regulation which provide individuals with no alternative but to act in the manner prescribed by the surrounding architectural environment, actively corrode the scope for moral action (Brownsword 2006; Kerr 2010). Yet whether our existing legal doctrine and principles are adequate to guard against such risks is seriously questionable, and for which further legal and ethical reflection is needed (Yeung 2011).

On the other hand, the obligation to treat others with dignity and respect might not apply to the way in which individuals treat themselves, and the moral acceptability of a competent adult treating herself as a mechanical object has spawned considerable debate, often discussed by bioethicists by reference to notions of individual authenticity or self-alienation (Levy 2007b). Yet even in this context, there are deeper moral and justice concerns at stake that are not adequately captured by these ideas. In particular, how we treat ourselves and others and the means we use to achieve our purposes, have an important *expressive* dimension. These social meanings play a critical role in our evaluation of both new and old technological forms of control. For example, critics of situational crime prevention techniques have argued that they express contempt for persons as individual moral agents, incapable trusting others, or exercising moral self-restraint or even moral reflection (Crawford 2000; von Hirsch, Garland, and Wakefield 2000). Likewise, the design of healthcare equipment to enhance patient safety might, on the one hand, demonstrate a welcome recognition that medical professionals are fallible individuals who will inevitably make mistakes in their provision of care, but it might also be interpreted as expressing a distrust in doctors’ professional agency and judgement in ways that might have corrosive effects on doctor–patient relationships (Yeung and Dixon-Woods 2010). Even Neil Levy, who argues that it is sometimes appropriate to treat ourselves as mere machines, rightly concedes that to regard ourselves as *just* mechanisms would indeed threaten our rationality, and to manipulate ourselves *too much* would threaten our agency (Levy 2007a: 120).

(p. 847) Choices we make about the means we use to achieve our ends may cause diffuse harms by changing the kind of society we wish to live in and might have profound effects on our collective identity and self-understanding (Glover 2006). These are important concerns that are often overlooked and difficult to articulate, precisely because they address complex questions about human value and what it is that makes life meaningful and worthwhile. One of the difficulties that arises in thinking about the moral legitimacy of new technological forms of control both within regulatory contexts and beyond is that our collective social, ethical, and cultural life is the product of a myriad of decisions and actions: by individuals, firms, governments, and civil society—sometimes acting in isolation, sometimes in cooperation with others, for a wide range of purposes, and for reasons that we might endorse or denounce. Making collective choices about how we employ such technological means is more likely to cause disagreement and dissent, particularly in lib-

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eral democratic societies which cherish individual freedom. I have no wish to medicate my children to calm their anxiety or enhance their educational performance. Not only would I regard this as contrary to their well-being, but to do so would fundamentally undermine how I understand my obligations to my children (including the obligation to treat children as persons rather than objects), the ways in which I believe that life is imbued with meaning and the inexpressible richness which my children bring to my own life and their relationships with others—however difficult and infuriating their behaviour might be at times. But I am yet to form a view on whether such practices are morally wrong, and how other parents bring up their children is not typically any of my business. Nevertheless, I also believe that I am democratically entitled to have some say in debates about the kind of social and educational environment in which my children learn. I do not wish to live in a society where medicating children for non-therapeutic reasons is practised, much less becomes normal or expected practice (Merkel 2007: 314). This is why the surrounding legal and ethical frameworks that regulate such practices are so important. Public and academic debate and discussion is vital in order that we collectively decide whether we wish to ban, restrict, permit, or even encourage such practices and to enable us to identify and develop regulatory institutions that will safeguard our choices.

6. Conclusion

In this chapter I have sought to identify and critically examine the legitimacy of design-based techniques of control, critically comparing the legitimacy of human biological techniques of control with more traditional design-based regulatory approaches that target the social environment. My analysis has touched upon a (p. 848) range of literatures from several disciplinary perspectives. In so doing, I have revisited the meaning of regulation within regulatory governance studies, suggesting that it can best be defined as ‘organized attempts to manage behaviour or risks in order to address a collective concern or problem’. In so doing, I have sought to expose the flaws in various arguments that often arise in debates about new technologies, including claims that technologies are morally neutral, and that biological and social interventions should be regarded as ethically equivalent.

This is not to suggest, however, that the legitimacy concerns raised by traditional forms of design-based regulation are of lesser importance than those raised by new forms of control that seek to operate directly on human physiological functioning. In this sense, I wholeheartedly endorse Levy’s claim that we need to attend to the legitimacy of social as well as biological approaches to influencing human functioning and behaviour. I have sketched various ways in which design-based regulation may be regarded as illegitimate, including their effects and effectiveness, their failure to promote constitutional values and the lack of democratic participation associated with their use. Evaluating the moral legitimacy of such techniques is complicated, important, and in need of constant revision as our technological capacities continue to expand, sometimes in powerful and unforeseen ways, but particularly in light of our increasing powers to intervene in the function-

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ing of the human mind. The arguments that I have made in this chapter only scratch the surface of these issues and are largely tentative and undeveloped.

How, then, might we proceed? In navigating this fraught territory, one useful starting point is suggested by Jonathan Glover in his discussion of the ethics of human genetic selection (2006). Glover calls for a framework indicating the values that should guide us, suggesting that one plausible starting point for exploring what we value in human nature lies in the idea of the good life for human beings. He identifies two dominant traditions in ethical discussion about what a good life is: that of human flourishing, and that of happiness, each of which could lead to quite divergent policies about genetic choice which could be readily applied to our individual and collective choices about both new and old technological forms of intervention. These two visions, he argues, corresponds to two strands of the good life which are brilliantly contrasted in Huxley's *Brave New World*: one about the fit between what you want and value, and what your life is like (i.e. the fit between one's desires and those desires being met) and one about how rich one's life is in human goods: what relationships you have with others, your health, how much you are in charge of your own life, how much scope for creativity you have. We are at a particular point in human history when we are beginning to use our recently acquired and ever-expanding powers to manipulate our mental and physical capacities in ways that have potentially profound consequences for human flourishing. The future of our humanity is at stake. Yet we are only starting to grapple with the social, ethical, and legal implications of our newly acquired powers—much more public and academic debate and discussion is urgently needed.

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Notes:

(1.) For example, the UK National Institute for Clinical Excellence (NICE) has recently recommended the prescription of nalmefene (also known under its brand name Selincro) by GPs for patients struggling with alcohol dependence. Nalmefene works by blocking the part of the brain which gives drinkers pleasure from alcohol, stopping them from wanting more than one drink: see 'Drinkers offered pill to help reduce alcohol consumption' (*The Guardian*, 3 October 2014) <http://www.theguardian.com/society/2014/oct/03/drinkers-pill-alcohol-cravings-consumption-nalmefene> accessed 19 January 2015.

(2.) In her more recent reflections, Black places greater emphasis on this aspect of her definition of regulation in seeking to distinguish it from the broader concept of 'governance', stating that '[r]egulation is a distinct activity which engages with a particular social problem: how to change the behaviour of others' (2008b: 8).

(3.) See discussion at section 4.1.2.

(4.) Even chemical castration has been used for several decades. Notably, celebrated British mathematician Alan Turing, who is widely credited for his critical role in cracking intercepted coded messages enabled the Allies to defeat the Nazis in several crucial battles in the Second World War, was prosecuted for homosexuality in 1952. At that time, homosexual predispositions were not only regarded as a form of sickness, but criminalized. Turing accepted treatment with oestrogen injections, which was employed as a form of chemical castration, as an alternative to prison. In 2009, UK Prime Minister Gordon Brown apologized on behalf of the UK government for Turing's appalling treatment. I am grateful to Lyria Bennett Moses for drawing Turing's plight to my attention.

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(5.) Because the purpose of this chapter is to reflect upon the legitimacy of using social and biological approaches to regulation, I will engage selectively, rather than comprehensively, with the arguments upon which Levy rests his claim.

(6.) See sections 2 and 4.1.

(7.) See section 2. It is important to acknowledge that attempts to define a sphere of scholarly inquiry in order to stabilize the content and parameters of a field or subfield of academic inquiry inevitably reflect, to a greater or lesser extent, individual scholar's subjective biases about what should and should not fall within the sphere of the discipline and therefore import a degree of arbitrariness.

(8.) Because the alternative purpose posited by Black's refined definition, i.e. to 'attain an identified end or ends' is wide enough to include attempts by parents to encourage their children to eat more vegetables, and attempts by commercial firms to encourage consumers to purchase their product, I will confine my definition to intentional attempts to address a collective problem or concern so as to exclude interventions of this kind.

(9.) For similar loopholes in relation to the regulation of brain-computer interfaces, see Maslen and others (2014).

(10.) Roughly, the thesis is the view that the mind is not confined within the skull of individual agents, but extends into the world, such that mental states are not constituted solely by brain states. The argument for the claim is essentially functionalist: some states and processes external to the brain play the same functional role in cognition as some internal states and processes, and therefore should be accorded the same status. Hence Levy argues that if mental states are not confined within the brain, then a stronger defence is needed for the view that neurological interventions are especially problematic (2007b).

(11.) 394 US 557 (1969).

(12.) See Bublitz and Merkel (2014); Bublitz (2014) who argue in favour of a conceptually distinct and self-standing right to freedom of mind.

(13.) *Buck v Bell* 274 US 200 (1927).

(14.) But if the state decided to provide stair-gates directly to parents of babies born within their jurisdiction, this would constitute a regulatory programme because it intentionally seeks to address a common concern aimed at achieving a specified outcome (i.e. the health and safety of the infant population).

(15.) R Morris, 'Should parents drug their babies on long flights? (BBC News Magazine, 3 April 2013) <www.bbc.co.uk/news/magazine-21977785> accessed 19 January 2015.

(16.) UNHCR blog, UNHCR #Syria assessment team finds acute humanitarian needs in Homs <<https://storify.com/Refugees/unhcr-syria-assessment-team-finds-acute-humanitari>> accessed 19 January 2015.

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(17.) For example, see the critical examination of the legitimacy of forest certification schemes established by non-state institutions to promote sustainable forestry, see Meidinger (1999–2000).

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Challenges from the Future of Human Enhancement

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Abstract and Keywords

This chapter explores some challenges that arise in respect of the regulation of human enhancement. It opens by advocating a definitional pluralism that acknowledges the existence of many concepts of human enhancement. These highlight different moral concerns about the application of genetic and cybernetic technologies to human brains and bodies. I identify one concept that is particularly effective at expressing the upsides of human enhancement. Another concept serves better to reveal enhancement's downsides. I describe a further concept that reveals moral issues connected with great degrees of human enhancement. The chapter concludes with a discussion of attempts to regulate enhancement in elite sport. I defend the efforts of the World Anti-Doping Agency (WADA) to keep artificial means of enhancement out of sport.

Keywords: doping, enhancement, human norms, radical enhancement, therapy, World Anti-Doping Agency (WADA), transhumanism

1. Introduction

A variety of new and emerging technologies promise to translate human enhancement from the plot lines of science fiction into science fact. There are technologies that select or modify DNA. Today some human pregnancies start with an embryo chosen specifically for the absence of DNA associated with a disease. Genetic engineers are becoming increasingly skilled at the techniques required to modify the DNA of a human embryo. Elsewhere, computer scientists are investigating ways in which human capacities can be augmented or created *de novo* by means of electronic implants. Some people born profoundly deaf now hear because of cochlear implants, electronic devices that connect directly with their brains. The focus of many of these applications has been on preventing disease or treating it. But there is nothing intrinsic to the techniques mentioned above that limits their application to disease. Some retargeting or redesign permits them to be used to enhance human capacities.

This chapter focuses on some challenges to regulators posed by the prospect of human enhancement. I argue that public and philosophical engagement with human enhancement has been guided by too simple an understanding of what it involves. I propose a definitional pluralism that acknowledges the need for many concepts of human enhancement. There is an ancestral concept that defines enhancement as improvement. (p. 855) For clarity's sake, I call this concept *enhancement as improvement*. This is a plausible account of what people typically mean then they say that someone or something has been enhanced. But it does not suffice for all of our explanatory or moral purposes. I describe two different elaborations of the ancestral concept of human enhancement that highlight different moral aspects of applying technology to human brains or bodies. There is what I will call *enhancement beyond human norms*. This concept separates enhancement from therapy, where the aim of therapy is to restore functioning to levels rightly considered normal for human beings or to prevent it from falling below those levels. The distinction between therapy and enhancement beyond human norms features in many critiques of human enhancement. A different elaboration of the ancestral concept of human enhancement is *radical enhancement*. One radically enhances when one produces capacities that greatly exceed what is currently possible for human beings. Examples of radical enhancement that are current research goals include millennial lifespans and intellects that are very many times more powerful than the most powerful of today's human intelligences. These possibilities sound like science fiction. But some serious-minded people are working towards them. I argue that we should not suppose that great degrees of enhancement bring, in moral terms, more of the same. We should view the search for therapies capable of adding a few years onto normal human lifespans differently from plans to give us millennial lifespans. Radical enhancements should be placed in a different moral category from enhancements of lesser magnitude.

I conclude this chapter with a discussion of an area in which there is active and ongoing regulation of human enhancement. This is elite sport. The World Anti-Doping Agency (WADA) publishes a Code that uses the concept of enhancement beyond human norms to separate interventions that elite athletes are permitted to use during competition from those that are banned. WADA's attempts to keep sport free of performance-enhancing drugs are controversial. I offer defence of WADA and its Code. The challenges for those seeking to keep artificial performance-enhancers out of sport are considerable. But WADA should be acknowledged as protecting something of great importance. A future in which we permit performance-enhancing drugs in elite sport is a future in which it loses much of its value to us.

2. Many Concepts of Human Enhancement

We cannot hope to find appropriate ways to regulate enhancement technologies without good understanding of what it means to enhance human capacities. It is important to acknowledge the limits of our common-sense concept of enhancement (p. 856) when confronting new ways of modifying human capacities. Genetic and cybernetic technologies cannot have played any significant role in influencing the dominant semantic intuitions

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about enhancement. People were talking about enhancement well before these technologies existed. I recommend a conceptual pluralism that acknowledges the existence of a range of concepts of enhancement. These different concepts of enhancement serve to highlight different moral issues arising out of the technological modification of human beings.

An analogy is instructive. When Francis Crick and James Watson described the structure of DNA they achieved a significant breakthrough in our understanding of inheritance. They expected their discovery to bring many more discoveries. Another thing they should have predicted was the need for more words—we would need a variety of elaborations of our common-sense concept of human inheritance to describe the processes we would discover. We would, to give some examples, need concepts of inheritance sensitive to differences in the way that DNA, RNA, and extra-chromosomal factors transmit information from one generation to the next. We currently find ourselves in an analogous location in respect of human enhancement. Human capacities will, over the next decades, be the focuses of many different technologies. It would be surprising if the single ordinary language concept of enhancement sufficed to describe all the ways in which humans might seek to use technology to alter themselves.

We can identify an ancestral sense of enhancement that treats the concept as synonymous with improvement. According to this concept of enhancement as improvement, one enhances a human capacity whenever one improves it (Harris 2007; Savulescu and Bostrom 2009; Buchanan 2011). I do not mean to say that analysing enhancement as improvement removes all philosophical problems. For example, there are questions about how one should understand the concept of improvement (see for discussion Roduit, Baumann, and Heilinger 2014). We might prefer a moralized concept according to which improvement makes something morally better. Alternatively, we might prefer a functional account in which an improvement is better performance of a naturally selected or designed function. Here, improvement occurs when an object of design better performs its function without regard to whether performance of that function is morally good. A conceptual pluralist will seek to avoid semantic squabbles and acknowledge the existence of two concepts of enhancement as improvement. We would have enhancement as moral improvement and enhancement as functional improvement.

It is not surprising that enhancement as improvement features prominently in the work of advocates of enhancement (Roduit, Baumann, and Heilinger 2014 make this observation; for examples of the use of enhancement as improvement in a positive evaluation of human enhancement, see Harris 2007; Savulescu and Bostrom 2009; Buchanan 2011). The philosophical debate about human enhancement was triggered by the recognition of the possibility of using genetic technologies to enhance human capacities. However, the activity of human improvement is far (p. 857) from novel. When teachers instruct children to do long division they are improving mathematical understanding and hence practising enhancement as improvement. Nick Bostrom and Julian Savulescu (2009) point to the ubiquity of enhancement as improvement to mock the pretensions of its purported philosophical opponents. Once we choose to interpret human enhancement as human improvement,

then the idea that we should seek to do without it is absurd. Enhancement as improvement is an indispensable feature of being human. Bostrom and Savulescu say ‘Stripped of all such “enhancements” it would be impossible for us to survive, and maybe we would not even be fully human in the few short days before we perished’ (2009: 3).

Defenders of enhancement seek to export this general endorsement of human improvement to novel methods. Geneticists have identified some genes that influence human intelligence. For example, the NR2B gene is thought to be especially active during the development of the brain. The addition of extra copies of NR2B to mouse genomes has produced so-called Doogie mice, candidates for the most intelligent mice to have ever existed (Tang and others 1999). Doogie mice seem to have brain tissue that is more connective, permitting them to significantly outperform other mice in tests of memory and problem-solving. It’s possible that adding extra copies of the gene to human embryos would have similar effects.

There are differences between adding an extra NR2B gene and traditional means of cognitive improvement such as algebra lessons. This addition of an extra NR2B gene to the genome of a human embryo occurs earlier than attempts to improve intelligence by means of algebra lessons. It involves different risks from the teaching of algebra. But the decision to group both interventions together under the same concept of enhancement as improvement greatly affects how we view these differences. The risks associated with inserting an additional copy of NR2B into a human embryo make it currently too dangerous. But if we view the aim of this intervention as essentially similar to that of finding a new way to teach algebra, then we can look forward to improvements in the safety of human genetic engineering that will enable us to draw the same conclusions about their moral advisability.

3. Enhancement beyond Human Norms versus Therapy

We have seen that the concept of enhancement as improvement tends to support a permissive attitude towards genetic enhancement. Those who feel suspicious about human enhancement should refuse the offer to express their concerns using their opponents’ conceptual tools. The concept of enhancement as improvement places (p. 858) the addition of NR2B genes and the attachment of cybernetic implants whose purpose is to enhance our cognitive powers in the same category as instruction in algebra. It’s not surprising that it tends to support a favourable view of the novel technique. Those who oppose the novel method will want to avail themselves of a concept of human enhancement that separates algebra lessons from the addition of NR2B genes and the attachment of cybernetic implants.

Consider two cases of enhancement as improvement that involve genetic intervention. First, there is the addition of an extra NR2B gene to a human embryo. Second, there is a hypothetical modification of the genome of a human embryo that corrects a mutation

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linked with fragile X syndrome. Fragile X syndrome is a genetic disorder associated with a range of cognitive impairments. The location of the mutation on the X chromosome means that it tends to affect males more frequently and severely than females.

Both of these genetic interventions share the purpose of improving cognitive abilities. This means that they are both cases of enhancement as improvement. But the fact that one concept of enhancement makes these interventions essentially similar does not prevent alternative concepts of enhancement from finding significant differences between them. The concept of enhancement beyond human norms permits those with doubts about some varieties of enhancement to express those doubts (Juengst 1998; Daniels 2000). It makes a distinction between preventing fragile X syndrome and introducing of additional copies of NR2B (see, for example, Fukuyama 2002; Kass 2002; Habermas 2003; President's Commission on Bioethics 2003; Sandel 2007). The addition of an extra NR2B gene is an enhancement beyond human norms. The correction of the X chromosome mutation that causes fragile X syndrome is a therapy. Its purpose is to prevent the cognitive abilities of a developing individual from falling below the level recognized as normal for human beings.

The fact that two activities are essentially different does not, in itself, enforce any moral distinction. The interventions could be essentially different but both morally acceptable. But the choice of a concept of enhancement that separates these two activities enables the expression of a principled opposition to one that does not apply to the other.

The most familiar context of therapy is medicine. Those motivated by heart problems to see their doctor are typically seeking improvements of cardiac functioning up to levels considered normal for human beings. The doctor who succeeds in restoring cardiac functioning to this level can consider her job done. She might properly view as inappropriate a request to further boost the functioning of hearts that already function the normal human range.

The concept of a human norm requires clarification. Norms are sometimes used in ways that are explicitly evaluative. On these understandings, being normal is supposed to be better than being abnormal. This is not the sense of 'norm' that is operative here. In this context, norms are explicitly biological. The level of functioning that is normal for a heart is the level that it was designed by natural selection (p. 859) to perform (Millikan 1989; Neander 1991; for the use of this concept in ethical contexts, see Daniels 2000). A cardiologist aims, wherever possible to restore to this biologically normal level hearts whose functioning has fallen below it. There is no specific level that corresponds to biologically normal cardiac functioning. Rather, it covers a range of different levels of functioning. Below this range we find hearts that pump insufficiently well to adequately perform their biological functions. Above this range we might find hearts that achieve a level of functioning well beyond that required by natural selection. Both borderlines will be characterized by regions of vagueness that contain hearts whose functioning does not clearly place them in one or other of two adjoining categories.

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The fact that a category lacks precise boundaries does not prevent it from being useful. There is vagueness in many of our morally significant categories. Many societies limit voting to people above a certain age. These laws are motivated by something that is clearly morally relevant to voting. The capacity to understand complex political choices tends to be absent from the very young. We acknowledge, however, that there is some variation in the age when people achieve this understanding. We recognize that many people never develop the intellectual capacities required to make proper political choices. We accept a specific nominated age as a workable approximation. When doctors examine hearts they are often seeking to make distinctions between levels of functioning that are sufficiently low to warrant therapeutic intervention and levels that are properly described as lying at the low end of the normal range and so do not call for intervention. They understand that they are dealing with categories that have vague boundaries.

The suggestion that therapies are essentially different from enhancements beyond human norms does not describe how this distinction should be used in moral reasoning. Here are two ways in which philosophers have sought to invest the distinction between enhancement beyond human norms and therapy with moral significance.

So-called 'bioconservatives' appeal to biological norms to mark the difference between genetic interventions that are morally permissible and those that are morally impermissible (Fukuyama 2002; Kass 2002; Habermas 2003; President's Commission on Bioethics 2003; Sandel 2007). Consider the claims of Habermas. He proposes that the choice by parents to genetically enhance children constitutes a problematic power of one generation over the next. The genetic engineers present themselves as co-authors of their children's lives: 'The programming intentions of parents who are ambitious and given to experimentation ... have the peculiar status of a one-sided and unchallengeable expectation' (Habermas 2003: 51). There is no possibility of questioning choices about your genetic constitution that were made before you existed. Habermas imagines a genetically enhanced individual having to constantly question the source of her motivations. Are they genuinely her own or are they the working out of her parents' plans expressed by way of their choices about the make-up of her genome? This is not a feature of gene therapy in (p. 860) which parents do not presume to make choices about how their children's lives will unfold, beyond that they enjoy good health and other basic prerequisites for the good life. Thus the distinction between enhancement beyond human norms and therapy separates genetic choices that are morally impermissible for prospective parents and genetic choices that should be unavailable to them.

The distinction between the permissible and impermissible is not the only way in which philosophers can make moral use of biological norms. Buchanan and others (2000) propose that the category of therapy corresponds approximately to those genetic interventions that a liberal state is required to make available to its citizens. The purpose of gene therapy is to enable normal participation in society. Such obligations tend not to apply in respect of enhancements beyond human norms. This does not imply a requirement to ban them. But it does suggest that people whose level of functioning falls below human

biological norms deserve priority over those whose level of functioning is currently normal but could benefit from superior levels.

In the final section of this chapter, I explore the use the distinction between therapy and enhancement beyond human norms in elite sport. It is currently permissible in elite sport to use artificial means to boost capacities from below normal to normal. It is impermissible to use artificial means to boost capacities to levels beyond human norms. I will suggest that a ban on artificial means of enhancing beyond human norms in elite sport differs from the two moral uses of this distinction described above.

4. Radical Enhancement versus Moderate Enhancement

Regulations governing human enhancement must take account of expected technological developments. Many enhancement technologies draw heavily on information technology. Information technologies are central to the sequencing and analysis of human DNA. A complete sequence of the human genome was announced in 2003. This achievement would have been impossible without significant increases in the processing power of computers. Information technologies make indispensable contributions to the cybernetic implants that some advocates of enhancement propose to graft to human brains and bodies.

Improvements in information technologies should lead us to expect significant improvement in their power to enhance our capacities. According to Moore's law, named for the Intel Corporation co-founder Gordon Moore, integrated circuits, key (p. 861) components of computers, double in processing power approximately every two years (for recent discussions of Moore's law and its implications, see Brynjolfsson and McAfee 2014; Agar 2015). Many human observers fail to properly appreciate the effects of this exponential pattern of improvement. They expect computers to improve in a more gradual, linear way and are surprised when chess computers benefit from exponential improvement and go rapidly from losing to 10-year-olds to beating Garry Kasparov, the player who in some estimates stands at the pinnacle of human achievement in chess. Moore's law is directly relevant to the invention of new enhancement technologies. The law was a significant contributor to the sequencing of the human genome. Sequencing technologies provide the information that would-be genetic enhancers will require to target their improvements. Others look to Moore's law to accelerate the development of the cybernetic implants that they hope to attach to human brains and bodies.

The inventor and futurist Ray Kurzweil expects humans to benefit from advances in digital technologies by progressively replacing computationally inefficient and disease-prone biological brain tissue with electronic chips. Kurzweil predicts the existence of a human-machine mind 'about one billion times more powerful than all human intelligence today' (Kurzweil 2005: 136). Aubrey de Grey is a maverick gerontologist who aspires to do considerably more than slow ageing down a bit, somewhat delaying the onset of age-related diseases (de Grey and Rae 2007). He is seeking engineered negligible senes-

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cence. A negligibly senescent human being does not age. Humans who do not age are not immortal. At some point, poorly directed buses or space vehicles or falls from space elevators should be expected to end the lives of negligibly senescent people. But they will not experience the increasing debility that is a standard feature of human lives today. De Grey plans to achieve this by developing therapies that will repair seven things that currently go wrong with human bodies at the cellular level. He does not claim to have these therapies now, but he does claim to know where to look for them. He awaits the funding from government and private sources that will enable him to realize his vision of universal agelessness. De Grey offers tantalizing predictions. He believes that the first person to live to 150 is alive today. Furthermore, he expects that the first person to live to 1,000 will be born only 20 years after the first person to live to 150 (Kelland 2011).

To sober-minded observers Kurzweil's and de Grey's forecasts may seem just wacky. It is clear, for example, that de Grey's optimism about the timeline for achieving negligible senescence is, in large part, about attracting funding. His record of talks at Google Corporation is evidence of his popularity with youthful tech entrepreneurs who would like very much to translate recently made millions into millennial lifespans. The idea that we might become one billion times smarter than the sum of all human intelligence today or live until one thousand and beyond pushes the limits of human understanding. But regulators should take these possibilities seriously. If we have regulations that cover some non-existent possibilities then a few ethicists, lawyers, and policymakers have wasted a bit of time. It is much worse (p. 862) to have technological realities that we find ourselves unable to adequately respond to because we have not granted them the attention they deserve.

Consider the confused international response to the 1997 announcement that a sheep had been cloned. Dolly was a created from a cell taken from another sheep's udder. It was apparent that the same techniques that produced Dolly could, in all likelihood, be applied to humans. But should this be done? On one side was the Raelian UFO sect whose claims to have already created a clone 'Eve' attracted considerable media attention (see Berryman 2003). On the other side was Leon Kass's hyperbolic comparison of human cloning with 'father-daughter incest (even with consent), sex with animals, mutilating corpses, eating human flesh' (Kass and Wilson 1998: 18). A more coherent and considered collective response might have resulted had commentators put serious thought into the ethics of human cloning before Dolly's announcement. For this reason, we should take seriously the possibility that Kurzweil and de Grey will be able to do what they say they want to.

In what follows, I propose that we should not think of Kurzweil's radically enhanced intellects and de Grey's radically extended lifespans as just more of the same—that if adding a few IQ points to normal human intellects is good then producing intellects with cognitive powers many times those of normal human intellects must be very good indeed. The differences between moderate and radical enhancement are such that we should not suppose that regulation fit for modest enhancements of biologically normal intellects or modest extensions of normal human lifespans will permit an adequate response to the cognitive enhancements and life extensions sought by Kurzweil and de Grey. Enhancements of

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this degree demand new concepts of enhancement. They will demand different approaches from regulators.

If philosophers of human enhancement are to offer guidance to policymakers they must move beyond the question that has, up until now, consumed most philosophical attention—the question of whether human enhancement is morally permissible. Suppose that we accept that some enhancements are morally permissible. Bioconservative arguments for the impermissibility of all and any human enhancements are mistaken. We must now decide where human enhancements belong on our societies' list of priorities. How do they rank alongside other important priorities such as reducing poverty, protecting the natural environment, correcting global injustice, and so on? The debate about moral permissibility does nothing to bring closer an answer to that question. Transhumanists argue for one view. They present radical enhancement as belonging at the top of our collective priorities (see, most strikingly, the claims of de Grey (2005) about radical life extension). I propose that a more circumspect evaluation places radical enhancement significantly lower on that list. The intense desires of some to radically enhance their intellects and extend their lifespans should be seen as eccentric and undeserving of much public support.

I define radical enhancement as improving significant attributes and abilities to levels that greatly exceed what is currently possible for human beings (p. 863) (Agar 2010, 2014). In the case of enhancement beyond human norms the contrast is with therapy. Here the contrast is with moderate enhancement in which the aim is to improve significant attributes and abilities to levels not far beyond what is currently possible for human beings. The category of moderate enhancement contains many enhancements beyond human norms.

As with the earlier distinction, the categories of radical and moderate enhancement are separated by regions of vagueness. These contain enhancements that do not fit straightforwardly into one category or the other. A person whose technological modifications permit her to live until 150 has a lifespan that exceeds the 122 years of the longest verified human lifespan as of 2015. She has clearly undergone enhancement beyond human norms. But is this moderate or a radical enhancement? This determination is difficult to make with great confidence. But such difficulties do not prevent us from placing millennial lifespans squarely in the category of radical enhancement.

Prominent among the advocates of radical enhancement are transhumanists. According to a widely cited transhumanist FAQ, transhumanism is an

intellectual and cultural movement that affirms the possibility and desirability of fundamentally improving the human condition through applied reason, especially by developing and making widely available technologies to eliminate aging and to greatly enhance human intellectual, physical, and psychological capacities.

(Humanity Plus 2015)

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The transhumanist vision is one of near eternal life and joy combined with a vastly enhanced power to solve collective and individual problems. Here's how the transhumanist philosopher Nick Bostrom envisages a radically enhanced life. Bostrom begins by inviting his readers to imagine that they have just celebrated their 170th birthday:

Each day is a joy. You have invented entirely new art forms, which exploit the new kinds of cognitive capacities and sensibilities you have developed. You still listen to music—music that is to Mozart what Mozart is to bad Muzak. You are communicating with your contemporaries using a language that has grown out of English over the past century and that has a vocabulary and expressive power that enables you to share and discuss thoughts and feelings that unaugmented humans could not even think or experience. ... Things are getting better, but already each day is fantastic.

(2008: 112)

These forecasts about a radically enhanced future are not impossible. We should nevertheless be wary of Bostrom's transhumanist boosterism. It exacerbates systematic tendency to overvalue radical enhancement. This has a disruptive effect on our setting of collective priorities. The benefits of radical enhancement seem readily apparent. Radical cognitive enhancement should permit us to solve intellectual problems that are currently insoluble by humans. Perhaps it will enable physicists to arrive at a full account of quantum gravity, finally reconciling the theory of relativity and quantum field theory. Maybe it will permit individuals to near instantaneously learn all human languages and gain immediate full appreciation of all of the classics (p. 864) of literature in their original languages. These things seem to belong to the realm of the amazing and wonderful rather than to that of the merely good. But there are dangers in the apparent magnitude of these rewards. They tend to make the potential costs of radical enhancement less visible. We are likely to make less good decisions when our focus on potential benefits of radical enhancement tends to prevent us from paying due attention to its potential downsides.

What costs of radical enhancement might we find to oppose the benefits described by the transhumanists? I think that certain things that we value are contingent on cognitive and physical abilities that are not far out of the current human range (see Agar 2010, 2014). Humans have imaginative limits which affect the value we place on the experiences and achievements enabled by enhancement. Moderate degrees of enhancement beyond human norms do not have the same effects on these values as would radical enhancement. Consider the kinds of things that we might place on the list of the most important achievements of a human life—sustaining a lengthy romantic relationship, having and successfully raising children, running a couple of marathons, writing and publishing a book, and so on. We construct the narratives of our existences out of such experiences. It's easy to imagine perspectives that make these achievements seem much less valuable. A human whose radical athletic enhancements enable her to run a marathon in under 30 minutes finds herself alienated from a pre-enhancement marathon time of just under three hours. Suppose that a philosopher radically enhances her intellect. The philosophi-

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cal proposals that filled her books and about which she formerly felt great pride are, from this radically enhanced perspective, either obvious truths or patent falsehoods. The value of the experiences that contribute the important relationships of our lives are at least tacitly tied to approximately human capacities. Your spouse's witticisms and social insights predictably become less valuable once you have radically enhanced your cognitive and emotional capacities. The transhumanists like to compare the degrees of enhancement they hope to achieve with the degrees of enhancement effected in our biological lineage by natural selection. Our posthuman future selves might stand to us now as we stand to the chimpanzee-like *Australopithecus*. Chimpanzees are very impressive beasts indeed, but few humans aspire to be in romantic relationships with them. What would it be like to abruptly find such a gulf separating your intellect and the intellects of your spouse or your children? Radical enhancements of our cognitive or emotional capacities have the effect of pulling the rug out from many of the things that we currently value. This undermining effect need not be a feature of lesser degrees of enhancement. If you keep on running marathons, then you may surpass your earlier athletic achievements. But these can nevertheless retain their meaning for you.

What relevance does this reasoning have for regulators of radical enhancement? It does not show that radical enhancement is immoral. Rather it indicates that its advocates may be guilty of overselling. It is unlikely to live up to inflated transhumanist expectations. Many of readily apparent benefits of radical enhancement (p. 865) may be cancelled by its less apparent costs. We have laws that prevent people from investing their retirement savings in get-rich-quick schemes. If radical enhancements tend to alienate people from their human attachments and past achievements, and this fact is insufficiently appreciated by those contemplating it, then there is a need for regulations that play a cautionary role. The capacity to dream up a correct theory of quantum gravity is worth acquiring. But suppose that acquiring it tended to undermine the value you place on many of your past achievements and distinctively human relationships. To the extent that you value these things you may be inclined to judge that what is gained does not justify what is lost. In any event, a truth-in-advertising clause should direct that people be fully informed about both costs and benefits before they take a momentous, potentially irreversible decision to radically enhance. This information is required to properly place radical enhancement on our list of collective priorities.

I have sought to show how different concepts of enhancement permit us to express different concerns and hopes about enhancing human capacities. Debates about human enhancement harbour more complexity than is indicated by any single understanding of the term. Philosophers should not seek to telescope this conceptual diversity down to a single 'true' concept of human enhancement. We should treat definitions as tools that we can use to express different concerns and hopes about applying technology to human beings. An important first step for those seeking to contribute to the philosophical debate about enhancement is to identify which variety of human enhancement their reasoning depends on. They should acknowledge the legitimacy of responses that depend on other ways of understanding enhancement.

5. Regulating Enhancement in Elite Sport

Thus far, I have stressed the importance of regulations informed by concepts of human enhancement that adequately prepare us for future technological developments. The focus of this final section is on the present. In elite sport there is active enforcement of regulations regarding human enhancement. The purpose of these regulations is to keep performance-enhancing drugs out of elite sport. The organization tasked with leading this effort is WADA. There is a general perception that WADA is losing its war against the dopers. One of the predictable features of the Olympic Games in the contemporary era is a stream of announcements of the names of athletes caught doping. Many commentators suspect that this is the mere (p. 866) tip of a doping iceberg. WADA is limited in its ability to catch cheats by its testing technologies. The story of how Lance Armstrong, at one time recognized as the winner of seven Tours de France, managed over many years of competition to consistently beat the testers seems to be further grounds for despair. The financial and personal rewards that accrue to the victors in elite sports are considerable. These supply the dopers with both the means and motivation to beat WADA's tests.

This has led some to challenge the whole undertaking of keeping performance-enhancing drugs out of sport. Julian Savulescu and his co-authors (2004) argue that performance-enhancing drugs should be embraced rather than being excluded from elite sport. Elite athletes are tasked with producing outstanding performances and drugs should be acknowledged as part of how they do this. This final section identifies the concept of enhancement at the centre of WADA's regulatory efforts. It offers a defence of the undertaking of keeping drugs out of elite sport. WADA's job is not easy. But drug-free Olympics and Tours de France have a value to us that warrants protection.

WADA publishes a code that seeks to both explain and justify its efforts to keep elite sport free of doping (World Anti-Doping Agency 2015). The Code bans a 'substance or method' if it meets two out of a list of three criteria. A substance or method satisfies the first criterion if it 'has the potential to enhance or enhances sport performance'. A substance or method satisfies the second criterion if it 'represents an actual or potential health risk to the Athlete'. A substance satisfies the third criterion if it 'violates the spirit of sport described in the introduction to the Code'. The Code's introduction explains that the spirit of sport 'is the celebration of the human spirit, body and mind, and is reflected in values we find in and through sport'. These values encompass such things as 'ethics, fair play, and honesty, health, fun and joy, teamwork, respect for rules and laws', and soon. This vagueness of clause three is clearly meant to give WADA officials some latitude to respond to instances of cheating that might be missed by a more precise formulation.

How should we understand the use of the term 'enhancement' in this context? A clause that describes 'Therapeutic Use Exemptions' makes it clear that the sense that interests WADA is enhancement beyond human norms. We expect elite athletes to strive to achieve well beyond human norms, but they are not supposed to use artificial means in their attempts to do this.

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The case of the most newsworthy current performance-enhancing agent, synthetic erythropoietin (EPO) illustrates how the therapeutic use exemption is supposed to apply. EPO is a hormone that is produced naturally in human bodies. Its role is to control the production of red blood cells, components of blood that supply organs and tissue with oxygen. In the late 1970s and early 1980s scientists worked out how to produce a synthetic version of EPO. Doctors were able to use it to treat anaemia that can result when the body has an impaired ability to produce red blood cells. This therapeutic use of EPO has the purpose of restoring a patient's red blood cells to biologically normal levels. It is a case of enhancement as (p. 867) improvement—doctors are aiming to improve patients' health. But it does not seek to enhance beyond human norms. WADA grants a therapeutic use exemption for such uses of synthetic EPO.

Competitors in endurance sports soon identified the potential for synthetic EPO to enhance beyond human norms. Over the multiple stages of the Tour de France cycling event it is normal for competitors to undergo a progressive loss of red blood cells. Injections of synthetic EPO serve to top up these levels ensuring that muscles are properly primed for gruelling mountain stages. Armstrong's use of synthetic EPO was not therapy. He entered the events with levels of red blood cells within the normal range for human beings. It is biologically normal for participants in a multistage cycling event to experience a progressive reduction in their levels of red blood cells. Suppose that a doctor discovers that a patient has low levels of red blood cells. The doctor then learns that her patient is a cyclist who has just completed the Tour de France. If she understands that her role is to administer therapies she would prescribe rest rather than administering an injection of synthetic EPO.

The philosopher Julian Savulescu and his co-authors (Savulescu, Foddy, and Clayton 2004) have challenged the WADA code. They propose a view of elite sport that not only accepts performance-enhancing substances and methods but embraces them. They say 'Far from being against the spirit of sport, biological manipulation embodies the human spirit—the capacity to improve ourselves on the basis of reason and judgment' (Savulescu, Foddy, and Clayton 2004: 667).

Exceptional athletic performances can be achieved by methods condoned by WADA. But they can also be sought by use of the substances and methods on WADA's prohibited list. In effect, Savulescu and his co-authors accuse WADA of inconsistency. According to WADA, it is wrong for competitors in elite sports to use synthetic EPO to boost their bodies' supplies of red blood cells. But WADA permits other techniques that achieve the same end. Well-resourced athletes can prepare for competition by training at altitude. The human body responds to the thinness of air at high altitudes by boosting its supplies of red blood cells. Competitors hope to carry these levels into competition when they return to sea level. Some competitors receive these advantages without the need for recourse to specially equipped gyms or recombinant DNA techniques. The legendary Finnish endurance skier Eero Mäntyranta won seven Olympic medals in the 1960s. His success was partly attributable to a rare genetic mutation that endowed him with a 40 to 50 per cent boost in his supplies of red blood cells. Mäntyranta was initially suspected of cheating but

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was cleared when the source of his advantage was identified and found to be natural. According to Savulescu, Foddy, and Clayton synthetic EPO is a relatively cheap means of receiving the advantages that some other competitors have the resources to achieve by other means and that others receive as an accident of birth.

The second of WADA's criteria refers to 'an actual or potential health risk'. Savulescu, Foddy, and Clayton grant that synthetic EPO is associated with risks. But they insist that acceptance of risk is part of elite sport as it exists today. (p. 868) Ultra-marathoners exceed levels of exercise that their doctors would describe as therapeutic. Recent publicity about the long-term harms of serial concussions in contact sports further dispel the notion that elite sport always or typically promotes good health. Elite sport is something that we enjoy watching even though we appreciate that it can be harmful to those who participate in it. We expect that elite athletes have freely consented to its risks. Savulescu, Foddy, and Clayton make the point that the decision to prohibit synthetic EPO makes elite sport more dangerous. Athletes are forced to take it without the benefit of the manner of medical supervision that would mitigate its dangers.

I support WADA's plan to exclude substances and methods that enhance athletes beyond human norms. WADA should be viewed as protecting a valuable feature of elite sport. It is important to understand the scope of the argument I am about to offer. This valuable feature I identify is quite specific to elite sport. The reasons offered here should not be assumed to prevent the application of enhancement technologies in other domains of activity.

Elite sports do not exist in a social vacuum. They differ from amateur varieties in having audiences. Elite sports supply their spectators with valuable experiences. I argue that WADA should be viewed as seeking to protect this spectator interest by enforcing a ban on performance-enhancing substances and methods.

There is a tendency to oversimplify the spectator interest in elite sport. It's true that we are interested in the performances of elite athletes because they are objectively impressive. The Jamaican sprint legend Usain Bolt covers 100 meters much faster than does the 50-year-old diabetic academic who is the author of this chapter. That's part of the reason his athletic performances have audiences and mine don't. But this spectator interest in extreme performances should be considered in its proper context.

An interest in extremes does not explain the enduring nature of our interest in elite sport. It's worth walking into a tent to catch a sight of the world's tallest human. But typically one viewing suffices. Few of those who emerge from the tent with the world's tallest human would show much interest in paying money to enter another tent to see the world's tenth tallest human. Elite sports do contain extreme performances. Many football fans have fond memories of Diego Maradona's 'Goal of the Century' in the 1986 World Cup. But these are not essential to our enjoyment of sport. Few fans front up to weekend football matches expecting anything of the calibre of Maradona's goal. We get something else out of elite sport, something that is distinctively human. We get to see performances that

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are possible for beings who are fitter, more talented, and more dedicated versions of ourselves. My, very human, 100-metre sprints aren't interesting in this way.

If audiences are essential to elite sports, then we should view elite athletes as similar to actors. Both human actors and elite athletes perform for human audiences. The best actors do more than just remember all their lines. They perform them in ways that have relevance for their human audiences. We would not expect visiting (p. 869) extraterrestrials to be much interested in Cate Blanchett's portrayal of an emotionally fragile, alcoholic socialite in Woody Allen's movie *Blue Jasmine*. Her performance is meant for us, not for them. Similar points apply to the performances of elite athletes. They perform for us. It's not just that Usain Bolt covers 100 metres very quickly, he does so in a way that is especially interesting to human spectators.

This spectator interest in elite sport does not carry over to the objectively very impressive performances of beings and things that are unlike us. I possess a 10-year-old Toyota Corolla that is capable of covering 100-metre distances faster than Bolt. My Corolla's performances over 100 meters are, like my running performances, not good candidates for live telecast. We take an interest in Bolt's performances because he has a relevance to us lacked by my Toyota and by humans with robotic limbs. Bolt enters Olympic competition with the same basic biological equipment that we possess. People inspired by watching an Olympic marathon to take up running understand themselves as doing something that is, in its essence, similar to that done by marathon record holders Dennis Kipruto Kimetto and Paula Radcliffe (see Agar 2011 for this argument). The gap between my Toyota's performance over 42.195 kilometres and those of Kipruto Kimetto and Radcliffe is even more striking than the gap over 100 meters between Bolt and my car. However, being ferried over 42.195 kilometres in a car inspires no one to go for a run.

Audiences have an interest in maintaining a proximity between them and elite athletes. We need their performances to be both impressive and relevant to us. This interest in maintaining a proximity between us and our sporting heroes explains why WADA acts on our behalf in seeking to exclude the items on its list of prohibited substances and methods. Many of those who followed Armstrong were inspired to take up the hobby of cycling. Few of them seriously considered injecting synthetic EPO.

What then should we say in response to the consistency claims of Savulescu, Foddy, and Clayton? The use of synthetic EPO was but one of many differences between Lance Armstrong and those who both enjoy watching the Tour de France and like to take their bicycles out in the weekend. Why should we focus on this respect in which Armstrong is different rather than all the other respects in which he and other elite athletes differ from us? Surely these also constitute barriers to our imaginative identification with our sporting heroes.

There is a good pragmatic justification for distinguishing the injection of synthetic EPO from other means by which Tour de France cyclists achieve objectively impressive performances. There are insuperable practical obstacles to excluding from competition other ways in which elite athletes predictably differ from the rest of us. One way for an athlete

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to boost his supply of red blood cells is to train at altitude. If we were to ban training at altitude, we would remove one difference between athletes and most of their spectators. But it would be absurd to ban training at altitude. This would have the effect of banning from competition many residents of the Andes. It does not make sense to seek to ban genetic ‘freaks’ like Mäntyranta. (p. 870) We expect that there are genetic differences between elite athletes and the rest of us. A sequence of Bolt’s genome would likely reveal many genetic advantages. Mäntyranta differs from Bolt in having a genetic advantage whose mode of operation is easily understood. It seems unfair to treat the former in a way that we would not treat the latter. The idea that Mäntyranta and Bolt were born a bit different from the rest of us is something that we understand when we watch them.

The injection of synthetic EPO resembles training at altitude and Mäntyranta’s genotype in predictably boosting performance in endurance sports. Injecting synthetic EPO differs from the other ways in which elite athletes differ from their spectators in being something that we can ban. The injection of a hormone for non-therapeutic purposes is something that we recognize as unusual. Excluding it from elite sport involves none of the injustices involved in banning those who live at high altitudes or those who inherit genetic advantages. It is not something that athletes and their trainers do inadvertently. Indeed, the advantage that these substances bring is conditional on them not being used by most of those against whom they compete. When an athlete injects synthetic EPO she understands herself as doing something out of the ordinary.

This fact about the conditions of our lives and what we tend to expect from our sporting heroes could change. If injections of synthetic EPO become standard features of our lives, then WADA should make no complaint on our behalf. The weekend cyclist who injects synthetic EPO would not recognize this as any kind of barrier to imaginative identification with Armstrong. There are many ways in which humans could change and these will have implications for the kinds of sports that we enjoy watching. Future Olympics could host cybernetically enhanced sprinters. Their performances will be relevant to cybernetically enhanced spectators. But they aren’t particularly relevant to us as we currently are.

Consider another example of our distinctively human interest in elite performances. Chess computers now beat the best human players. There was speculation when, in 1997 the IBM programmed chess computer Deep Blue defeated Garry Kasparov, that this would spell the end of our interest in chess played by humans. But this did not happen. We continue to follow the exploits of Magnus Carlsen in the era of computer chess just as we continue to be interested in the objectively mediocre performances of human sprinters. Human players have a relevance to human observers of chess that Deep Blue never could have. When we learn of elite chess players who take toilet breaks during competitions to receive advice from chess computers we find our interest in the game undermined (Moss 2015). In this era of immense portable computing power, it is difficult to keep the machines out of elite human chess. But if human interest in top-level chess is to be maintained, it is worth doing so. We have a greater interest in how Carlsen might choose to move his knight than in how it could feature in the schemes of Deep Blue.

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I have suggested that athletes who use performance-enhancing drugs fail to live up to the terms of legitimate expectation that their audiences have in elite sport. (p. 871) WADA should be seen as a body that protects that interest. The scope of this argument against performance enhancement beyond human norms is limited. It is specific to elite sport. Spectators have an interest in performances that do not result from artificial means of enhancement beyond human norms. They view the objectively impressive performances of athletes who dope as less relevant to them than the less objectively impressive performances of athletes who do not dope. The rules of sport prohibit many activities that are perfectly permissible outside of sport. Rugby players are not permitted during play to pass the ball forward. But throwing a ball forward is permissible off the rugby field. The argument I have just offered suggests that artificial means of enhancement beyond human norms should be banned in elite sport. But it says nothing about what should be allowed outside of elite sport. You are right to object to artificial means of enhancement beyond human norms in your sporting heroes. Suppose however that you find yourself stranded on the slopes of Everest. You learn that your rescuer required an injection of synthetic EPO to reach you. You have no grounds for complaint. Here you have interest that is very different from the spectator interest in elite sport. You want your rescuer's efforts to save your life. You don't care so much that an injection of synthetic EPO makes these efforts harder to imaginatively identify with.

There is no denying that WADA faces a difficult task in keeping elite sport free of artificial enhancements beyond human norms. But there should be no denying that when it does so it is seeking to protect something of great value to us. Lance Armstrong was a fraud in the sense that he repeatedly lied about having taken performance-enhancing drugs. But he was a fraud in a deeper sense. He presented himself as essentially similar to the weekend cyclists who sought to vicariously experience his performances.

6. Concluding Comments

This chapter stresses the importance of formulating regulations of human enhancement that prepare us for future technological developments. These regulations should acknowledge a plurality of concepts of human enhancement. Those who participate in the current debate about human enhancement should identify the senses of enhancement that are of interest to them. They should not be compelled to use a concept that is not adapted to the concerns or interests that they seek to express. I conclude by discussing and vindicating WADA's efforts to keep artificial enhancers out of elite sport.

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Race and the Law in the Genomic Age: A Problem for Equal Treatment Under the Law

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Abstract and Keywords

Despite the ‘Age of Genomics’, many scholars who study race and the law resist biological insights into human psychology and behaviour. Contemporary developments make this resistance increasingly untenable. This chapter synthesizes recent findings in genomics and evolutionary psychology, which suggest cause for concern over how racial concepts function in the law. Firstly, racial perceptions engage a ‘folk-biological’ module of psychology, which generates inferences poorly adapted to genomic facts about human populations. Racial perceptions are, therefore, prone to function in ways more prejudicial than probative of many issues relevant to criminal and civil liability. Secondly, many folk biological inferences function automatically, unconsciously, and without animus or discriminatory intent. Hence, current equal protection doctrine, which requires a finding of discriminatory intent and is a central mechanism for guaranteeing people equal treatment under the law, is poorly suited to that task. These facts support but complicate several claims made by Critical Race Theorists.

Keywords: race, implicit bias, genetics, genomics, discrimination, psychology, folk biology, essentialism, equal protection

1. Introduction

¹²DESPITE the rise of the ‘Age of Genomics’, many scholars who study race and the law currently resist integrating biological insights into their understanding of human psychology and behaviour. One reason for this resistance is historical: pseudo-biological concepts of race have more often than not played a pernicious role in distorting legal and social policy. The response of many academics and social scientists who study race has been to suggest that racial concepts reflect social constructions, not biological facts, and to avoid biological paradigms altogether. Perceptions of race nevertheless persist and continue to play a role in many social interactions—including interactions between state officials, like police, judges and policymakers, and citizens.

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For those interested in race and the law, resistance of evolutionary and biological insights has become increasingly untenable. Recent technological, empirical, and theoretical advances have created a veritable renaissance in these fields. Technologies now exist to sequence full human genomes, and the costs of sequencing have been lowering dramatically. New methods exist to sequence ancient (p. 875) DNA as well. As a result, scientists can now study patterns of evolution and natural selection in human populations through much greater expanses of space and time. Within the field of population genetics, recent advances in computational and statistical methods now allow for an increasingly broad array of inferences to be drawn from large masses of genomic data. These tools can be used to identify deep patterns of ancestry and phylogenetic relationship among human populations. Major theoretical and empirical advances have similarly occurred in the fields of evolutionary psychology, evolutionary game theory, epigenetics, socio-genomics, and at the intersection of evolutionary and developmental biology. Together, these developments are beginning to shed increased light on how biological mechanisms can affect the complex traits of social species like humans. These same developments have, however, also led some to believe that race may be more biologically real than many race scholars and social scientists typically believe (see, for example, Andreasen 1998; Kitcher 2007).

These developments create a contemporary problem of translation. The law must constantly adapt to the technological developments and findings from other fields. Absent a solid understanding of how these particular developments bear on issues of race, however, legal officials, policy makers, and academics risk serious misunderstanding. This risk is only exacerbated when biological paradigms are ignored in many policy contexts, because popular biological misconceptions still affect legal officials' understandings in a more piecemeal and unregulated manner.

This chapter synthesizes recent findings in genomics and evolutionary psychology, which suggest that there is more, rather than less, cause for concern with respect to how racial concepts typically function in the law. The short reason is twofold. First, many racial perceptions engage a 'folk-biological' module of human psychology. This module is best adapted to generate inferences about the properties of different species but poorly adapted to identify genetic or biological facts associated with people who are members of distinct modern populations. Especially in the context of the law, racial perceptions are, therefore, prone to function in ways that are far more prejudicial than probative of many factual questions relevant to criminal or civil liability. Second, folk biological inferences often occur automatically, unconsciously, and without the need of any animus or discriminatory intent. Hence, current equal protection doctrine, which requires a finding of discriminatory intent for liability and is the central constitutional mechanism for guaranteeing the equal treatment of persons under the law, is poorly suited to that task.

Although critical race theorists typically reject evolutionary and biological paradigms (and many even reject the concept of truth), some have begun to argue for more direct engagement with the social sciences (Carbado and Roithmayr 2014). Their rejection of evolutionary and biological paradigms is unfortunate because—as this chapter will show

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—a contemporary synthesis of recent findings from these fields lends qualified support to several claims typically associated with critical race studies. Among those claims that Devon Carbado and Daria Roithmayr identify as ‘key modernist claims of the theory about which there is general (p. 876) consensus among practitioners in the United States’ are the following: (1) ‘Racial inequality is hardwired into the fabric of our social and economic landscape’; (2) ‘Race is [nevertheless] a social construction whose meanings and effects are contingent and change over time’; (3) ‘Racial stereotypes are ubiquitous in society and limit the opportunities of people of color’; (4) ‘Because racism exists at both the subconscious and conscious levels, the elimination of intentional racism would not eliminate racial inequality’; (5) ‘The concept of color blindness in law and social policy and the argument for ostensibly race-neutral practices often serve to undermine the interests of people of color’ (Carbado and Roithmayr 2014). This chapter suggests that contemporary insights from evolutionary psychology and human population genetics offer some support—while also complicating and adding dimension—to each of these claims.

After developing these general points, the chapter ends by identifying four legal and policy implications. First, remedial forms of affirmative action may be needed to cure not only past practices of intentional discrimination, but also the continuing disparate impacts that arise systematically from folk biological perceptions of race. Second, the Supreme Court should reinterpret the Equal Protection Clause of the United States Constitution to protect against not only intentional discrimination but also any identifiable disparate impacts that are systematically caused by folk biological perceptions of race. This claim is related to more familiar claims about implicit bias, but does not depend on conceptualizing the problem as involving unconscious animus or discriminatory intent. History suggests that the requirement of discriminatory intent only became settled beginning in the 1950s and 1960s and that equal protection law had more plasticity before that (*see* Siegel 1997). Third, more policy focus should be placed on producing cohesive forms of social integration—a goal that has largely been abandoned since the last concerted efforts to enforce *Brown v Board of Education* in the 1980s (Anderson 2011) but can help to reduce folk biological perceptions of race in some circumstances. Fourth, state actions and police policies that impact racial minorities should be based on deliberations that actively involve more racially diverse constituents. Mechanisms to ensure more racially diverse juries should be considered, within constitutional limits.

2. An Emerging Popular Misconception

To begin, it will help to describe an increasingly popular misinterpretation of how contemporary developments in the Genomic Age bear on questions of race. (p. 877) Some interpret these developments as establishing that racial categories are more biologically real, and can be used to support a broader class of biologically meaningful inferences, than social scientists typically acknowledge. This interpretation might seem to be supported by the increasing use of racial classifications in some medical diagnostic contexts (González

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Burchard and others 2003), as well as by the popular use of genetic testing to identify patterns of ancestry.

In *A Troublesome Inheritance: Genes, Race and History*, Nicholas Wade defends this emerging view in some detail. According to Wade, a highly influential scientific journalist, contemporary developments in genetics, evolutionary science and biology establish that:

Human evolution has not only been recent and extensive; it has also been regional. The period of 30,000 to 5,000 years ago, from which signals of recent natural selection can be detected, occurred largely independently within each race. The three principle races are Africans (who live south of the Sahara), East Asians (Chinese, Japanese and Koreans) and Caucasians (Europeans and the peoples of the Near East and the Indian subcontinent). In each of these races, a different set of genes has been changed by natural selection ... This is just what would be expected for populations that adapt to different challenges on each continent. The genes specially affected by natural selection control not only expected traits like skin color and nutritional metabolism but also some aspects of brain function, although in ways that are not yet understood

(Wade 2015).

Wade is right to suggest that human evolution is much more recent, extensive, and regional than many have previously thought (Sabeti and others 2007; Voight and others 2006). He is wrong, however, to conclude that traditional racial categories have thereby been established.³ It would be even more wrong to think that traditional racial concepts can be assumed to play an unproblematic role in many inferences relevant to criminal or civil liability.

To understand why these views are wrong, it will help to distinguish two questions. The first, discussed in Section 3, is how racial perceptions typically function. Even if racial categories have some probative value for some facts relevant to criminal or civil liability, perceptions of race may function in ways that shape human inference, perception, and motivation differently than belief in other categories. Section 3 suggests that racial perceptions often engage a ‘folk biological’ module of human psychology, which is best adapted to identify certain widely shared biological properties of species. Because of how this psychological module functions, however, perceptions of race can simultaneously distort the inferences needed to treat people equally, and as particularized and responsible agents, under the law.

The second question, discussed in Section 4, is whether the right genomic and biological facts exist to warrant use of the folk biological module to make inferences about particular people from different human populations. Even if the fit is not perfect, it may be good enough, in some cases, for the probative value of some racial inferences to outweigh the risk of prejudice. On the whole, however, the opposite (p. 878) will turn out to be true—at least for many questions relevant to criminal and civil liability. Hence, in today’s ‘Age of Genomics’, there are additional reasons to believe that, absent mechanisms to solve these

problems, common perceptions of race will continue to undermine the capacity of the law to guarantee people equal treatment.

3. On the Evolutionary Psychology of Racial Belief

Empirical studies conducted on contemporary Westerners suggest that encounters with new individuals typically generate three ‘primitive’ or ‘primary’ forms of encoding, relating to race, sex, and age (Messick and Mackie 1989; Kurzban, Tooby, and Cosmides 2001). These classifications tend to occur automatically and in a mandatory fashion—ie, they operate across all or most social contexts with roughly equal strength (Kurzban, Tooby, and Cosmides 2001). But what precisely does it mean to classify people by race, and how do racial beliefs typically function? Most who believe that race exists find it infamously difficult to define racial categories in clear terms, and different cultures and people often categorize ‘race’ differently.

Fortunately, it is possible to examine how racial concepts and perceptions *function in human psychology* even for people who disagree over how to define ‘race’ and cannot articulate any essential or universal differences between proposed ‘races’. One of the most important points to recognize is that not all concepts function in the same way. Evolutionary psychologists have now produced a formidable body of evidence to suggest that—contrary to the standard social scientific model of human cognition—the human mind does not operate like a general-purpose, content-free processor of information, which derives all of its information empirically, starting from a proverbial ‘blank slate’ (Buss 1995; Cosmides and Tooby 2013). Nor does it encode or operate with all content in the same way (Buss 1995; Cosmides and Tooby 2013). In many cases, the human mind is better understood as a portfolio of smaller modules, each of which is specially adapted to resolve a distinct class of problems that recurred in humanity’s environment of evolutionary adaptation (Buss 1995; Cosmides and Tooby 2013). In order to serve these specialized functions well, these modules are often specially adapted to contain or favour the acquisition of some content. In addition, these modules often use categories to shape human (p. 879) inference, perception, and motivation in different specialized ways that differ from module.

For example, the basic emotion of fear, which responds to perceptions of the ‘dangerous’, typically operates quickly and reflexively to generate a specific fight-or-flight response to certain stimuli (Öhman and Mineka 2001). Some of the stimuli considered ‘dangerous’ are instinctive in humans, while others can be learned. Across all cultures, ordinary humans are also endowed with a ‘folk physics’, which is specially adapted for inferences about the likely movements and interactions of inanimate objects (Geary and Huffman 2002). Other research suggests that people have an innate ‘folk psychology’, which is specially adapted to aid in inferences about peoples’ mental states, including their beliefs, desires, plans, and intentions (Geary and Huffman 2002). People appear to have an innate ‘folk morality’, which includes a universal moral grammar (Mikhail 2007) and in-

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nate sense of obligation (Kar 2013). This module animates many aspects of the law (Mikhail 2007; Kar 2013), and it appears to be specially adapted to help people resolve problems of cooperation with other perceived members of their in-group (Kar 2013). Humans also have a natural language module for communication (Hauser and Wood 2010), and a ‘folk biology’, which is specially adapted to support inferences about the biological properties of organisms in their environment (Geary and Huffman 2002; Atran 1998). Each of these modules draws distinctions of different kinds and operates with these distinctions in different ways. Each module has some features that are near universal, or closer to ‘hard-wired’, and others that are sensitive to learning, experience, and culture.

The module that will turn out to be most relevant for understanding racial concepts is the folk biological module. Before examining how folk biological concepts of race function in the law, it will therefore help to describe how this module functions in less controversial cases.

There is evidence to suggest that people in all cultures distinguish between living and non-living beings, and cognize living beings as having certain intrinsically goal-like or purposive (sometimes called ‘teleological’) natures that are functional and causally efficacious (Atran 1998). People thus have an innate tendency to think of living organisms as having certain internal animating principles, which are like natural or biological aims. It is similarly natural for people to attribute teleological functions to many *parts* of living organisms, like the lung or the heart. Although the specific folk biological concepts that people accept can be learned and are highly culturally dependent, people naturally classify living beings into species-like groups, and organize these groups into taxonomies that have a special (1) hierarchical and (2) non-overlapping structure (Atran 1998).

With respect to the *hierarchical* relations among folk biological concepts, two species of oak tree might, for example, be represented as falling within a more generic biological category of oak tree; an even more generic biological category of tree; and an even more generic biological category of plant. Each of these successively (p. 880) more generic categorizations will typically be taken to explain some aspects of a particular oak tree’s organic and ecological properties, which it shares with other members of its kind at that same level of generality. These categories are then typically represented as *non-overlapping* in the following sense: if the fact that an organism is part of one folk biological category, like ‘oak tree’, explains a set of properties that it has, then no inference will be made that organisms that do not fall into that same folk biological category have those same properties. It is presumed that organisms that fall into distinct folk biological categories cannot mix properties.

Of course, it is still possible for organisms that fall into non-overlapping categories to have common properties that are perceived as aspects of their biological natures. For example, parrots and bats both have wings and this is typically thought of as part of their biological natures. Still, parrots and bats are intuitively viewed as nesting hierarchically into two distinct and non-overlapping biological categories—namely, bird and mammal, respectively—despite their sharing of wings. To represent things in this manner is to be-

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lieve (correctly, as it turns out) that no part of being a parrot (or even a bird) causally explains why bats, which are mammals, have wings—just like birds. Nor is this shared trait explained by any admixture between birds and bats, in the way that yellow, picked out by a colour concept, can be explained as an admixture of red and green. Colour concepts function differently than folk biological concepts.

There are, on the other hand, other properties shared by birds and bats that intuitively reflect their belonging to a more generic biological category. For example, both parrots and bats have four limbs, as do many other animals, such as birds, mammals, lizards, amphibians, and turtles—but neither insects nor fish. Biologists have identified a specific phylogenetic category—that of the ‘tetrapod’—which closely parallels this intuitive category. As it turns out, all tetrapods are descended from a common ancestor, which first evolved the skeletal shoulder structure and associated genetics needed for four limbs. This trait, which differs from the structure required for fins in fish, involves certain genetic developments that have been passed on in some form to all species that descend from this common ancestor (Daeschler, Shubin, and Jenkins 2006). Hence, parrots and bats really do share certain common genetics, which explain why both have four limbs. The fact that their forelimbs have evolved into wings is not, however, explained by any shared, inherited genetics or admixture between parrots and bats. This is instead a case of the parallel evolution of wings in two distinct and non-overlapping species. (Some of these relations can be seen in Figure 36.1 below.)

Although folk biology is not identical with modern biological science (Atran 1998), its method of representing the relationships among folk biological concepts finds a close parallel in the way that modern evolutionary scientists represent the phylogenetic relationships among species. A ‘species’ can be defined as any group of organisms capable of interbreeding. Thus defined, the phylogenetic relationships among species turn out to have a tree-like structure, with features (p. 882) that (p. 881) correspond to both the hierarchical and non-overlapping aspects of folk biological concepts.

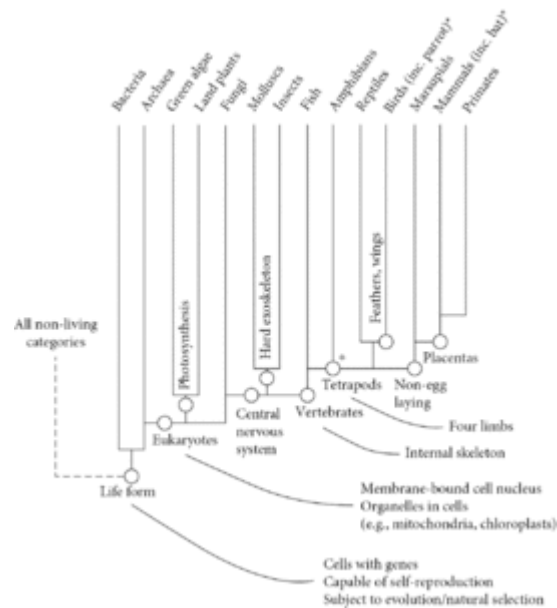


Figure 36.1 The tree of life

The 'the tree of life' depicts the evolutionary and phylogenetic relationships between several major categories of biological organisms. The existing categories (eg, bacteria, archaea, green algae, ... mammals, primates) appear at the top of the diagram. The evolutionary and phylogenetic relationships between these categories are then represented by a tree-like structure, which starts at the bottom with the most basic distinction between organic ('life form') and inorganic entities. As one moves up the tree, some major adaptations that distinguish a new ancestral biological life form and that have been passed on to all of its remaining descendants are marked with circles and descriptions of the adaptations. For example, the adaptation of having a membrane-bound cell, which distinguishes eukaryotes from bacteria and archaea, is something that all organisms descended from the first eukaryotes share. This adaptation distinguishes all these organisms from bacteria and archaea. Photosynthesis is, in turn, an adaptation shared by green algae and land plants, but not other organisms on this tree. Tetrapods have four skeletal limbs. This adaptation arose in the common ancestor of all amphibians, reptiles, birds, marsupials, mammals, and primates. This adaptation is not, however, found in organisms that are not descended from that particular ancestral tetrapod—ie, not in bacteria, archaea, green algae, land plants, fungi, molluscs, insects, or fish. Although fish have fins, fins are not connected skeletally to a shoulder bone, and so modern fish are not tetrapods.

Figure 36.1 presents a highly simplified family tree of this kind. The figure depicts some of the known phylogenetic relationships among birds, mammals, and plants, among other organisms. Each circle in Figure 36.1 represents an evolved trait, which is biologically

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functional and depends on specific genetic underpinnings. These biological traits have been passed down in some form to all species descended from the common ancestor that first evolved the trait. The trait of having four limbs—but not the trait of having wings—has, for example, been passed on to amphibians, reptiles, birds, marsupials, and mammals, including primates. It has thus been passed on to both parrots and bats.

Within folk biology, hierarchical and non-overlapping taxonomies like these ‘not only organize and summarize biological information, but they also provide a powerful inductive framework for making systematic inferences about the likely distribution of organic and ecological properties among organisms’ (Atran 1998). People who believe that a particular animal is a bird may, for example, be more inclined to draw certain inferences about whether it hatched from an egg, whether it has the skeletal structure needed to support four limbs, and whether it has (or will naturally develop) wings capable of flight. In addition, people in all cultures typically presume—either consciously or not—that ‘each generic species has an underlying causal nature or essence, which is uniquely responsible for the typical appearance, behavior, and ecological preferences of the kind’ (Atran 1998). Folk biological inferences thus depend on the projection of certain perceived teleological natures into each species—and, indeed, into other broader forms of folk biological classification. These teleological natures are presumed to be essential, necessarily heritable, and near universal in all members of a species.

Because of facts like these, people do not operate with folk biological classifications in the same way they operate with concepts linked primarily to other psychological modules—like the ‘yellow’ (colour perception module), the ‘dangerous’ (fear module), the ‘heavy’ (folk physics), the ‘intentional’ (folk psychology), or the ‘wrong’ (folk morality). To see this, consider some judgments that are commonly made about the green sea turtle, one of the seven currently existing species of sea turtle. As this locution suggests, people often speak in tenseless generalizations about *the* green sea turtle, including features of its natural lifespan, diet, behaviour, and methods of reproduction (for extended discussion of other examples, see Thompson 1995; 1998; 2004). It is quite common to hear statements like: ‘When the green sea turtle first hatches, it instinctively heads toward the water’. This is not a statement about any particular green sea turtle, but rather about an idealized folk biological kind. People who believe in this folk biological kind are then inclined to make numerous further inferences about particular green sea turtles based on their attributions to them of the idealized folk biological property of *being* a green sea turtle.

(p. 883) In addition, beliefs about what it is to *be* a green sea turtle turn out to bear a complex relationship to the empirical evidence about particular green sea turtles (Thompson 2004). If, for example, a particular green sea turtle was to remain motionless after hatching, that fact would typically be viewed as irrelevant to what it is to *be* a green sea turtle. Most people would simply conclude that there is something wrong with that particular green sea turtle vis-à-vis its essential nature. Similarly, the fact that predators eat the great majority of green sea turtles before they ever reach the ocean is typically deemed irrelevant to the correct description of *the* life cycle of *the* green sea turtle. *The* green sea turtle is still viewed as a distinct biological kind, which *would*—if left to its essential, pur-

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positive nature—move directly into the ocean, take decades to reach sexual maturity, and mate in the water rather than on land. Judgements about *the* natural life cycle of *the* green sea turtle can thus be accepted as true even if very few green sea turtles ever live such a life (Thompson 1995; 1998; 2004). Indeed, these judgements might even be accepted as true if the green sea turtle were to become extinct. In that case, the judgements would help specify the nature of an animal that no longer exists.

As examples like this show, folk biological concepts do not function as mere vehicles for statistical inference about the likely characteristics of particular organisms. They shape human perception and expectation in ways that are often poorly responsive to evidence of particularity. In addition, they incline people to accept different types of explanations for different types of characteristics of organisms. Common characteristics are often viewed as the causal results of a shared biological nature, whereas differences are often viewed as the results of external forces that affect or suppress this nature.

The phrase ‘grammar of folk biology’ can be used to refer to the distinctive ways that folk biological concepts function in human inference, perception and motivation. This grammar is relevant to how belief in race functions because the way most people think about race suggests that it is itself a folk biological concept. As explained in the Stanford Encyclopedia of Philosophy:

The concept of race has historically signified the division of humanity into a small number of groups based upon five criteria: (1) Races reflect some type of biological foundation, be it Aristotelian essences or modern genes; (2) This biological foundation generates discrete racial groupings, such that all and only members of one race share a set of biological characteristics that are not shared by members of other races; (3) This biological foundation is inherited from generation to generation, allowing observers to identify an individual’s race through her ancestry or genealogy; (4) Genealogical investigation should identify each race’s geographic origin, typically in Africa, Europe, Asia, or North and South America; and (5) This inherited racial biological foundation manifests itself primarily in physical phenotypes, such as skin color, eye, shape, hair texture, bone structure, and perhaps also behavioral phenotypes, such as intelligence or delinquency.

When people view one another through folk biological concepts of race, they are thus inclined to perceive one another through the lens of certain tenseless, (p. 884) idealized abstractions, like the ‘White Person’, the ‘Black Person’, or the ‘East Asian’—to use Wade’s proposed major categories. These abstractions are presupposed to have certain necessarily heritable properties which are causally efficacious and license inferences from the race of a person to a variety of characteristics that he or she is naturally and essentially inclined to have. Whether or not these abstractions exist in fact, folk biological categories then shape peoples’ perceptions of one another. What people see of one another, they often see through these lenses. Once engaged, the folk biological module does not depend on peoples’ expressed beliefs about whether race is a real biological kind or on whether anyone has animus or discriminatory intent toward any group.

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One way to make this phenomenon vivid is to consider Ludwig Wittgenstein's well-known example of the 'duck-rabbit', a revised version of which appears in Figure 36.2. This image can be seen as either a duck or a rabbit, both of which are folk biological kinds, even though the physical lines, which are the only facts in the world, never change. When people see something as a duck or a rabbit, the world literally looks different to them. This difference often correlates with different patterns of attention, inference, belief, emotion, attitude, expectation, motivation, evaluation, and reaction. To perceive all people as members of one race or another is thus to see all people as having, in addition to their basic humanity, another essentially heritable nature, which has real causal properties and divides people into discrete and non-overlapping biological kinds. This can look very real. To be truly 'colour-blind', on this same metaphor, would be like being *unable* to see either a duck or a rabbit in this figure (and perhaps to see only an animal)—a nearly impossible feat for most.

The next section discusses whether the right biological facts exist to warrant the application of folk biological concepts to subgroups of humans to aid cognition that is purely fact seeking. Before that, however, there are at least three reasons to believe that the folk biological racial perceptions can interfere with the objectivity of many inferences relevant to identifying criminal and civil liability.

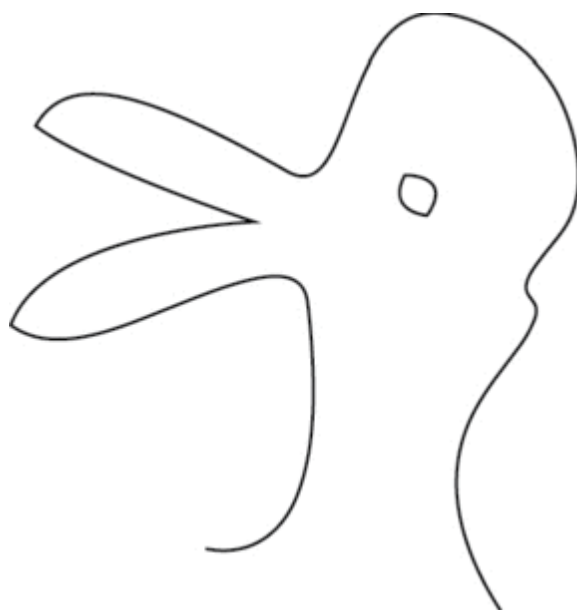


Figure 36.2 The Duck-Rabbit

This 'duck-rabbit' figure, based on the one found in Ludwig Wittgenstein, *Philosophical Investigations*, Part II, sec. xi, can be seen under two aspects—ie, either as a duck, or as a rabbit.

(p. 885) First, folk biology is specially adapted to help people draw inferences, based on generalizations of a special kind, to deal with *classes* of organisms in the biological world. It is thus poorly adapted to support the particularized inferences needed to treat people

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fairly based on their particular qualities and characteristics. The folk biological belief that 'snakes are dangerous' might, for example, provide people with useful information on average, even if it inclines people to overreact to many non-dangerous snakes. To people who hold this folk biological belief, even non-dangerous snakes will literally *look* scary, and these people will tend to react to snakes as such. The folk biological belief that 'black people are criminally inclined' should therefore function in a similar way. It should prove prejudicial in many cases because, even *if* it is statistically true that African-Americans commit more crimes on average in some populations, it will predictably generate the unfair perception and treatment of many individual people. Of course, the statistical presumption here may also be false.

The ideal in American law is, however, for the state and its legal officials to treat each person equally, regardless of race. This means, at minimum, that the law should assign criminal and civil liability to each person based on specific facts about that individual person—ie, facts about how that particular person has chosen to act, along with the particular mental states that accompany those actions and particular qualities or other characteristics that the relevant individual has. Only particularized facts of this kind can warrant the individualized attributions of things like intention, desert, breach, responsibility, and accountability that are relevant to most forms of criminal and civil liability.

If folk biological concepts of race were to shape legal officials' perceptions of particular peoples' character for criminality, then common racial perceptions—which are hard for most to shake—should therefore systematically undermine the ideal of equal treatment under the law. It should do this whether or not people have animus toward other races, and whether or not they are conscious of the effects that folk biological racial categories have on their perceptions of others.

Unfortunately, many people, including some legal officials, appear to hold folk biological beliefs of just this kind. For example, when the US Department of Justice conducted a recent investigation into the police department in Ferguson County, Missouri, it discovered e-mails that indicate both the acceptance by some law enforcement officers of folk biological concepts of race and perceptions that tie some racial categories to criminality. An April 2011 e-mail depicted President Obama as a chimpanzee, thus expressing a perception that different races are like different species, presumably susceptible to folk biological categorization and patterns of inference. A May 2011 e-mail contained the following racist 'joke':

An African-American woman in New Orleans was admitted for a pregnancy termination. Two weeks later she received a check for \$5000. She phoned the hospital to ask who it was from. The hospital said, 'Crimestoppers.'

(p. 886) This e-mail proposes a folk biological explanation for the increased rates of criminal prosecution and incarceration of African-Americans in the United States. For reasons explained, belief in folk biological racial classifications makes explanations like these appear more salient and intuitively plausible, even if rigorous meta-analysis of the available social scientific evidence suggests that the strongest and most stable empirical predictors

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of crime in a community are poverty, family disruption, and racial *heterogeneity* (Pratt and Cullen 2015), and even if folk biological beliefs like this prejudicially increase the rates of (both true and false) criminal convictions of African-Americans.

Second, racial categories are often bound up with in-group/out-group distinctions (Culotta 2012). The tendency to make in-group/out-group distinctions is a culturally universal feature of human psychology (Messick and Mackie 1989), which appears to have evolved to manage patterns of coalition and competition among ancestral human groups (Kurzban, Tooby, and Cosmides 2001). These categorizations regularly produce patterns of in-group favouritism and out-group indifference, hostility, and dehumanization (Kurzban, Tooby, and Cosmides 2001). In fact, '[t]he simple act of categorizing individuals into two social groups predisposes humans to discriminate in favour of their in-group and against their out-group in both the allocation of resources and evaluation of conduct' (Kurzban, Tooby, and Cosmides 2001). Categorizations like these can also affect the way people perceive the very same actions as intentional or accidental, malicious or innocent (Hackel, Looser, and Van Bavel 2014)—thus colouring attributions of criminal intent and responsibility.

When folk biological concepts of race are tied to perceptions of in-group/out-group status, as they often are, they can also prejudice inference and perception in other ways. For example, when it comes to learning fear, both humans and non-human primates have some selective, or prepared, tendencies to engage in 'aversive learning'. Some natural categories, such as snakes and spiders, are naturally coded as 'fear-relevant' and are therefore more readily associated with aversive events than stimuli from other categories, such as birds and butterflies, which are naturally coded as 'fear irrelevant' (Olsson and others 2005). Empirical research suggests that this same natural bias extends to out-group categories, including those defined by 'race'. Hence, 'individuals from a racial group other than one's own are more readily associated with an aversive stimulus than individuals of one's own race, among both white and black Americans' (Olsson and others 2005).

This psychological tendency is especially problematic for the operation of law because it can colour legal officials' and private citizens' levels of fear in response to people of other races. For example, in his testimony to the Grand Jury in the Ferguson case, Officer Darren Wilson, a non-African-American police officer who shot and killed Mike Brown, an unarmed African-American teenager, testified that Mike Brown 'looked like a demon' at the time of the shooting. No facts in the world (p. 887) can, however, ever turn a human into a demon, and so this perception must have been the projection of emotions like fear and estrangement. Dehumanizing perceptions like these are quite common in relation to members of perceived out-groups. In the Trayvon Martin case, George Zimmerman, a non-African American citizen who shot and killed another unarmed African-American teenager, similarly testified that he perceived himself to be under threat at the time of the shooting. The jury credited that perception, which was enough to sustain Zimmerman's acquittal for murder under Florida's 'stand your ground' laws.

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The empirical evidence suggests, however, that the fear of other social groups operates much like the fear of snakes (Olsson and others 2005). It overgeneralizes and does not always track facts that pose real dangers (Olsson and others 2005). In addition, fear can distort people's perceptions of what is happening in a situation. It can incline people to perceive the innocent motions of an unarmed person as 'reaching for a gun'; or, as in a recent case from Cleveland, seeing an African-American child who is playing with a toy gun as a dangerous threat. In that case, the police shot and killed the child within seconds of seeing him on a playground. When perceptions like these are directed unequally at different races, state actors fail to treat people equally under the law—whether or not there is any animus or discriminatory motive, conscious or not.

Third, there is now some evidence to suggest that the psychological tendency to divide people into folk biological categories may even be *specifically adapted* to manage coalitional alliances rather than to track any biologically useful information. Because all people are part of a single species, there is an evolutionary puzzle as to why humans would ever use folk biological concepts to divide humans into subgroups at all. Throughout most of human prehistory, humans lived in small hunter-gatherer bands, and interacted primarily with other local bands, which would have been closely genetically related. In these circumstances, the projection of folk biological concepts onto other groups of people would have rarely tracked any biologically useful information (Kurzban, Tooby, and Cosmides 2001). Still, the violence and oppression associated with intergroup conflict appears throughout human history and prehistory (McFarland 2010)—and, indeed, well into the primate line (Boehm 2012). In humans, social processes like these often involve the psychological projection of perceived essential natures onto groups of people (Leyens and others 2001). Although the specific concept of race proposed by Wade is a modern one in the West and does not appear to have shaped people's perceptions until the Age of European Colonialism (Smedley and Smedley 2005), racial categorization currently operates in a seemingly automatic and mandatory way in the psychologies of most contemporary Westerners (Messick and Mackie 1989).

One way to explain all these facts, including the cultural flexibility of racial concepts, is to hypothesize that modern concepts of race are the historically local (p. 888) by-products of a more universal cognitive machinery, which is specially adapted to manage coalitional alliances (Kurzban, Tooby, and Cosmides 2001). This machinery often appears to deploy (or redeploy) the folk biological module for this purpose. In the contexts of intergroup conflict and competition that characterize much of the environment of evolutionary adaptation for early humans, the projection of folk biological concepts onto other groups of people may not have proven especially useful for tracking any genuine biological information. It may have nevertheless proven incredibly useful for tracking certain *relational* facts relevant to group conflict and competition.

For example, the members of two competing groups might all perceive members of their own group as naturally 'trustworthy' and members of competing groups as naturally 'untrustworthy'. Each group member might be right about their *group-relative* judgments of trustworthiness, but each would be wrong to think that these judgments reflect any nat-

ural or essential biological properties of people. For similar reasons, the projection of folk biological concepts onto other groups of people may have proven useful for tracking certain *non-biological* facts about other groups' *cultural* forms of life. Projection of this kind would have risked prejudice, but—just as in the case of fear of snakes—that risk need not have undermined the selective advantages of stereotyping other groups in circumstances of intergroup conflict and competition. There is now considerable cross-cultural evidence that people from around the world tend to form and hold derogatory stereotypes of members of perceived out-groups (Cuddy and others 2009).

Robert Kurzban and his colleagues have, moreover, produced a series of recent experiments that provide empirical support for this coalitional explanation of racial classification. Despite the considerable empirical research suggesting that contemporary people in the West automatically and mandatorily categorize one another in terms of race, their experiments show that 'less than 4 minutes of exposure to an alternative social world', which makes alternative cues of coalitional alliance more salient, 'was enough to deflate the tendency to categorize by race' and inflate the tendency to categorize people by these other cues (Kurzban, Tooby, and Cosmides 2001). These findings suggest that particular racial concepts are not hard-wired. The ways that people carve humanity into kinds appear to track shifting patterns of competition better than biological cognition (see also Caprariello and others 2009).

The next section presents further evidence for this coalitional explanation of racial classification. It does this by showing just how difficult it is to articulate an alternative, realist explanation of this psychological tendency—i.e., one that explains the psychological tendency to divide people into folk biological kinds as an aid to sound cognition about the biological properties of people. Although this realist explanation might appear intuitive at first, it is nothing more than a 'just so' story: it is a superficially compelling explanation that is refuted by a closer look at the genomic and evolutionary evidence.

(p. 889) **4. On the Fit (or Lack Thereof) between the Grammar of Racial Belief and the Facts of Human Biology**

Because many common perceptions of race appear to engage the folk biological module of human psychology, belief in race is often governed by the grammar of folk biology. The last section described that grammar. It also identified three reasons to think that belief in race can prejudice cognition in ways that undermine sound moral and legal judgment and the equal treatment of persons under the law. It is, however, a separate question whether folk biological categories that purport to divide people into discrete racial kinds can ever prove sufficiently probative of any legal issues to outweigh this risk of prejudice.

One cannot answer this question merely by asking whether race is 'biologically real' in the abstract. One must inquire into the *specific types* of biological facts needed to warrant the use of folk biology's inductive framework to support cognition that is purely fact

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seeking. The critical question is one of fit—ie, between the biological and genomic facts about human populations and certain psychological processes of inference and perception that come with folk biological classification.

The best candidates for biological facts that warrant use of folk biology's inductive framework are clearly those that divide organisms into species, defined as groups of organisms that are capable of interbreeding. Organisms that are part of a single species typically share a great amount of genetic material, which is both causally efficacious and has been selected to serve various natural functions. By definition, species cannot breed with other species, however, and so this shared genetic material cannot recombine with that of any other species. As a result, members of different species really do typically share a great deal of heritable and causally efficacious genetic material that is passed on to all and only members of the same species with near necessity, absent random mutation. In addition, all known living organisms share a common ancestor at some point in their evolutionary history—as shown in Figure 36.1. It therefore makes sense to think of different species as having different biological natures, which are fully heritable, show signs of apparent function or purpose, and divide species into discrete categories that are both non-overlapping and hierarchically nested. It is under these conditions that the folk biological module works best for inferences about the biological properties of particular organisms.

Hence, the relevant question to ask is whether there are any analogous facts about human genetics that might warrant the use of folk biology's inductive framework to support similar inductions about people who fall into different perceived 'races'. As it turns out, there are some minor aspects of human genetics that exhibit the right kind of non-overlapping and hierarchical tree-like structure. One that (p. 890) has drawn quite a bit of recent attention, due to its popular use in private ancestry testing, relates to genetic mutations on the Y-chromosome. Unlike most other human genes, the vast majority of genes on the Y-chromosome are passed on from father to son without recombination. These segments nevertheless undergo random mutation from time to time, and these mutations tend to accumulate. These mutations can therefore be used as genetic markers to group people into what are called 'Y-haplogroups'.

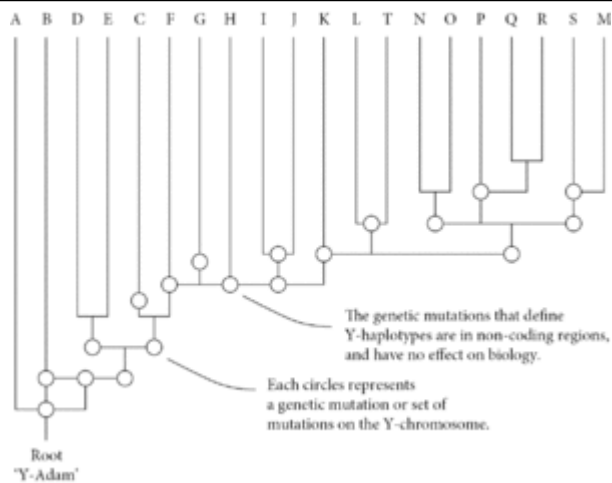


Figure 36.3 Major Y-haplogroups in humans

This figure depicts the evolutionary and phylogenetic relationships between the major Y-haplogroups of humans. Each male human has a Y-chromosome that has been passed on without any recombination from his father. From time to time, however, a random mutation can occur in the Y-chromosome, which is then passed on to all male descendants of the man in whom that random mutation first occurred. Geneticists can therefore look at the Y-chromosomes of men and determine where in the phylogenetic tree of human Y-haplogroups the man falls. It should be noted that the phylogenetic relationships among Y-haplogroups need not correspond to the phylogenetic relationships of different parts of a person's genome, as other parts of peoples' genetic material are typically recombined in random ways. This means that different parts of a human genome have different ancestral histories, which can reflect different phylogenetic trees and ancestral input.

From the International Society of Genetic Genealogy
Y-DNA Haplogroups Tree 2015 Data.

Figure 36.3 depicts the relationships between the major Y-haplogroups of human males. As shown, these relationships are both non-overlapping and hierarchically nested. If one were to look only at genetic data like this, then humans might seem to be divisible into just the types of genetic categories needed to warrant the division of people into folk biological kinds.

There are, however, three major problems with this interpretation of the genetic evidence. First, the genetic mutations that define these particular phylogenetic (p. 891) relationships lie on regions of the Y-chromosome that are believed to be causally inert. Hence, they are incapable of supporting any of the causal inferences that folk biological beliefs in race incline people to make about the biologically meaningful differences between persons who fall into different populations. Second, there is no single Y-haplotype that is shared by all and only members of any traditional race. This point can, in fact, be further generalized: the modern scientific consensus is that there is no particular genetic

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material that all and only members of any traditional racial group share (Mallon 2006). Third, and relatedly, most other human genes undergo recombination during human reproduction. When this happens, the rest of the genetic deck is effectively shuffled, and Y-haplotypes tend to correlate poorly with many broader patterns of human genetic variation. The same can be said of any genetic markers that are used to produce phylogenetic categorizations of humans into non-overlapping and hierarchically nested kinds. Because most genetic variants tend to become uncorrelated through recombination in human reproduction, analyses of different genetic material will, in fact, tend to produce different and conflicting phylogenetic trees. It follows that there is no single non-overlapping and hierarchically definable genetic tree that could ever correspond to the folk biological concept of 'race'.

Most people who believe that the new science of genomics nevertheless supports the use of racial categories to support biological inferences about particular persons therefore focus on a different set of facts. They point out that geneticists can still identify human populations that differ with respect to the relative *frequencies* with which their members reproduce with people from other populations (Andreasen 1998; Kitcher 2007). Differences like these can arise from geographical facts, like the distance between continents, or cultural facts, like differences in language, religion, or prohibitions against interracial marriage. Whatever the cause, the result is that human populations will sometimes undergo different patterns of genetic drift⁴ and other processes that cause them to differ with respect to the frequencies of certain genetic alleles (or variants). When this happens, knowledge about population membership can support some valid *statistical* inferences about the likelihood that members of different populations will have certain genetic variants. This is essentially what is happening when doctors seek to use racial categories in some medical diagnostic contexts to aid in risk assessment of various diseases. It should be noted that the differential power of these inferences is typically incredibly weak in comparison to other methods of diagnosis based on the particular features of a person's symptoms and conditions.

Are the differences in gene frequency that are sometimes found among some human populations sufficient to warrant the use of folk biology's full inductive framework to infer legally relevant biological differences between people categorized by folk biological concepts of 'race'? The answer is no, for three reasons. First, it is *genes* that are heritable, not *frequencies* of genes. Hence, no differences in gene frequency among human populations could ever qualify as the types of (p. 892) necessarily heritable and universally shared racial essences that are presupposed by folk biological concepts of race. The most that folk biological categories of race could ever license are some statistical inferences about some of the more or less likely genetic features of some individuals. To employ folk biological categories to make inferences like these will, however, tend to make these inferences appear more necessarily valid than they really are and predictably prejudice many particular persons.

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Second, even when it comes to purely statistical inference, traditional racial categories do not cut human population structure at its best joints. Population geneticists have created computational and statistical tools, which allow them to analyse large amounts of genetic data from people around the world and derive the ancestral population groupings that best explain the aggregate data. The ‘best’ constructed population groupings are those that would, if posited, maximize the within-group and minimize the between-group differences in assortative mating⁵ and allele sharing needed to explain the genetics of living humans as resulting from iterated processes of human reproduction. These same tools can also be used to identify the precise number of groupings needed to best explain a given data set—though it should be emphasized that the proposed groupings and number of groupings will often vary depending on the data set. The best supported statistical inferences that could ever be drawn from population grouping to individual genetics should therefore come from groupings like these, which may or may not correspond well to any traditional racial category or modern population grouping.

To illustrate, Metspalu and others have recently run these tools on one genetic dataset of individuals from selected modern populations from around the world—eg, the San, French, Armenian, Han, Japanese, and so on (Metspalu and others 2011). The data set they used suggested that fifteen ancestral groups showed the best fit to their data, but the differences between the graphs beginning with ten groupings and up are visually insignificant. Figure 36.4A shows how the individuals in this particular dataset would look if represented as admixtures of the twelve best-attested population groupings in the data. It also indicates where the groups would fall on Wade’s proposed classification of the three ‘major’ races: ‘Sub-Saharan African’, ‘Caucasian’, and ‘East Asian’. For purpose of reference, Figure 36.4B then illustrates what Figure 36.4A *would* have looked like if these statistical methods had identified only three best attested ancestral populations and if Wade’s three modern groupings—i.e., ‘Sub-Saharan’, ‘Caucasian’, and ‘East Asian’—were the unadmixed descendants of just these three ancestral populations. To be clear, Figure 36.4B is *not* an accurate representation of the modern genomic findings. It is offered to clarify, through its contrast with Figure 36.4A, why the known genomic facts about human populations suggest that folk biological classifications of modern populations are likely to distort inferences. (p. 893)

One of the first facts that stands out in Figure 36.4A is that modern individuals from groups of any significant population are not, in fact, unadmixed descendants of any of the best attested ancestral groups in the genetic data. In Figure 36.4A, unlike in Figure 36.4B, Wade’s ‘Caucasian’ category is not only highly admixed (ie, different modern populations show genetic ancestry from a number of different ancestral populations) but different ‘Caucasian’ populations are admixtures of different and sometimes completely non-overlapping ancestral population groupings. This should be clear from the fact that, in Figure 36.4A but not Figure 36.4B, ‘Caucasian’ groups show ancestry coming from many different ancestral populations. In addition, the modern individuals that show the least amount of admixture with respect to the best-attested ancestral groupings correspond poorly to Wade’s conception of three primary races. They include some individual members of: (1) the San and Mbuti (p. 894) pygmies from Sub-Saharan Africa (who many con-

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temporary Westerners might consider 'Black' but form a different population grouping from their Bantu neighbours); (2) the Yoruba; (3) the Mozabites; (4) the Bedouin; (5) the Druze; (6) the Sardinians; (7) some populations in South India (who are closely related to the Andamenese Islanders,⁶ who many Westerners might also consider 'Black' based purely on visual phenotype); (8) the Dai/Lahu; (9) the Oroqens (from Siberia); and (10)–(11) two separate groups from Melanesia and Papua New Guinea (who many contemporary Westerners might also consider 'Black' based on visual phenotype but group separately). There is also another well-attested ancestral population group in this data, which shows up throughout most European, Near Eastern, Central, and South Asian populations in Figure 36.4A, but appears nowhere in anything like a pure form in this modern data. This ancestral population appears to have admixed with many different populations, from Europe and the Middle East to India and other parts of South Asia, during human prehistory. These facts clearly undermine the use of a conceptual framework for induction that presupposes categories that are instead non-overlapping and hierarchically related.

(p. 895)

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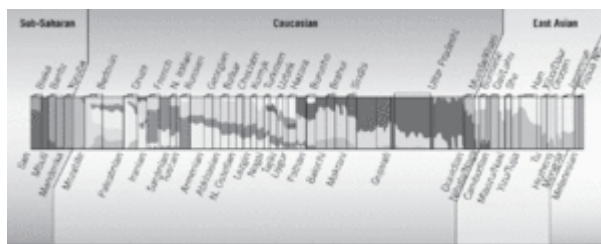


Figure 36.4A Best attested patterns of population structure and admixture in individuals from selected modern human populations

Together, Figures 36.4A and 36.4B show how poorly both folk biological concepts of race and more sophisticated concepts, based on perceived genetic population clusters, track anything like what is needed to support certain common racial inferences.

Figure 36.4A depicts genomic data from modern individuals from around the world. Each vertical bar clusters a series of individuals, who fall into a familiar modern population grouping—eg, Bantu, French, Han, etc. Within each vertical bar, a series of vertical lines have been collected (though they are not separated visually). Each of these thinner vertical lines represents the genetic material from one individual. The different colours in each vertical line represent the percentage of that individual's genomic data that was inherited from one of the sixteen ancestral populations that were best attested in the world-wide genomic dataset. The statistical program 'ADMIXTURE' found that these sixteen ancestral populations provide the best fit to the data, but, modern individuals can contain different proportions of genes inherited from these sixteen ancestral populations. What Figure 36.4A suggests is that most modern individuals who appear in familiar modern population groupings are not directly and completely descended from any of the distinct ancestral population groupings that are best represented by the data. If they were, then Figure 36.4A would look like Figure 36.4B. Instead, modern individuals look like distinctive admixtures of those best-attested ancestral populations (ie, those populations that would, if posited, cut nature best at its genomic 'joints' by maximizing the within-group genetic relatedness and without-group genetic differences between these posited ancestral groups).

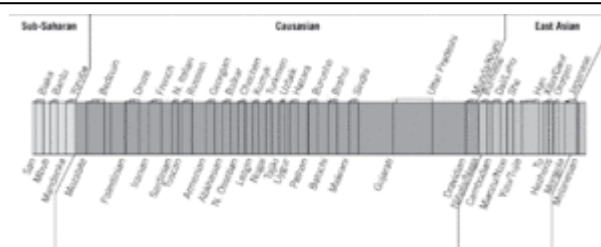


Figure 36.4B How modern populations would look if modern population ancestry had found three best attested ancestral populations unadmixed descendants of these three best attested ancestral populations

Figure 36.4B shows what modern populations would need to look like for the genetic data to support the limited inferences that a population cluster conception of ‘race’ are sometimes thought to justify. As Figure 36.4A shows, however, modern populations do not have the properties needed to justify these types of inferences. For reasons described in the main text, folk biological concepts of race make even stronger assumptions about the underlying genetic facts and purport to support inferences that are even more at odds with the underlying genetic facts. Hence, folk biological reasoning can distort inferences in more egregious ways. In sum, modern population structure is a much less credible foundation for genetic inference than either folk biological or population cluster conceptions of race implicitly presume.

Readers interested in full colour versions of Figures 36.4A and 36.4B with more detail should consult <https://ssrn.com/abstract=2629819> <https://emea01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fssrn.com%2Fabstract%3D2629819&data=01%7C01%7Ckris.perez_hicks%40kcl.ac.uk%7Cb7d2a9167fb84ccc4ec608d44e058a4e%7C8370cf1416f34c16b83c724071654356%7C0&sdata=0gXyV0Vv0APIFe4QhRxUpNi4TREpHyU1jc%2FMzA0yFi8%3D&reserved=0>

This same type of analysis can be run to produce the best attested population groupings for any number of proposed ancestral populations. As shown in Figure 36.5, when modern populations are represented as admixtures of just the two ancestral groups that are best attested in this genetic data, the Han Chinese (and some closely related groups) appear most distinct, and sub-Saharan Africans group closely with Europeans (Metspalu and others 2011). That division should therefore provide a better basis for statistical inference than one that distinguishes sub-Saharan Africans from all non-Africans. Within the groups represented in Figure 36.5, there are also several—such as some from Melanesia, Papua New Guinea, and related to the Andaman Islanders—who would appear to most contemporary Westerners to be ‘Black’ based on visual phenotype. These populations nevertheless group separately from all sub-Saharan Africans not only in Figure 36.4A but also as soon as even the two best attested ancestral groupings are reconstructed as shown in Figure 36.5 (Metspalu and others 2011). Hence, contemporary phenotypic

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cues to 'race' fail to track the most meaningful population structures revealed in the genomic data.

In the United States, the genetic evidence relating to African-Americans is even more complex. Dr Henry Louis Gates, Jr has recently presented evidence from a number of private genetic testing companies, including Ancestry.com, 23andme.com and FamilyTreeDNA.com. Although some selection bias should be presumed (p. 896) in data like this, the results from all three companies are highly consistent. African-Americans who submitted personal DNA for testing to one of these three private sites exhibited, on average, somewhere between 65–75 per cent 'sub-Saharan African', 22–29 per cent 'European', and 0.6–2 per cent 'Native American' genetics (Gates 2013). Admixture like this, which shuffles the genetic deck at different loci in different people, greatly interferes with the validity of even any statistical inferences that one might try to draw from the fact that a person is 'African-American' to any particular genetic component. Once again, the problem is that these categories are not in fact non-overlapping in any of the ways that make folk biological inferences about species work.

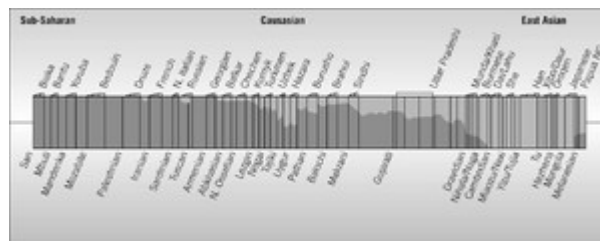


Figure 36.5 How certain familiar conceptions of race are poor fits to data

This figure shows how different individuals, from different modern population groups, would look if the genetic material that they have inherited from the two best-attested ancestral populations are shown in two different colours. Rather than dividing the world into two clear 'races', this diagram shows that most groups have individuals whose genetic material comes from both of sides of this largest ancestral divide. As discussed in the main text, the main phenotypic traits that people use to identify 'race' are poorly correlated with this best-attested ancestral division. It should also be remembered that the program ADMIXTURE found that sixteen ancestral groupings is a better fit to the data. Hence, this diagram is used mainly to show that certain familiar conceptions of race are poor fits to the data even if a division of two were forced onto the data.

In any event, third, both Figure 36.4A and Figure 36.5 and many of the commonly perceived phenotypic differences used as traditional cues to 'race' greatly exaggerate the degree to which genetic population structure is likely to correlate with any *functional* biological differences. The genetic variants that show up at different frequencies in different human populations can be broken down into three basic types: (1) those that have no

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effect on any phenotype and are hence merely informative as markers of ancestry; (2) those that have some effect on observable phenotype but have not been subject to recent natural selection and so serve no genuine biological function; and (3) those that have been subject to recent natural selection and hence may serve a biological function.

To be subject to natural selection, and hence to fall into the third category, a gene must have been causally efficacious in a population's environment of evolutionary adaptation. Its regular effects must have conferred selective advantages on its bearers, and those effects must causally explain the proliferation of the gene through an ancestral population. In these circumstances, there is a precise sense in which a trait, and its underlying genetic variant, can be understood to be part of a biological 'adaptation', which has the 'natural function' of producing those particular effects (Godfrey-Smith 1994; Kaplan and Pigliucci 2001). Using these definitions, it can properly be said that the natural function (or 'purpose') of the heart is *to pump blood* (Kar 2013); and that it is part of the natural function (or 'purpose') of a green sea turtle's life for it to head toward the ocean at birth. Although scientists reject the Aristotelian conception of a 'telos' or 'final cause' (at least if interpreted as a purposive, internal animating principle that operates independently of efficient causation), folk biology freely employs teleological judgments. Teleological judgments can be understood as unproblematically true when they operate as folk biological shorthand for true natural function claims (Kar 2013).⁷ Hence, only genetic differences that fall into this third category could ever warrant the projection of teleological racial 'essences' onto groups of persons to aid in biological cognition.

Unfortunately for the concept of race, the great majority of differences in gene frequency used to identify population groupings like those depicted in Figure 36.4A and Figure 36.5 fall into the first category: they lie on regions of the genome that are currently believed to be causally inert. Hence, they should have no effects on (p. 897) phenotype whatsoever, and figures like Figure 36.4A and Figure 36.5 leave a greatly exaggerated sense of the degree to which members of different populations are likely to differ in any biologically meaningful senses. A similar distortion is created by the increasingly widespread use of 'PCA'—or principal component analysis—plots to show frequentist genetic differences among groups of living humans, such as that shown in Figure 36.6 based on (Lu and Xu 2013).

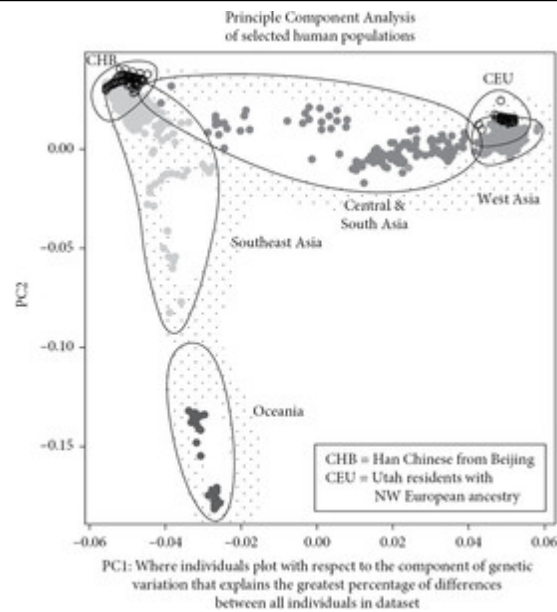


Figure 36.6 An example of 'Principle Component Analysis'

Principle component analysis identifies two components of the genetic variation in a group of individuals that explains the most, and then second most, amount of variation within the sample of individuals. It then plots individuals with respect to where they fall on these two scales of differentiation. On graphs like these, people from some modern population groupings (eg, Han Chinese, or Utah Residents with Northwest European Ancestry) tend to cluster closer together than people from very different parts of the world.

Graphs like these focus on the genetic *variation* among populations. In order to make this variation visible to the human eye, they mask out the uniformities. Humans share roughly 99.9 per cent of their genetic material on average.⁸ One recent hallmark study suggests that the within-population source of variation (p. 898) (89.8 per cent to 94.6 per cent in the genetic data studied) is typically much larger than both the among-population variation (2.4 per cent to 5.4 per cent) and among-region variation (3.6 per cent to 5.2 per cent) (Rosenberg and others 2002). The 'regions' used in this study were Africa, Europe, the Middle East, Central/South Asia, East Asia, Oceania, and America. In addition, of the 4199 alleles used to quantify population-based differences, only 7.4 per cent were found to be exclusive to one of these regions. These region-specific alleles were, however, 'usually rare, with a median relative frequency of 1.0% in their region of occurrence' (Rosenberg and others 2002). Rare variants like these cannot ever ground the racial 'essences' presupposed by folk biological concepts of race. Many reflect random mutations that are uncorrelated with any observable traits.

Most of the remaining differences in gene frequency fall into the second category: they involve genetic variants that can produce some observable differences in phenotype but

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exhibit no evidence of recent natural selection or *biological function*. Frequency differences of this kind can arise from a number of well-known evolutionary processes, like random mutation, genetic drift, population bottlenecks,⁹ and founder effects.¹⁰ When people think they see 'race', they are often relying on observable phenotypic differences like these (ie, category two) as informal cues to a deeper racial nature, which they implicitly presume to have further, functional properties (ie, category three, discussed below). Absent a sufficiently strong correlation between these visual cues and genetic differences that have undergone some recent natural selection, however, there is no reason to think that these cues provide any information whatsoever about the likely functional differences between people.

This leaves only one more category of differences. However, the genetic variants that fall into category three (i.e., genuinely functional, with evidence of natural selection) turn out to be incredibly few and far between. In a recent analysis of 3,000,000 single nucleotide genetic polymorphisms¹¹ found in the International HapMap Project Phase 2, Sabeti and others (2007) found only 300 strong candidate regions for recent natural selection. This suggests that only roughly 1/100th of a per cent of the genes that segregate in frequency in modern human populations are strong candidates for generating functional biological differences. This is roughly 1/100th of a per cent of the 0.1 per cent of genetic material (in the form of single nucleotide polymorphisms) that differ, on average, between persons. As discussed, even fewer of these differences (roughly 7.4 per cent) are exclusive to a geographic region, and most of these regional variants show up in less than 1 per cent of the people within these different regional populations. Clearly, membership in modern populations construed as 'races' are extremely poor indicators of even of functional biological differences of these kinds.

In addition, when scientists have identified specific genes that show strong evidence of recent natural selection, natural selection shows little respect for human population structure. Three examples should suffice to illustrate this point.

(p. 899) First, scientists have identified a gene for high-altitude adaptation, which shows strong signs of recent natural selection in Tibetans (Huerta-Sánchez and others 2014). Most would consider Tibetans to be East Asians, however, rather than a separate race, and Figure 36.4A similarly suggests that Tibetans—just like the Han Chinese and most other East Asian groups—show up primarily as admixtures between the two ancestral groups most closely related to modern-day Dai/Lahu and Oroqens in the Metspalu data set. Modern research suggests that the Tibetan gene for high-altitude adaptation is rare in other East Asian populations, however, and entered into Tibetan populations from neither of their primary ancestral groups (Huerta-Sánchez and others 2014). Instead, it entered into Tibetan populations via a very small amount of admixture with a prehistoric and now extinct hominid named the 'Denisovan', a sister clade to the Neanderthal (Huerta-Sánchez and others 2014). The fact that this gene reaches such high frequencies in modern Tibetans is explained not by population structure or any folk biological category of 'race' but rather by the fact that Tibetans live on the highly elevated Tibetan plateau, where adaptations for high-altitude living have proven especially advantageous for sur-

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vival and reproduction. In this case, geography proves a better statistical indicator of functional biological difference than any traditional racial category or visually observable phenotype.

Second, scientists have identified specific genes for lactose tolerance, which also show signs of recent natural selection in some populations. These genes essentially allow humans to digest milk and dairy products into adulthood. They are much more widespread with respect to geography, and they appear to have evolved on at least two separate occasions—once somewhere in Eurasia (Voight and others 2006) and once most likely in East Africa (Tishkoff and others 2007).

The Eurasian version of the gene currently appears at particularly high frequencies in many descendants of Northwest Europeans (Itan and others 2010), but the gene does not correlate well at all with ‘Europeans’, ‘Caucasians’ or the more colloquial category ‘White person’. Evidence for this comes from the fact that the gene appears at much lower frequencies among many groups from Southern Europe and the Caucasus (Itan and others 2010). Those European populations that have this gene at the highest frequencies appear to have it because they are descended largely from certain pastoralist and cattle-breeding groups who entered Europe from the Eurasian Steppes beginning in or around 3000 BC and then continued to rely heavily on dairy products for their subsistence (Allentoft and others 2015). These groups were not in any way a separate ‘race’ of people (Allentoft and others 2015), and they are, in fact, closely related to many modern populations that have this gene at much lower frequencies but subsisted primarily on meat and agriculture. The Eurasian version of this gene also reaches higher than normal frequencies in some North African pastoralist groups (Itan and others 2010), who appear to have admixed with some of these same Eurasian pastoralists (Myles and others 2005), but many of whom contemporary Westerners would consider to be ‘Black’ based on (p. 900) visual phenotype. Hence, historical subsistence strategy, which crosses perceived racial divides, proves a better statistical indicator of this functional biological difference as well.

Consistent with this suggestion, the other main version of the gene known to produce lactose tolerance appears to have evolved in East Africa and currently reaches its highest frequencies among certain pastoralist groups in East Africa (Tishkoff and others 2007) and Saudi Arabia (Enattah and others 2008). Hence, this version of the gene crosses the perceived racial divide as well. Once again, its frequency is better predicted by historical subsistence strategy than any traditional racial category or difference in observable phenotype.

Third, scientists have found specific genes that show signs of recent natural selection for protection against malaria, but these genes appear to have evolved separately and undergone selection in populations from at least three distinct regions: the tropical regions of Sub-Saharan Africa, Southeast Asia, and Oceania. Interestingly enough, one adaptation for malaria resistance appears to have arisen separately in Central Africa and Papua New Guinea, but nevertheless evolved via an identical adaptive mechanism (Zimmerman and others 1999). In each case, selection for these genes occurred in equatorial regions,

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where the existence of malaria is high (Hedrick 2011). Descent from a tropical region where malaria thrives thus proves a much better statistical indicator of this functional biological difference than any traditional racial category or difference in observable phenotype.

These three examples illustrate a more general point. Although continental differences can produce differences in assortative mating, which often lead to the accumulation of observable but non-functional (and merely frequentist) genetic differences among human populations, recent natural selection for functional biological difference is much rarer and shows little respect for human population structure—especially once there is even a minor amount admixture between populations. There has, however, always been some such admixture, and it is only growing in the modern world. It follows that visual cues to ‘race’ should predictably leave people with not only an *exaggerated* but also a *distorted* sense of the likely functional differences between persons of different ‘races’.

The problem with folk biological racial categories is that they presuppose people can be divided into groups that have discrete and non-overlapping biological natures. These biological natures are presumed to be necessarily heritable, to capture racial ‘essences’ that are shared by all members of a race, and to serve real biological functions. But no genetic characteristics of people have all these properties at once. Hence, folk biological concepts of race really are a myth. They incline people to employ the powerful inductive framework of folk biology, which supports valid inferences about the near universal and functional biological properties of *species*, but in circumstances that are likely to be more prejudicial than probative of any meaningful differences *between persons*. This cognitively unreliable psychological mechanism operates in many contexts, often unconsciously, where group (p. 901) differences are effectively biologized (Dar-Nimrod and Heine 2011). It should also be noted that there is nothing about merely professing a belief that race is socially constructed, or fails to capture a biological essence, however sincerely, that guarantees the folk biological module will stop operating with racial perceptions in these manners. Nor does the folk biological module require any animus or discriminatory motive, whether conscious or unconscious, to function in these ways.

5. Some Implications for Equal Treatment Under the Law

The last section explained why the fit between the biological facts about humans who fall into different groups and those needed to warrant the application of folk biological categories to human groups is poor. Yet the tendency to divide people into folk biological categories is still strong and appears to serve competitive purposes better than cognitive ones. These facts create a major obstacle to the equal treatment of persons under the law, and one that current law is poorly suited to address. This section describes the problem and four possible solutions.

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The problem arises from two sets of facts. First, legal systems depend on humans to serve in many roles, like those of judge, jury, lawmaker, police officer, investigator, attorney, and witness. Humans, however, have the typical human psychological inheritance, and this inheritance, which is partly natural and partly cultural, can pull in competing directions. It gives people the capacities to make sound moral, legal, and factual judgements, but it can also incline people to view members of perceived out-groups in ways that unconsciously interfere with the equal treatment of persons. This is especially true when people—whether consciously or unconsciously—use folk biological categories to divide people into groups or perceived ‘races’. Second, many parts of the law nevertheless presume that that both discrimination and non-discrimination are fundamentally conscious decisions; and that conscious animus or discriminatory intent is therefore needed before people can treat others differently based on race. Current law is therefore poorly suited to address any sources of unequal treatment that arise from folk biological racial perceptions.

Beginning with the first set of facts, evidence suggests that universal moral grammar and the human sense of obligation may have initially evolved to promote cooperation among small groups of hunter-gatherer bands (Kar 2005). It naturally functions by inclining people to perceive themselves as having genuine obligations to other members of their perceived in-groups and to structure their social interactions accordingly (Kar 2013). These mechanisms have a cognitive component, which gives people the (p. 902) capacity to make sound factual judgements related to moral and legal obligations (Mikhail 2007; Kar 2013). Unlike many beliefs about the world, however, beliefs in obligation are also tied to a special portfolio of motivations, which produce a complex and highly structured form of human social life and interaction (Kar 2013). As a cultural matter, modern legal systems appear to redeploy these psychological mechanisms to sustain much larger forms of cooperation and civil society, based on widely shared perceptions of shared citizenry (Kar 2013; 2005).

By contrast, the psychological tendency to divide human groups into folk biological kinds appears to have evolved primarily to promote competition *between* groups (see, for example, Boehm 2012). When active, it regularly produces perceptions of other groups that are more prejudicial than probative. Tendencies like these can distort sound moral, legal and factual judgment by regularly causing the disparate treatment of persons. When people who accept folk biological beliefs about race play their various roles in modern legal systems, their behaviour should therefore be expected to reflect some elements of *both* the equal treatment of persons under generally applicable rules *and* some differential treatment of any groups that are perceived (either consciously or unconsciously) as falling into folk biological kinds.

When this unequal treatment results from the acceptance of folk biological concepts of race, rather than discriminatory intentions, it will often shape people’s perceptions of one another in unconscious manners and without the need for any accompanying animus. Many people who treat each other differently *in fact* should therefore be expected to see themselves as merely responding *to* different facts. They may also exhibit unconscious patterns of attention, inference and concern, which make it easier for them to identify the

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interests of their in-group while overlooking those of out-groups. This explains why democratic processes cannot always be relied upon to guarantee the equal treatment of persons under the law, and why some constitutional protections are needed.

Turning to the second set of facts, the law is poorly suited to address this particular source of unequal treatment to the extent that it pictures the only relevant obstacles to equal treatment as arising from forms of *intentional wrongdoing*. This way of picturing things can arise in any legal system. To clarify the problem, it will nevertheless help to focus on the United States, where courts currently require proof of discriminatory intent—and not just disparate impact—to find a violation of the Equal Protection Clause of the United States Constitution.¹² It has not always been this way (Siegal 2017), but Chief Justice Roberts expressed a similar view when he proposed that '[t]he way to stop discrimination on the basis of race is to stop discriminating on the basis of race'.¹³ This proposal assumes that both discrimination and non-discrimination are simple matters of conscious choice. It also assumes that the only obstacles to equal treatment under the law arise from conscious decisions to discriminate.

A related thought can be found in some strands of the Court's affirmative action jurisprudence. The Court has acknowledged that past instances of intentional (p. 903) discrimination have created major patterns of racial inequality in the United States.¹⁴ Some Justices are nevertheless inclined to view any conscious decision to treat people differently on the basis of race as a form of objectionable discrimination.¹⁵ They are therefore inclined to believe that affirmative action is itself a form of (so-called 'reverse') discrimination, which can only be justified either to serve remedial purposes (i.e., to remedy a past history of intentional discrimination)¹⁶ or to promote some other legitimate, non-discriminatory purpose (e.g., to create a diverse learning environment).¹⁷ Given the increasingly widespread acceptance of norms against intentional racial discrimination, Justice O'Connor famously predicted that there may be no further need for affirmative action once the effects of conscious past abuses have been remedied.¹⁸

The common assumption in all of these views is that there are only two possible human causes of inequality: (1) conscious intentions to discriminate and (2) race-neutral decisions that coincidentally create disparate impacts on different groups. As currently construed, the Equal Protection Clause is sometimes said to guarantee equal treatment, but not equal results.

However, to assume that these two psychological sources of unequal treatment exhaust the logical space is simply wrong. Contemporary developments in evolutionary psychology suggest that humans can also have psychological mechanisms that evolved and are therefore specifically adapted to produce an unequal allocation of treatment and resources among groups. When psychological mechanisms like these exist and serve their functions well, the inequalities they produce will be more than merely coincidental (i.e., more than just the second category). They will show evidence of selection and evolutionary design, and they will regularly function to produce unequal treatment in much the same way that hearts regularly function to pump blood and eyes regularly function to pro-

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duce sight. The competitive advantages of applying folk biological categories to out-groups will help to explain the proliferation and stability of certain beliefs, like belief in 'race', within some dominant communities (Wright 2000). Still, the psychological mechanisms that serve these functions need not operate through conscious intentions to discriminate (so they do not just fall into the first category either). In the case of other folk biological categories like 'duck', 'rabbit', and 'snake', for example, no intentions to discriminate are needed to see and react to different perceived folk biological kinds differently. Most of the psychological work happens both unconsciously and without any animus or discriminatory intent. People simply believe they are responding to different facts about different biological kinds.

A holistic understanding of recent developments in evolutionary psychology, genetics and the biological sciences therefore suggests that much more thought needs to be given to how to create legal systems that can guarantee the genuine equal treatment of persons under the law. Some psychological sources of racial inequality show evidence of adaptation for competition rather than cognition, but they can operate in the psychologies of people who deplore racial hatred and sincerely accept norms against intentional discrimination. This cause of inequality can undermine the capacity of a legal system to guarantee that people receive equal treatment, but it should (p. 904) prove especially difficult to address under current legal doctrine because it means that people who treat each other differently will not always be engaging in conscious discrimination. Many people who feel they know their own minds and do not detect any animus, may also be inclined to take umbrage at charges of racism and believe that their good faith efforts to call 'balls and strikes' are being misunderstood. Just as humans are often unaware of all of the functions of their organs and anatomy, however, they are often unaware of all of the functions of their evolved psychology.

The main purpose of this chapter is to identify these problems, and clarify how problems associated with folk biological racial classifications. Before concluding, however, it will help to outline four proposals for legal reform that may help to alleviate these problems and therefore deserve more sustained attention.

First, the evidence suggests that structural inequalities of treatment are unlikely to be cured by affirmative action programmes if those programmes are limited to remedies for past practices of intentional discrimination. Affirmative action of some kind may also be needed whenever folk biological racial classifications cause systematically disparate impacts in how the law or other institutions function with respect to people of different perceived races. This can happen in many contexts that go well beyond those where affirmative action is currently employed in the United States—for example, in employment, on juries, and in the marketplace. In addition, and contrary to Justice O'Connor's apparent suggestion in *Grutter v Bollinger*, some needs for affirmative action should be assumed to extend beyond the time needed to cure for past practices of intentional discrimination. The need should persist at least until a sufficiently clear showing that folk biological

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racial perceptions are no longer creating disparate impacts that undermine the equal treatment of persons.¹⁹

Second, although the Supreme Court does not currently interpret the Equal Protection Clause of the United States Constitution to protect against unintentional forms of disparate treatment (and instead leaves any such protection to democratic processes), democratic processes cannot be relied upon to generate laws, institutions, and official behaviours that genuinely treat people equally. To know that there are other regular and continuing sources of unequal treatment by state officials, while still interpreting the Equal Protection Clause to protect only against intentional discrimination, is thus to 'deny ... [some persons] the equal protection of the laws' in the most straightforward sense of the Equal Protection Clause's language. The Supreme Court's current interpretation of the clause thus rests on overly narrow assumptions about the psychological causes of unequal treatment. If these assumptions are refuted by a growing body of empirical evidence, then that fact should have implications for how best to interpret the Equal Protection Clause.

The Court has not always taken such a limited view of the causes of unequal treatment or the scope and application of the Equal Protection Clause's language (see Siegel 2017). Given the arguments in this chapter (which dovetail with a number of claims made by other social scientists about implicit bias and structural inequality), the Court should therefore consider interpretations of the Equal Protection Clause that (p. 905) would help the Constitution guarantee people *actual* equal treatment under the law. This would require, at minimum, an interpretation that allows for broader and more vigorous constitutional protection against disparate impacts caused by either intentional discrimination or psychological processes that regularly function to cause disparate treatment.

Third, if the coalitional alliances that often segregate people of different perceived 'races' into different groups are a major source of the problem, then processes that better integrate diverse groups should be a bigger part of the solution (for excellent and extended discussion, see Anderson 2010). Unfortunately:

Since concerted efforts to enforce *Brown v. Board of Education* in the 1980s, activists, politicians, scholars and the American public have advocated non-integrative paths to racial justice. Racial justice, we are told, can be achieved through multiculturalist celebrations of racial diversity; or equal economic investments in *de facto* segregated schools and neighborhoods; or a focus on poverty rather than race; or a more rigorous enforcement of anti-discrimination law; or color-blindness; or welfare reform; or a determined effort within minority communities to change dysfunctional social norms associated with a 'culture of poverty.'

(Anderson 2011)

All of these proposals are limited, however, insofar as they can coexist with *de facto* racial segregation. This still persists and is even growing in many parts of the United States (Anderson 2011; Roithmayr 2014). But the empirical evidence suggests that racial isola-

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tion tends to harden intergroup bias and stereotypes, whereas working and socializing together with common goals—at school, in employment contexts, in the army, in the public square, and on juries—tends to reduce intergroup bias (Gaertner and Dovidio 2000). More social integration is therefore needed to undermine the coalitional structures that sustain current folk biological racial beliefs. To be effective, this integration should ideally involve shared projects that ease the bonds of friendship and community among diverse citizens.

Fourth, because limited perception and attention is another source of the problem, and because different groups tend to have different patterns of cognitive limitation, deliberations that lead to state action should involve more people who can make up for one another's limitations in critical areas. For example, more police policy should result from face-to-face deliberations between police forces and the diverse citizens they serve. More police hiring and promotional decisions should require input from the communities policed.

For similar reasons, more juries in cases that involve racial minorities should be racially diverse. They should include people who are inclined to see particularity rather than group stereotype. The empirical evidence suggests that '[i]ntegrated juries deliberate longer, take into account more evidence, make fewer factual mistakes, and are more alert to racial discrimination in the criminal justice process than all-white juries' (Anderson 2011). 'Deliberation in an integrated setting [also] ... makes whites deliberate more intelligently and responsibly: They are less likely to rush to a guilty judgment, and more likely to raise and take seriously concerns about (p. 906) discrimination in the criminal justice process, than all-white juries. The need to justify oneself face-to-face before diverse others motivates people to be responsive to the interests of a wider diversity of people' (Anderson 2011). Hence, within constitutional limits, some affirmative action in some jury settings may even be needed to guarantee people the actual equal protection of the laws.

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(2) Provost's Postdoctoral Scholar in Human Genetics at the University of Chicago Department of Human Genetics.

(3) Wade's book has drawn criticism from many geneticists and social scientists. See, e.g., Michael Balter, *Geneticists Decry Book on Race and Evolution*, in *Science Insider* (8 August 2014). Wade has responded to some of these critics, charging them with being 'indoctrinated in the social-science creed that prohibits a role for evolution in human affairs.' See 'Five Critics Say You Shouldn't Read This "Dangerous" Book', *The Huffington Post Blog* (19 June 2014). This chapter does not accept that (or any other) creed, but rather assesses the relevant evidence about the role of evolution in human psychology and biology holistically.

(4) Genetic drift is a process whereby the frequencies of genetic alleles among human populations begin to differ over successive generations because of purely random chance.

(5) Assortative mating refers to mating patterns in which individuals with similar genotypes or phenotypes mate with one another more frequently than would be expected if mating were purely random.

(6) These are some of the groups that fall into the 'Dravidian' category, and who show the most of what David Reich has terms 'Ancestral South Indian' ancestry. David Reich and his colleagues have shown that this ancestral component is descended from an ancestral population from which the Andamanese Islanders appear almost completely derived (Reich and others 2009).

(7) These claims have truth conditions that are purely causal-historical, and thus dispense with the metaphysically problematic notion of a final cause (Kar 2013).

(8) Because reproduction can involve many complex processes, not only of recombination and random mutation, but also of insertions and deletions, there are different ways to estimate the genetic variation among humans. One simple rule of thumb is to take the average number of single nucleotide polymorphisms found per person and divide that by the average number of base pairs per person. Recent data from the 1000 Genomes Project suggest that each person has, on average, approximately one single nucleotide polymorphism for every 1000 base pairs (Altshuler and others 2012). Other types of genetic dif-

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ferences show individual variations on the same order of magnitude (Altshuler and others 2012).

(9) A ‘population bottleneck’ occurs anytime there is a sharp reduction in the population size of a group. These processes tend to reduce much of the genetic variation within a given population, which thus leads to a greater frequency of some alleles and lesser frequency (or even elimination) of others in subsequent generations.

(10) A ‘founder effect’ refers to a process whereby a subset of a population breaks away from its original population, often through migration, carrying with it only a subset of the original genetic variation from the original population. Like population bottlenecks, these processes tend to reduce the genetic variation within the new population, which thus leads to a greater frequency of some alleles and lesser frequency (or even elimination) of others in the new population.

(11) DNA typically comes in a double-stranded helix, each strand of which is made of a chain of single nucleotides that come in four varieties—commonly referred to as ‘A’, ‘C’, ‘T’ and ‘G’. When the nucleotides have the same value at the same locus among all members of a population, the nucleotides are not said to be ‘polymorphic’ in the population. A ‘single nucleotide polymorphism’ thus exists within a population if, at a given location, different people in the population have nucleotides with different values—thus allowing for genetic variation within the population.

(12) See, for example, *Crawford v Board of Ed. of Los Angeles*, 458 U.S. 527, 537–538 (1982); *Arlington Heights v Metropolitan Housing Development Corp.*, 429 U.S. 252, 264–265 (1977); *Washington v Davis*, 426 U.S. 229 (1976).

(13) *Parents Involved in Community Schools v Seattle School Dist. No. 1*, 551 U.S. 701 (2007).

(14) See, for example, *Grutter v. Bollinger*, 539 U.S. 306 (2003); *Regents of Univ. of Cal. v Bakke*, 438 U.S. 265 (1978).

(15) See, for example, *Parents Involved in Community Schools v Seattle School Dist. No. 1*, 551 U.S. 701, 851 (2007) (Thomas J, concurring) (‘Therefore, as a general rule, all race-based government decisionmaking—regardless of context—is unconstitutional.’); see also *id.* at 772 (‘Most of the dissent’s criticisms of today’s result can be traced to its rejection of the colorblind Constitution. The dissent attempts to marginalize the notion of a colorblind Constitution by consigning it to me and Members of today’s plurality. But I am quite comfortable in the company I keep.’).

(16) See, for example, *id.* at 750 (Thomas J, concurring) (‘Because this Court has authorized and required race-based remedial measures to address *de jure* segregation, it is important to define segregation clearly and to distinguish it from racial imbalance. In the context of public schooling, segregation is the *deliberate* operation of a school system to “carry out a governmental policy to separate pupils in schools solely on the basis of race”.’) (emphasis added and citations omitted); *Richmond v J.A. Croson Co.*, 488 U.S.

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469, 493 (1996) (stating that unless race-conscious legislation is ‘strictly reserved for remedial settings, [it] may in fact promote notions of racial inferiority and lead to a politics of racial hostility’).

(17) See, for example, *Grutter v Bollinger*, 539 U.S. 306 (2003); *Regents of Univ. of Cal. v Bakke*, 438 U.S. 265 (1978).

(18) In *Grutter*, she said, ‘We expect that 25 years from now, the use of racial preferences will no longer be necessary to further the interest approved today.’ *Grutter v Bollinger*, 539 U.S. 306 (2003). It should be emphasized, however, that Justice O’Connor was not suggesting the *Grutter* was based on a remedial rationale—especially as that term is used in the technical sense in the Court’s current affirmative action jurisprudence. She seemed to be predicting that the *diversity and educational rationales* upon which *Grutter* was based would no longer require affirmative action programs once certain widespread but lingering effects of past racist attitudes and segregation in society had been eliminated for a sufficient period of time.

(19) This is not to underplay other grounds for affirmative action, like the creation of a diverse educational experience.

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New Technologies, Old Attitudes, and Legislative Rigidity

John Harris and David R. Lawrence

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Abstract and Keywords

Two genetic technologies capable of making heritable changes to the human genome have revived interest in, and in some quarters a very familiar panic concerning, so-called germline interventions. These technologies are most recently the use of CRISPR/Cas9 to edit genes in non-viable IVF zygotes and Mitochondrial Replacement Therapy (MRT). The possibility of using either of these techniques in humans has encountered the most violent hostility and suspicion. Here, we counter the stance of the US NIH and its supporters by showing that differing global moralities are free to exist unimpeded under international biolaw regimes, which do not in any way represent unified opinion against such technologies. Furthermore, we suggest a more rational approach to evaluating them through analysis of similar technologies which have caused past controversy.

Keywords: human embryos, germ-line modification, gene editing, Crispr/Cas9, mitochondrial replacement therapy, MRT

1. Introduction

1

The concept of altering the human germline in embryos for clinical purposes has been debated over many years from many different perspectives, and has been viewed almost universally as a line that should not be crossed... Advances in technology have given us an elegant new way of carrying out genome editing, but the strong arguments against engaging in this activity remain

(Collins 2015)

THUS spake the director of the US National Institutes of Health, Francis Collins. As we shall see, however, this public statement is somewhat misleading.

The statement was issued in the wake of the media furore² engendered by the publication of research by Liang and others (2015), in which the genome of a human embryo was edited to correct mutations which are the basis of potentially severe β -thalassaemia type blood disorders. The controversy rolls on with the recent application by UK researchers for a licence to conduct similar experiments using the Crispr/Cas9 system (Cressey and others 2015).

It should be noted at this point that, in the Chinese research as well as the proposed UK research, the embryos were/would be destroyed once the success or failure of the procedure was determined. At no point were any of the involved embryos proposed for implantation or otherwise bringing to fruition. In a broader sense, the collective human germline remains unaffected by research in this manner; this is an idea to which we will return later.

Collins' claim regarding germline modification being 'universally' shunned is intriguing. He does not elaborate on how this has been demonstrated, legally or otherwise. Marcy Darnovsky, Executive Director of the bioconservative Centre for Genetics and Society, suggests in a statement supporting Collins that it would be in the US's interest to follow (or institute anew) 'international agreements, along the lines of the Council of Europe's Convention on Biomedicine and Human Rights and UNESCO's Universal Declaration on the Human Genome and Human Rights' (Centre for Genetics and Society 2015). The inference perhaps being that the named legislation represents Collins' universal consensus, though this notion is questionable at best.

The Council of Europe's Convention on Human Rights and Biomedicine (henceforth ECHR or 'the Convention') was intended to constitute a binding reference for patient rights and general human rights in the context of advancements in biotechnology and medical science. It has, numerically speaking, been quite successful in its uptake. The official listings published by the Council indicate that out of 47 member states, 35 are signatories and of these, 29 have ratified the Convention (Council of Europe 2015a). We cannot, however, necessarily take these figures at face value; particularly when we consider the idea of 'agreements' in the spirit in which it is employed by, for example, Darnovsky, who is representative of those broadly favourable to the spirit of Collins' statement.

Several of the leading European nations, at least as far as genetic science goes, for example the United Kingdom, Germany, and Belgium, made clear their disagreement with the Convention by choosing not to sign at all. Largely, these disagreements were over Article 18, regarding cloning human embryos for research, among other 'significant articles that conflict with [UK] legislation' (Science and Technology Committee 2004-05).

The Convention required only five states (Council of Europe 2015a: Art 33.3) to ratify in order for it to enter into force, and within eight months of its opening it had gained 23 signatures—a sufficient number of which ratified to allow an entry into force on January 12th 1999.³

Further ratifications quickly followed, giving a total of 13 within five years of publication. It is important to note that roughly two-thirds of the present-day signatures on the ECHR were made in 1997, while in the last ten years there has been (p. 917) only one new signatory: Albania in 2011 (Council of Europe 2015a). Though, this is perhaps unsurprising since it might be expected that most of those who were ever going to sign had done so by this point. In signing the Convention, nations do not necessarily 'express their consent to be bound by it' (Council of Europe 2015a) and so, if we are to treat this literally, we may not consider that this act in itself constitutes an accord with the ideals espoused within it.

Frances Millard (2010: 427) has suggested that nine of the ten post-communist central and eastern European states all signed and quickly ratified the ECHR, 'with no indication of engagement by parliamentary deputies, specialist committees, professional bodies, or the wider public'. We must ask, then, whether what might be termed 'mimetic' uptake of legislation without proper and mature consideration in this manner can be truly considered to represent consensus. Noting Millard's views on a perceived need by these nations for international 'legitimization', we must consider that for the most part, the newly sovereign states lacked specialist bioethical and patient rights legislation (Birmon-tiene 2004), having had to construct and legislate a recently democratized state. Much human rights policy was formed on the basis of Council of Europe guidelines, and it is of importance that we note that most of the Constitutions of these nations hold that the norms of ratified international treaties are directly applicable in the national legislation; so courts can rule based on the texts of international treaties, even if national laws have not yet been adopted after the ratification (Goffin and others 2008). This effectively means that in the Convention, these states were presented with ready-made legislation covering gaps in their own, which was fully and legally applicable with no further domestic law-making required. None of the states engaged in meaningful debate over any part of the Convention, if at all, and so ratifications came quickly and without dissent. We might also note that the provision of Article 1—namely, that 'Each Party shall take in its internal law the necessary measures to give effect to the provisions of this Convention' (Council of Europe 2015a: Art 1)—becomes self-fulfilling in respect to the aforementioned style of constitutional absorption of international non-binding conventions.

Instantly, then, from holding no position on the matters addressed by the Convention, these post-communist nations aligned in consensus with it. Of course, it is possible that one or more of these nations may eventually consider holding future debate on any of these issues and then be in a position to join a genuine consensus or not on the basis of something approaching informed consent.

If morally derived laws such as the ECHR do not reflect the moral standpoint of a particular nation, then such laws are unlikely to reflect either any contribution to a consensus nor yet any evidence for democratic support. While this can be held to be true under any theory of ethics, it has been argued that:

we need not adopt a quietism about moral traditions that cause hardship and suffering. Nor need we passively accept the moral norms of our own respective societies, to the extent that they are ineffective or counterproductive or simply unnecessary

(Blackford 2010: 62).

(p. 918) This is to say that the subjective values of a culture or nation are worthy of defence, and, as such, we do not have to accept contraventions of these from within or without. The method by which we defend our values on a national scale is through the enactment of laws, and so it may follow—as Darnovsky appears to agree—that to prevent encroachment from abroad one must pass international legislation.

To examine this, we might utilize the example once more of the ECHR, which is nominally aimed solely at member states of the Council of Europe. It is important to note that the Convention is not global legislation. Although it allows for the accession of non-member states⁴, the Convention contextualizes itself as pertaining to the benefit of the Council of Europe in its Preamble: ‘Considering that the aim of the Council of Europe is the achievement of a greater unity between its members ...’ (Council of Europe 2015a: Preamble). This passage can be interpreted as specifying the area of influence of the document, and as such makes it clear that it is intended to protect or rather promote a coherent expression of values within that area.

The issue which remains, then, is that while protection of one’s own values is acceptable, it is quite another action to impose such laws on others. This would usually constitute a contravention of human rights ideals and also steps somewhat beyond a defence, becoming an attack upon the values held by the subject. There are two ways in which we can consider this dilemma.

The first line of inquiry requires us to endorse the notion that international disagreement, represented by a failure of consensus amongst the drafting agents of a document, leads to a weak compromise designed to placate all parties. Such a criticism was levelled at the then-draft Universal Declaration on Bioethics and Human Rights by John Williams, who called it ‘a document that does not advance international bioethics in any way’ (Williams 2005: 214) and went on to suggest that ‘a genuinely significant international [declaration] ... is essentially unrealisable’. (Williams 2005: 215; for similar proposals see Harris 2004). This problem would appear to be a necessary result of formulating proposals for legislation to maximize acceptability, as would be one provision for law from a morally relativistic position; and so it lends itself as evidence in support of the idea that international laws have legitimacy issues.

Secondly, nations are free not to accept the terms of any international instrument. For example, as mentioned earlier several states refused to sign, let alone ratify, the ECHR (Council of Europe 2015a). Whether for reasons of protecting values already enshrined in domestic law (Science and Technology Committee 2004–05), or for reasons of cultural morality as given in India’s explanation for voting against the Universal Declaration on

Human Cloning (UDoHC) (that ‘some of the provisions of the Declaration could be interpreted as a call for a total ban on all forms of human cloning’ (United Nations 2005), when India supports therapeutic cloning), it is unquestionably the case that nations are able to protect their own values by refusing to accede. We might (wryly) note that the UDoHC was originally (p. 919) intended to be a binding Convention, but was downgraded due to disagreement (United Nations 2005).

Therefore, we may assume that differing global moralities are free to exist unimpeded under international biolaw regimes, and they do not in any way represent unified opinion against a technology such as germline modification; despite the way that supporters of the NIH’s stance may seek to justify their condemnation.

Having noted that appeals to moral and legislative consensus on the permissibility or even wisdom of germline interventions may be premature, it is now time to examine in more detail what might constitute a basis for a rational approach to new technologies in this field. To do so we will examine the emergence, or re-emergence, of three new such technologies that involve germline interventions. In the following sections the discussion follows lines explored by one of the present authors in two recent research papers (Harris 2016a and 2016b).

2. Altering the Human Germline in Embryos: A Case Study

The human embryo modification debate opened with the birth of Louise Brown, the first IVF baby on 25 July 1978 (for description of the technique, see Harris 1983; and for discussion of some possible advantages of human cloning, see Harris 1985 and 2004). However, the defining event was of course the birth of another instantly famous female baby in the United Kingdom, which was announced in *Nature* on 27 February 1997 (see Wilmut and others 2007). This baby was named Dolly, allegedly because she had been cloned from a mammary gland which instantly reminded those responsible of Dolly Parton. Louise and Dolly proved to be healthy and, as far as is publicly known, happy individuals; who, like the over five million babies since born worldwide via IVF, owe their existence to British science and in particular to the work of Bob Edwards and Patrick Steptoe (Brian 2013). Louise Brown and Dolly are related also by the unfortunate prejudice against them and denunciation of their respective births of those who objected and continue to object to the technologies and indeed the scientists that produced them. We may hope that a very large proportion of these children are glad to be alive and glad their births were not prevented by the suppression of the science that made them possible ... more of which anon.

Two genetic technologies capable of making heritable changes to the human genome have revived interest in, and in some quarters a very familiar panic concerning, so-called germline interventions. These technologies are most recently the (p. 920) use of CRISPR/Cas9 to edit genes in non-viable IVF zygotes (Collins 2015) and Mitochondrial Replace-

ment Therapy (MRT) the use of which was approved in principle in a landmark vote earlier this year by the United Kingdom Parliament (Human Fertilisation and Embryology Regulations 2015). The possibility of using either of these techniques in humans has encountered the most violent hostility and suspicion. However, it is important to be aware that much of this hostility dates back to the fears associated with IVF and other reproductive technologies and by cloning; fears which were baseless at the time with both having proven to be highly beneficial to humanity and to be effectively regulated and controlled.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) publishing their Universal Declaration on the Human Genome and Human Rights, on 11 November 1997, endorsed ‘The preservation of the human genome as common heritage of humanity’. Article 13 of the ECHR provides:

An intervention seeking to modify the human genome may only be undertaken for preventive, diagnostic or therapeutic purposes and only if its aim is not to introduce any modification in the genome of any descendants

(UNESCO 1997: Art 13).

How any such modification could be made without having the aim of introducing such ‘modification in the genome of any descendants’ the Council of Europe does not explain. And, Article 1 of the Additional Protocol specifically aimed at banning cloning provides:

1. Any intervention seeking to create a human being genetically identical to another human being, whether living or dead, is prohibited.
2. For the purpose of this article, the term human being ‘genetically identical’ to another human being means a human being sharing with another the same nuclear gene set (Council of Europe 2015b).

Those who appeal to the common heritage of humanity in this way have also come to see the present evolved state of the human genome, not only as the common heritage of humanity, but as involving the, almost always un-argued, assertion that the human genome must be ‘frozen’, as far as is possible, in perpetuity at this particular evolutionary stage.

The consensus against germline interventions per se—a consensus that one of us long ago argued was ill-conceived (Harris 1992: ch 8)—is now crumbling. The recent vote in the UK Parliament (Vogel and Stokstad 2015) to change the law concerning germline interventions—along with the previously mentioned recent application to conduct such research in human embryos—and the willingness of the United States Institute of Medicine of the National Academies to make a serious and objective re-assessment of these, are just two examples issues (see National Academies 2015; Harris 2016a).

UNESCO (and many before and since) conveniently ignore the fact that cloning is the only reproductive method that actually does preserve the human (p. 921) genome intact. Indeed, it copies it (though sometimes only almost) exactly. Other forms of human reproduction on the other hand randomly vary the human genome with each combination of the genetic material of two or more different individuals. What human reproduction does

not do very well is improve it. As Harris (2007) has argued, the human genome in its present state is a very imperfect 'work in progress'. The problem is that progress via Darwinian evolution is extremely slow and the direction unpredictable, save only that it will facilitate gene survival (Dawkins 1976). We surely need to accelerate either the development of better resistance to bacteria, disease, viruses, or hostile environments, or of the technologies that will be eventually necessary to find, and travel to, habitats alternative to the earth.

3. Mitochondrial Replacement Therapy (MRT)

As mentioned, recent papers, editorials, and news items discuss possible research and therapy using various genome modification techniques, and have been followed by the announcement that a group in China had used such techniques in human embryos (Cyranoski and Reardon 2015; Cyranoski 2015). In the light of these and other developments, we urgently need to re-assess the safety, efficacy, and ethics of the use of such techniques in humans and move towards a new consensus as to the appropriate conditions for their ultimate acceptability (Baltimore and others 2015; Cyranoski 2015; Lanphier and others 2015; Vogel 2015). David Baltimore and others (2015: 2) emphasize the need for such work to be carried out 'in countries with a highly developed bioscience capacity' and ones in which 'tight regulation' of such science exists or can be established.

In the UK, any further such modifications that would end up in the genome of an implanted human embryo would have to be licensed by the UK regulatory body, the Human Fertilisation and Embryology Authority (HFEA) as established by Act of Parliament in 1990. Such measures would probably also need to be approved separately by the UK Parliament, as has recently happened in the case of MRT (Human Fertilisation and Embryology Regulations 2015). In the UK, we have for more than 25 years had, so far, adequate and robust safeguards in place. However, these safeguards result from prior years of wide public consultation, scholarly research, and authoritative reports (Department of Health and Social Security 1984), resulting in a broad consensus on the way forward, established and continually reviewed by Parliament.

(p. 922) MRT is considered (by the above standard) as now 'safe enough' for use in humans, remembering that there is no such thing as 'safe'. What is 'safe enough' is context-relative and always involves risk benefit analysis appropriate to the context. For example, almost all chemical therapies used in the treatment of cancer are highly toxic and as a result, unlike most other pharmaceuticals licensed for human use, have never been tested on 'healthy adults' before clinical adoption. They are however considered safe enough by cancer patients, their families, and clinicians in the light of the lethal nature of the alternatives.

MRT will enable some 2500 women in the UK to have children genetically related to them and also avoid that child suffering terrible disease. Mitochondrial disease can be very se-

rious, causing conditions like Leigh's disease, a fatal infant encephalopathy, and others that waste muscles or cause diabetes and deafness.

3.1 Future Generations

Many objections to germline interventions emphasize that such interventions differ in affecting 'generations down the line' (Sample 2012). However, this is true not only of all assisted reproductive technologies, but of all reproduction of whatever kind. This so-called 'uncharted territory' (Sample 2012) naturally involves trade-offs between benefits to people now and concerns about future dangers. The introduction of all new technologies involves uncertainty about long-term and unforeseen events.

This is, of course, also true of 'normal' sexual reproduction, a very dangerous activity indeed, and one often described as a 'genetic lottery':

Every year an estimated 7.9 million children - 6 percent of total birth worldwide - are born with a serious birth defect of genetic or partially genetic origin. Additional hundreds of thousands more are born with serious birth defects of post-conception origin, including maternal exposure to environmental agents, (teratogens) such as alcohol, rubella, syphilis and iodine deficiency that can harm a developing fetus

(March of Dimes Birth Defects Foundation 2006: 2).

Sexual reproduction, with its gross inefficiency in terms of the death and destruction of embryos—according to Ord (2008), the estimated survival rate to term is in the region of only 37%, with around 226 million spontaneous abortions—involves significant harm to future generations, but is not usually objected to on these grounds.

If the appropriate test for permissible risk of harm to future generations is sexual reproduction, other germline changing techniques (other than sexual reproduction, that is) would need to demonstrate severe foreseeable dangers in order to fail. MRT will prevent serious mitochondrial disease and the suffering it causes for women with mitochondrial disease, their own children, and for (p. 923) countless future generations. This looks like a reasonable cost benefit strategy to attempt.

Moreover, as Harris (2016a) points out in a comprehensive discussion of these issues,

In the case of Mitochondrial disease we know that many women will continue to desire their own genetically related children and will continue to have them if denied or unable to access MRT. The denial of access to MRT will not prevent serious disease being transmitted indefinitely through the generations whereas access to MRT can be expected significantly to reduce this risk. The choice here is not between a germline intervention which might go wrong and as a result perpetuate a problem indefinitely and a safe alternative. It is between such a technique

and no current alternative for women who want their own genetically related offspring and who will also act so as to perpetuate the occurrence of disease.

In other words, the alternative to MRT involves a greater known risk.

3.2 Three-parent Families

The popular press usually labels MRT as the ‘three genetic parents’ process, despite the fact that the third-party DNA contained in the donated mitochondria comprises much less than 1% of the total genetic contribution, and does not transmit any of the traits that confer the usual family resemblances and distinctive personal features in which both parents and children are interested. The mitochondria provide energy to cells, and when they are diseased cause inheritable harm—hence the need for mitochondria replacement therapy. No identity-conferring features or other familial traits are transmitted by the mitochondria. In any event, to be a parent properly so called, as opposed to a mere progenitor, involves much more than a genetic contribution to the child and often not even a genetic contribution.

4. The Use of CRISPR/Cas9 in Embryos

Many of the arguments rehearsed above also apply to objections to other germline modification techniques. To return to our starting point, Francis Collins (2015) has further stated:

[T]he strong arguments against engaging in this activity remain. These include the serious and unquantifiable safety issues, ethical issues presented by altering the germline in a way that affects the next generation without their consent ...

(p. 924) ‘Serious and unquantifiable’ safety issues feature in all new technologies—what is different here? Collins thinks one important difference is absence of consent.

4.1 Consent

Consent is simply irrelevant here for the simple and sufficient reason that there are no relevant people in existence capable of either giving or withholding consent to these sorts of changes in their own germline. We all have to make decisions for future people without considering their inevitably absent consent. All would be/might be parents take numerous decisions about issues that might affect their future children, and they/we do this all the time without thinking about consent of the children; how could they/we not do so? There are decisions first and foremost in most cases of sexual reproduction, about what genetic endowment is likely to result from a particular pairing (or more complex combination) of sets of chromosomes. George Bernard Shaw and Isadora Duncan were famous, but only partial and possibly apocryphal⁵ exceptions. When she, apparently, said to him something like: ‘why don’t we have a child ... with my looks and your brains it cannot fail’ and received Shaw’s more rational assessment ... ‘yes, but what if it has my looks and your

brains!’ Although unlike most would-be parents, they did think about what combination of their collective genes would be advantageous or otherwise, even they did not think (unlike Collins) their decision needed to wait for the consent of the resulting child. Nobody does! All parents decide for their present and future children until such children are capable of consenting for themselves. This is not, of course, to say that parents and scientists should not decide responsibly on the best available combination of evidence and argument; this they must do. Rather, the basis of their decision-making cannot, for obvious reasons, include the consent of the future children.

This is of course Derek Parfit’s famous ‘non-identity problem’ (1984: 351–377). This disregard of the relevance of such consents is this potential child’s only chance of existence and therefore so long as the best guess is that the child’s eventual life would not be unacceptably awful, it would be in that child’s interests to be created.

Notice that those who raise issues of consent in relation to non-existent beings, or indeed in relation to those beings incapable of consent, only do so in circumstances when they wish to claim that the relevant children would not, or should not, have consented, rather than the reverse, and therefore that those potential children should not be or have been born.

If there is a discernible duty here it is surely to create the best possible child. That is what it is to act for the best, ‘all things considered’.⁶ This we have moral reasons to do; but they are not necessarily overriding reasons (Harris 1985; 1998).

(p. 925) 4.2 Transgenerational Epigenetic Inheritance

One further possibility that has, we believe, so far entirely escaped attention in this context is the fact that heritable changes are not necessarily confined to conventional germline genetic effects (Reardon 2015). As noted recently: ‘The transmission of epigenetic states across cell divisions in somatic tissues is now well accepted and the mechanisms are starting to be unveiled. The extent to which epigenetic inheritance can occur across generations is less clear ...’.⁷ For example, how can UNESCO’s absurd claim already noted concerning the obligation to preserve ‘the human genome as common heritage of humanity’ be applied to epigenetic effects which may only be apparent *post hoc*? Should we be alarmed or comforted by this apparent crack in the armour? These issues have been discussed recently elsewhere⁸ and they are issues on which the authors continue to work.

For now, we need not panic. Rather, we need to recognize that we are the products of a germline-altering process called evolution, which uses the very hit and miss experimental technology sometimes politely called ‘sexual reproduction’ (and sometimes not). That process is mind-bogglingly slow, but it has not stopped and we cannot stop it except by our own extinction. We know for sure that in the future there will be no more human beings and no more planet Earth. Either we will have been wiped out by our own foolishness or by brute forces of nature or, we hope, we will have further evolved by a process

more rational and much quicker than Darwinian evolution; a process described by both Harris (2007) and Lawrence (2014).⁹

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Notes:

- (1.) This chapter follows lines developed in Harris (2016a, and 2016b).
- (2.) Including the entertainingly titled Stanley (2015).
- (3.) A date at which, we might note, human germline editing of the type currently being discussed was not a reality, let alone a concern of policymakers.
- (4.) 'After the entry into force of this Convention, the Committee ... may ... invite any non-member State of the Council of Europe to accede to this Convention' (Council of Europe 2015a: Art 34.1).
- (5.) 'Actually,' said Shaw, 'it was not Isadora who made that proposition to me. The story has been told about me in connexion with several famous women, particularly Isadora Duncan. But I really received the strange offer from a foreign actress whose name you wouldn't know, and which I've forgotten. But I did make that reply.' (Gibbs, 1990: 417, 419) (Section: Tea with Isadora, excerpt from "Hear the Lions Roar" (1931) by Sewell Stokes, published by Harold Shaylor, London).
- (6.) John Harris develops the importance of this imperative, 'to act for the best all things considered', in his new book *How to be Good* (OUP 2016).
- (7.) Announcement of a workshop on Transgenerational Epigenetic Inheritance of The Company of Biologists 4th-7th October 2015 organised by Edith Heard, Institute Curie, Paris, France and Ruth Lehmann Skirball Institute, *The Company of Biologists*, 2015) <<http://workshops.biologists.com/transgenerational-epigenetic-inheritance/>> accessed 27 June 2015.
- (8.) (n 25) *Germ line modification and the burden of human existence*.
- (9.) Also in a forthcoming doctoral thesis.

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New Technologies, Old Attitudes, and Legislative Rigidity

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Transcending the Myth of Law's Stifling Technological Innovation: How Adaptive Drug Licensing Processes Are Maintaining Legitimate Regulatory Connections

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This chapter explores the lessons that can be drawn from how adaptive drug licensing processes cope with legitimacy issues of regulatory connections. The exploration assumes that a responsive approach to technology regulation offers opportunities to meet legitimacy requirements. Looking at existing and proposed adaptive drug licensing pathways through the lens of this theoretical frame we see a realistic responsive approach to regulation. By indicating that adaptive licensing can bring beneficial medicinal drugs earlier to patients this approach seems to be equipped to transcend the myth of law's stifling technological innovation. The evaluation of the current stage of adaptive drug licensing leads to three tentative lessons. First, a shared interest, accompanied by strong drivers and enablers, is crucial; second, ongoing prudent coordination of a leading regulatory agency is essential; third, to ensure that new responsibilities and the norms of participation, transparency, integrity, and accountability are taken seriously a new social contract can be supportive.

Keywords: responsive technology regulation, legitimacy technology regulation, adaptive drug licensing, evidence-based regulation, stepwise regulatory learning, prudent regulatory stance

1. Introduction

REPRESENTATIVES of industry and science often claim that regulation stifles beneficial innovation because it lags behind technological development. This was clearly voiced, for instance, in the 2010 Bernstein Report of the American BioCentury Publications on pharmaceutical innovation which claimed that

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the regulatory system is not configured to learn, and until it learns to adapt to science and clinical experience, the regulatory paradigm will continue to delay the progress of needed treatments to patients and drive risk capital to invest in other endeavours.

(BioCentury Publications 2010)

In conclusion BioCentury emphasized that regulatory innovation is urgently needed to connect regulation successfully with pharmaceutical innovation.

The necessity of continuously maintaining connections between regulation and technological innovation has also been brought forward by influential scholars and regulators. At the launch of the journal *Law, Innovation and Technology* Brownsword and Somsen offered sophisticated and inspiring ideas on how the connection between technological innovation and (legal) regulation can be maintained in order to safeguard human rights and human dignity, and, at the same time support desirable technological innovation and ensure that benefits are fairly shared (2009: 3). According to this account, a 'successful' regulatory connection involves the legitimacy of the particular regulatory environment.

In the pharmaceutical sector Western regulators have been strongly engaged to support the marketing of urgently needed innovative drugs. To ensure that patients suffering from rare conditions enjoy the same quality of treatment as other patients, the United States enacted orphan drug regulation in 1983. Other examples of seeking appropriate regulatory connections are the accelerated, exceptional, and conditional approaches to pharmaceutical authorization which serve to bring urgently needed medicines to the market and to expedite patient access (Eichler and others 2012: 427; Ludwig Boltzmann Institute 2013). Over the past eight years, a wave of proposals for prospectively planned adaptive approaches to drug licensing has emerged under various labels, including a staggered approach, managed entry, adaptive approval, and progressive authorization (Eichler and others 2012: 427). By making the licensing process more dynamic, inclusive, interactive, and tailored to patient needs these proposals promise to maximize more generally the positive impact of new pharmaceuticals on public health.

Some of these regulatory innovations seem to have effectively maintained the regulatory connection with pharmaceutical innovation and patient needs. The US Orphan Drug Act, for instance, is said to be one of the most successful legislative interventions of the United States in recent history (Haffner, Whitley, and Moses 2002). Empirical research on the accelerated, exceptional, and conditional approaches to licensing indicates that drugs that were approved with more limited clinical data sets turned out to be as safe as drugs that followed the standard procedure (Boon and others 2010; Anardottir and others 2011). The legitimacy of these regulatory innovations, however, is contested. Despite the regulatory efforts to increase the access of patients to urgently needed pharmaceuticals the number of approved drugs per year has remained flat. Commentators conclude that there are few truly innovative treatments (Eichler and others 2012: 426; Baird and others (p. 931) 2013). It is striking that only a few pharmaceutical companies have used the conditioned approval (Boon and others 2010). Probably a lack of trust in the regulatory inno-

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innovations has played a role in these examples. All stakeholders seem to wrestle with the uncertainties that conditioned licensing involves (Hoekman and others 2015). To tackle these problems, adaptive drug licensing pathways have been proposed recently in the US, Europe, Canada, Japan, and Singapore. These innovations of regulatory processes seem to have the potential to improve the legitimacy of regulatory connections.

The chapter explores the lessons that can be drawn from how adaptive drug licensing processes cope with legitimacy issues of regulatory connections. Adaptive licensing is a particularly interesting case because it seems to be supported worldwide by a large range of relevant stakeholders. It uses a responsive approach to regulation which is regarded as the way forward to cope with the uncertainties of technological developments and their effects (Levi-Faur and Comaneshter 2007; Dorbeck-Jung 2013). The chapter first explores the promises and requirements of responsive regulation to make legitimate connections with technological innovation. The exploration starts with a brief discussion of specific legitimacy problems of technology regulation, the aim being to identify a responsive approach that is equipped to cope with these problems. Second, the chapter discusses the regulatory strategy of adaptive licensing of medicinal products. It describes why this example of responsive technology regulation has been proposed, how it has been developed, and what the first experiences are. It evaluates the promises and legitimacy problems regulators are currently facing to bring adaptive licensing into practice. This leads to tentative lessons on the factors that could stimulate the legitimacy of technology regulation.

2. Promises and Requirements of Responsive Approaches to Technology Regulation

2.1 Specific Legitimacy Issues of Technology Regulation

To understand specific legitimacy issues, it is helpful to have a closer look at the notion of the 'social licence' of technology. Generally, this notion is understood as 'that in democratic societies, it falls to politicians and regulators to guide desirable technological innovation' (Brownsword and Somsen 2009: 2). It is the task of (p. 932) regulators to set the limits of technological innovation, to coordinate the assessment and management of risk, to design procedures for public participation, to set the terms for compensatory responsibility, and to support desirable technological innovation.

When making efforts to take the 'social licence' seriously regulators have to cope with numerous difficulties that refer to governability aspects and good governance norms. The notion of governability sees to the intended effects of regulation, while norms of good governance have been derived from the broad concept of the rule of law and certain ideas on democracy (van Kersbergen and van Waarden 2004). Governability and good governance are aspects of legitimate governance. They concern two of the four legitimacy claims that guide the contributions of this Handbook (see the editorial introduction to this volume). These two claims refer to the performance of regulation and to the norms of the

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regulatory process. Performance-based legitimacy regards the outcomes of regulation (do outcomes contribute to the achievement of the goals of regulation?), while democratic legitimacy is concerned with the quality of regulatory processes (are the processes transparent, inclusive, and deliberative; and are regulators independent and accountable for their activities?). This chapter focuses on these two legitimacy claims.

Regarding performance-based legitimacy regulators have to cope with contradictions and tensions within the social licence tasks. Setting limits to ensure constitutional rights and regulatory goals can conflict with the regulatory task to enable technological innovation. Uncertainties over safety issues, for example, can inhibit the marketing of innovative drugs. In the regulation of new technologies, the most critical problem is how to cope with the *uncertainties* related to technological development and its broader social, ethical, and legal impact. Uncertainties exist in relation to the characteristics of technological development, its benefits and risks, as well as its implications with regard to the human condition and constitutional concerns (Hodge, Bowman, and Ludlow 2007; Hodge, Bowman, and Maynard 2010; Reichow 2015). It is uncertain whether new technologies can be appropriately controlled by the existing regulation or whether there are regulatory gaps that should be reduced. In addition to these 'technology-related uncertainties' regulators have to cope with general uncertainties about whether the goals of regulation will be achieved, whether control measures will create trust, and whether the regulated parties will comply with the rules ('general regulatory outcome uncertainties').

Technology-related uncertainties are not in themselves new. They accompany the emergence of any new technology. What is arguably new, however, is the potential scope and impact that these 'uncertainties' may have, in part, due to the level of sophistication and complexity now associated with any new, emerging technology (Dorbeck-Jung and Bowman 2017). Furthermore, emerging technologies are placed today in more connected, globalized, and emancipated societies. This poses particular challenges to regulatory responses. Also new is the current effort to take the social licence of technologies seriously at early stages of the development. (p. 933) According to the European view on the precautionary principle, regulators have to take action at an early stage of technological development when basic values like human dignity, health, safety, environment, and privacy are at risk (EC 2000; Fisher 2007). Regulators (and sometimes regulated parties) are obliged to explore the latest state of science and technology and its consequences for regulatory processes. Recently, under the umbrella of so-called responsible research and innovation, a myriad of proposals has been brought forward to develop frameworks for guiding technological development legitimately before its impacts come to fruition, under circumstances in which multiple uncertainties exist (Owen and others 2012; von Schomberg 2013; Dorbeck-Jung and Bowman 2017) Anticipatory regulatory approaches, though, have to recognize the limits of prediction (Kearnes and Rip 2009).

To tackle uncertainties at an early stage of development is extremely difficult for regulators, because they are obliged to base all their activities on scientific evidence. Evidence-based regulation requires access to relevant knowledge and time for reflection on the consequences of new insights for regulatory frames. In these activities, regulators are

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bound to adequately respond to claims of *scientific legitimacy* (Forsberg 2012). Adequate responses include continuous enhancement of knowledgeability, ongoing tests of the robustness and reliability of knowledge and the involvement of all stakeholders in knowledge gathering (Kica Ibraimi 2015). Appropriate stakeholder engagement is also one of the claims of *democratic legitimacy*. Further claims are the transparency of regulatory processes and outcomes, independent regulators and accountability (Scharpf 1999; Schmidt 2010).

Given the numerous requirements for legitimate technology regulation, cooperation with all stakeholders seems to be the way forward to connect regulation to fast moving technological development. In technology law, co-regulation has been introduced at a very early stage of the development. From the very beginning in the nineteenth century technology law depended on co-regulation between industry, experts, and government (Kloepfer 2002; Randles and others 2014). Knowing the limits of their technological knowledge governments have built on private standard setting and private oversight activities. Vice versa, industries have often welcomed regulatory collaboration because they expect that public regulation provides stability, certainty, and intellectual property protection. Currently, co-regulation is frequently employed in the regulation of emerging technologies. In the regulatory process of therapeutic nanoproducts, for example, the medicines agencies collaborate with influential scientists, industry associations and patient organizations to get insights into potential regulatory gaps (Dorbeck-Jung 2013). In regulatory processes of nanotechnologies, for instance, regulatory decisions are prepared by continuous coordination of scientific and regulatory competence in the context of network building and maintenance (Reichow 2015).

According to the focus on co-regulation, the 'social licence' is interpreted as a shared responsibility of public and private regulators. Due to the dynamics of (p. 934) technological development and changing insights into its effects trade-offs between restriction and facilitation of technological innovation are temporary and fragile. In the next section we discuss responsive perspectives which are said to be equipped to cope with the social licence tasks.

2.2 Responsive Approaches to Regulation

Responsive approaches to regulation have been proposed by Nonet and Selznick (1978), Selznick (1992), Ayres and Braithwaite (1992), Braithwaite (2006; 2013), Gunningham, Grabosky and Sinclair (1998), Baldwin and Black (2008) and Black and Baldwin (2010). Drawing on different strands of social scientific theory these frameworks underpin different enquiries. The objective of the highly influential theory of Braithwaite is to maximize enforcement strategies, while Nonet and Selznick more broadly sought to reconnect law to social problems. Gunningham, Grabosky, and Sinclair's ideas on 'smart' regulation have extended Ayres and Braithwaite's regulatory theory with a more holistic perspective including the interactions between regulators and regulated parties, as well as with the requirement of compatible regulatory instruments (Baldwin and Black 2008: 65). Taking into account the criticisms of responsive enforcement strategies, Baldwin and Black pro-

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posed further extensions which they regarded as 'really responsive regulation' (2008, 2010). 'Really' responsive regulation shifts the focus from individual compliance motivations to the logics, institutional environment and performance of a particular regulatory regime. It draws attention to changes of all elements of the analytical framework which is said to be applicable not only in the context of enforcement, but to all regulatory activity (Baldwin and Black 2008: 69).

To get insight into how regulators can cope with the legitimacy issues of technology regulation we elaborate on Nonet and Selznick's ideas (1978; Selznick 1992). Unlike other frameworks of responsive regulation Nonet and Selznick focus on the legitimacy of regulatory connections. Their ideas about prudent co-regulation and experimentation can inspire legitimate technology regulation. Nonet and Selznick proposed responsive law to renew the connections between law and the social environment. They had observed that earlier forms in the evolution of law, which they described as repressive and autonomous, had undermined the authority of law. With its sharp separation of law and politics, 'autonomous law' had met fundamental critiques that resulted in a crisis of law's legitimacy (Nonet and Selznick 1978: 4). To enable law to contribute to the solution of social problems, Nonet and Selznick proposed a responsive approach that aspires to function as a vital ingredient of the social order and reliable source of saving society from arbitrary will and unreason. Emphasizing the potential resilience and openness of institutions, responsive regulation is open to 'challenges at many points, should encourage participation, (p. 935) and should expect new social interests to make themselves known in troublesome ways' (Nonet and Selznick 1978: 6).

The core idea of Nonet and Selznick's approach is that regulatory legitimacy can be enhanced by critical responses to regulatory concerns and consequent adaptation of structures and institutional environments when this is required to solve social problems. Critical responses include attempts to strike a balance between conflicting interests and conflicting normative requirements. To deal with these challenges, Selznick later advocated a prudent regulatory stance (1992). Referring to Aristotle's ideas he emphasized that prudence does not mean to focus on cunning intelligence and economic calculation (Selznick 1992: 60). Prudent regulators rather focus on adequate moral judgements in regulatory practices. Responsive regulation commits regulatory institutions (1) to enlarge their scope of inquiry to embrace knowledge of the social contexts and effects of regulatory decisions; (2) to a style of reasoning that reaches beyond mere rule-following by focusing on social consequences; (3) to test alternative strategies for the implementation of mandates and reconstructing those mandates in the light of what is learned; and (4) to cooperate with all stakeholders and encourage participation (Nonet and Selznick 1978; Selznick 1992; Trubek and others 2008: 1). In short, responsive regulation involves continuous interactive learning and alignment processes.

2.3 Responsive Technology Regulation

To underpin the investigation of the performance of technology regulation efforts have been made to develop analytical frameworks that draw on Braithwaite's ideas (Levi-Faur and Comaneshter 2007) and Selznick's work (Dorbeck-Jung 2011; 2013). This chapter builds on Dorbeck-Jung's operationalization of Selznick's perspective which focuses on broader legitimacy issues. The aspirations of responsive regulation seem to have the potential to cope with the legitimacy challenges of technology regulation. To tackle general regulatory outcome uncertainties and specific technology-related uncertainties, responsive regulation encourages a focus on continuous knowledge collection and exchange. It indicates that prudent regulators are aware of the limits of evidence-based regulation and prediction in the context of large uncertainties. Responsive regulation recognizes the tensions between regulatory tasks. It supports prudent weighing of contradictory tasks, continuous vigilance and prudent adaptation of regulation. Responsive regulation strongly supports the participation of all stakeholders. It stimulates the transparency of regulation, as well the integrity and accountability of regulators. Maximizing responsiveness of regulation is, however, as Nonet and Selznick concede, a 'high-risk' approach. In their words: 'The high-risk perspective ... may invite more trouble than it bargained for, foster weakness and vacillation in the face of pressure, and yield too much to activist minorities' (Nonet and Selznick 1978: 7). Hence, responsive regulators are required to critically review the consequences of their activities.

Regarding the inspiration Nonet and Selznick's ideas offer it is striking that regulatory theory has hardly built on their approach. Probably this is mainly due to the vagueness of their conceptualization and lack of operationalization. In contrast, Ayres and Braithwaite presented a fully fledged analytical framework that has been used frequently in empirical research and has been continuously refined (Braithwaite 2006; Baldwin and Black 2008; Braithwaite 2013). In addition to the critical remarks on this influential framework that were addressed by Baldwin and Black (2008: 68), Lehmann Nielsen (2006), and Lehmann Nielsen and Parker (2009) have shown how difficult it is for regulators to act responsively. The success of responsive regulation seems to depend on so many factors, among which are the knowledgeability of the regulatory staff, its communication and relational skills, as well as the institutional capacity for integrity of the regulatory agency (Lehmann Nielsen and Parker 2009: 395). Due to restrictions of time and financial resources, regulators usually set priorities regarding the requirements of responsive regulation. The next section explores how regulators are coping with these difficulties in a responsive approach to the licensing of medicinal products.

3. Adaptive Licensing of Medicinal Products—A Realistic Responsive Approach?

3.1 Why and How Adaptive Licensing Pathways Have Been Developed

Since drugs regulation was established the approval provisions have been challenged by the controversy over timely access to new therapeutics, product withdrawals and post-approval modifications to labels (Eichler and others 2012: 426). Proposals to make the approval of drugs more adaptive to scientific development and the requirements of the social context are a response to the critique of existing licensing pathways. The critique focuses on the conundrum of 'evidence versus access to medicines' which was strongly voiced by human immunodeficiency virus (HIV) advocacy groups in the 1980s. As one of their spokespersons put it: 'The safest drug that no one can afford or that arrives too late is of no benefit to a patient' (Eichler and others 2015: 235). At present, the costs and complexity of the clinical (p. 937) trials that the drug developer needs to conduct seem to increase without a concomitant increase in the number of new drug approvals (Baird and others 2013). Pharmaceutical firms have difficulties to meet a continuously increasing demand of safety and efficacy data to market a new drug. In the words of Eichler and others (2012: 427):

There is tension across satisfying the need for comprehensive information on benefits and risks, reducing barriers to innovation, and providing timely patient access. Under the current model of drug licensing, it is difficult to improve the terms of these trade-offs.

Adaptive licensing is said to reduce this tension and to get a medicine eight years earlier to patients than is possible under the traditional drug development cycle (Baird and others 2013). Looking at the development of adaptive drug licensing pathways, we see three waves of regulatory responses that built on each other. First of all, in the 1980s, a myriad of new regulations was issued to enable and expedite the approval of drugs. Responding to the critique of HIV, rare diseases, and other advocacy groups, regulators introduced orphan drugs regulation, as well as the scheme for accelerated approval (US), the conditional marketing authorization (Europe and Japan), and the approval under exceptional circumstances to treat rare and life-threatening conditions (Europe). Commentators agree that these regulatory responses have paved the way for more fundamental regulatory innovation (Eichler and others 2012; Jong de, Putzeist, and Stolk 2012; Baird and others 2013). Yet, they also criticize these regulatory adaptations for not adequately responding to the latest far-reaching changes in drug innovation and its social context (among which we should note personalized medicine and increasing influence of payers). The new regulations have been useful only to a small subset of drug development (serious and life-threatening conditions) and they have received less attention than they deserved. Pharmaceutical companies perceive the conditional marketing authorization, for example, only as a rescue option when evidence is insufficient (Hoekman and others 2015). A major point of critique is that this 'first wave' of regulatory innovation still follows the tradi-

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traditional binary approach to licensing that is characterized by the dichotomy of pre- versus post-licensing stages. This approach focuses on the 'single magic moment' between non-approval and approval (Eichler and others 2012: 426). It does not respond adequately to scientific progress in clinical trials, requirements of deliberative regulatory processes, and reimbursement demands. To align more closely to patient needs, growing scientific evidence and insights into the benefits and risks, and timely access to new drugs, influential commentators advocate a more comprehensive and transformative regulatory framework (Eichler and others 2012; 2015).

This argumentation was taken into account in the second wave of adaptive approaches to drugs licensing that have been proposed since 2005.¹ Although these proposals emerged under various labels and vary in detail, all of them advocate prospectively planned drugs licensing and adaptation to evolving knowledge of drugs. (p. 938) In 2012, a group of leading regulatory agencies, pharmaceutical companies, industrial organizations, and universities came up with the next step in the evolution of drug approval—a more general, uniform, and comprehensive perspective on adaptive licensing (AL). This group proposed the following working definition (Eichler and others 2012: 428)²:

Adaptive licensing is a prospectively planned, flexible approach to the regulation of drugs and biologics. Through iterative phases of evidence gathering to reduce uncertainties followed by regulatory evaluation and license adaptation. AL seeks to maximize the positive impact of new drugs on public health by balancing timely access for patients with the need to assess and to provide adequate evolving information on benefits and harms so that better-informed patient-care decisions can be made.

According to this definition, adaptive licensing includes the entire life span of a drug. The dichotomy of pre- and post-authorization stages of the traditional approach is replaced by a graded, more tightly managed market entry. Adaptive licensing is an attempt to integrate, evaluate, and refine earlier regulatory innovation from a 'systems' perspective. It draws on the insight that knowledge of drugs evolves over time. Adaptive licensing approaches build on staged assessment and reassessment rather than conventional single-point-in-time evaluations. They are based on stepwise learning under conditions of acknowledged uncertainty, with iterative phases of data gathering and regulatory evaluation. They involve an initial approval which is based on the evaluation of a limited clinical trial, one or more subsequent cycle(s) of data collection, and an analysis and adjustment of the intended treatment population ('subsequent approval') which results in a 'full authorisation' (Eichler and others 2012: 430–432). The goal of each authorization step is to minimize the uncertainty about the benefits and risks and to ensure that patients and practitioners understand what is and what is not known about the product. It is expected that the degree of uncertainty will diminish with additional evidence generation which is said to be bound to the usual scientific and methodological rigour.

At present, the proponents of adaptive licensing emphasize that 'one size does not fit all patients' (Eichler and others 2012: 431). As different unmet patient needs may require

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different data, a variety of pathways have to be developed on a case-by-case basis.³

Various pathways of adaptive licensing respond also to the trend of more individualized therapies in modern medicine (Rosano and others 2015).

With its focus on aligning regulation on the basis of a continuously evolving and tested knowledge base while taking into account the changing context and social consequences of drugs approval, as well as the input of all stakeholders, adaptive licensing proposals appear to follow truly responsive approaches in the sense of Selznick's ideas. They address aspects of scientific and democratic legitimacy. According to the legitimacy norms of technology regulation that were set out in the second section, the question arises whether regulators are prudent enough to recognize the conditions on which the success of adaptive licensing pathways depends, (p. 939) whether they do take into account all concerns of legitimate regulatory decision making, whether they understand the limits of their proposals and whether they develop ideas to cope with these challenges. In the next section the proponents' views with regard to the requirements for legitimate adaptive licensing will be discussed.

3.2 Conditions for Legitimate Adaptive Licensing Pathways

Proponents of adaptive licensing pathways have addressed a number of conditions that should be met to get safe and beneficial pharmaceuticals earlier to patients. They have also specified aspects of legitimate regulatory decision making. They emphasize that it is crucial that all stakeholders are clearly aware of the temporary uncertainties about benefits and risks of the drug concerned and that they clearly accept them (Eichler and others 2015: 238). Patients, practitioners, payers, and regulators must be willing to take greater risks, including the risk of the unknown when it comes to ultimate efficacy and safety (Eichler and others 2012: 427). In this context commentators clarify that adaptive licensing is not about changing the necessity of a positive benefits-risks balance that usually governs the market entry of all pharmaceuticals. Change is only proposed regarding the acceptable degree of evidence. As it is not yet clear whether 'acceptable' refers to a standard of clear and convincing evidence ('substantial evidence') or a well-reasoned and transparent 'balance of probabilities with continuous monitoring' (Eichler and others 2015: 238), a further requirement is an acknowledged definition of acceptability. Furthermore, continued surveillance is said to be critical because it may reveal rare adverse events and other information that could lead to further adjustments of the drug label and/or treated population.

Regarding the legitimacy of regulatory decision making a new *social contract* has been proposed by the Health Technology Assessment (HTA) International Policy Forum (Husereau, Henshall, and Jivraj 2014: 245). The social contract is a response to the requirements of informed and interactive decision making, extended collaboration, and alignment of all stakeholders. It recognizes that all parties are important contributors to shared decision making and that the goals and benefits of adaptive approaches require a shift in the roles, obligations, and responsibilities of clinicians, patients, the public, regulators, HTA/coverage bodies, and industry. This would mean, for instance, that clinicians

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might lose some autonomy in prescribing drugs (in particular, the off-label use of drugs). Regarding the limited population of clinical trials, appropriate targeting to the label population is critical to anticipate safety and efficacy problems. Disregard or insufficient understanding of the label would defeat the intent of adaptive licensing to reserve certain medicines for (p. 940) specific patients who need them most and are therefore willing to accept a higher degree of uncertainty (Eichler and others 2012: 430).

Under an adaptive licensing scenario more emphasis is laid on public communication of uncertainties, the evolving nature of knowledge and the provisional nature of benefit-risk assessments (Eichler and others 2012: 429; Husereau, Henshall, and Jivraj 2014). The concept of the new social contract involves improvements in communication, interaction, and cooperation. Patients and physicians have a greater personal responsibility for communicating the personal benefit-harm profile of a drug. Under certain circumstances they could be required to accept limited product liability. The 'contract' commits regulators to co-regulation with all involved parties and vice versa. Particularly, HTA and coverage bodies are bound to cooperate more intensively with regulators and to provide more clarity about reimbursement and data assessment than in the current situation. Industry is required to deliver more downstream data and to be more transparent about their development plans. To ensure that the relevant clinical data will be collected a new level of cooperation among industry, regulators, and payers is required. Adaptive licensing proposals involve the participation of patients in defining acceptable thresholds of risk tolerance and an acceptable level of uncertainty. To achieve the goal of timely patient access, a further condition is the alignment of HTA evidence requirements with those of licensing and interactions with payers on the reimbursement prerequisites (Henshall and others 2011: 20; Eichler and others 2012: 435).

Regarding the numerous conditions which seem to require far-reaching innovation of regulatory drug approval processes, new competences and commitment of stakeholders, many questions arise in relation to the feasibility of adaptive licensing pathways. In other words, is adaptive drug licensing a realistic responsive regulatory approach?

3.3 Feasibility of Adaptive Licensing Pathways

In the literature, the proposal of adaptive licensing pathways has met with strong interest, but also raised many feasibility questions. To get more insights into these questions projects have been set out in the US, Europe (EU), and elsewhere. Since 2011, Massachusetts Institute of Technology's (MIT) Center of Biomedical Innovation Initiative 'New Drug Development Paradigms' (NEWDIGS) programme is working on defining the building blocks and processes of an adaptive development and licensing trajectory (Baird and others 2014; Trusheim and others 2014). NEWDIGS focuses on modelling the effects of potential stakeholder decision making in an adaptive licensing setting by means of an expanded iterative scenario design process. More specifically, the Janus Initiative,⁴ a part of this programme, is enabling a multi-stakeholder process with an integrated, best-of-breed quantitative (p. 941) simulation toolset for supporting adaptive licensing discussions. Currently this initiative is moving forward with its first case studies and will continue to de-

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velop across multiple therapeutic areas and global regions. Commentators reaffirm that the Janus Initiative delivers valuable input on multi-stakeholder involvement (Baird and Hirsch 2013). They conclude that the adaptive licensing model seems to increase stakeholder commitment (Baird and others 2013: 12).

Another interesting initiative to test the feasibility of adaptive licensing pathways is the pilot project the European Medicines Agency (EMA) launched in 2014 (EMA 2014a). By discussing a number of medicines currently under development ('life assets') the Agency hopes that all stakeholders will be able to address the feasibility of adaptive licensing and potential blocking factors. In 2014, the EMA has published a report on the initial experience of the pilot project which highlights a learning curve on the part of all stakeholders involved (EMA 2014b). Learning seems to have been enhanced by a strong link to the Scientific Advice Working Party that provided optimization of resources and facilitated high-quality input. The report shows also how important the cooperation with experienced Health Technology Assessment (HTA) bodies is to identify stumbling blocks to the success of adaptive licensing pathways. At present, the final report of the pilot project has been published (EMA 2016). Regarding the limited participation of patients, healthcare professionals and payers the final report concludes that adaptive pathways is still a concept in development which has to be refined.

A third, cross-country initiative was the test of the legal foundations of adaptive licensing. In April 2012, the US MIT Center for Biomedical Innovation and the EMA co-sponsored a workshop on legal aspects of adaptive pharmaceuticals licensing. Attorneys from the US Food and Drug Administration, the EMA, and the Health Sciences Agency Singapore found that existing statutes provided authority for adaptive licensing in their countries (Oye and others 2013). Interestingly, Health Canada discovered gaps in the Canadian legislation.

Today, the potential merits and challenges of adaptive licensing are discussed worldwide. Very recently, a group of influential proponents argued that there are far-reaching changes taking place in the scientific and political environment of drug development and marketing that will make adaptive pathways the preferred approach in the future (Eichler and others 2015). According to this account, four factors are paving the way for successful performance of adaptive licensing pathways. They include growing patient demand for timely access to promising therapies, emerging science leading to fragmentation of treatment populations, pressure on the pharmaceutical industry to ensure sustainability of drug development, and rising payer influence on product accessibility. With regard to the growing patient demand for timely access the commentators argue that today this demand is much more underpinned and powerful than in the past. Patient groups are now better informed, better organized, and, in some instances, even willing to fund and steer clinical research (for example, in the case of cystic fibrosis, Eichler and others 2015: 236). In this context the commentators emphasize that adaptive (p. 942) licensing is not purely needs-driven. It sticks to the legal principle that expected risks for a defined patient population must be outweighed by benefits. Hence, early access can be delayed by the exploration of the effectiveness and safety of the drug. Commentators concede that a

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crucial point is how far risks and benefits have to be estimated to grant an initial authorization. A complicating factor is that acceptance of uncertainty and risks can differ across patient subpopulations and national cultures.

With regard to the second factor—certain developments in science—the commentators point to scientific progress in clinical trials methods. These methods have been remarkably refined. A better understanding of pathologies is leading to a growing number of defined subpopulations which enables more personalized treatment (Orloff and others 2009; Eichler and others 2015: 238). Based on these methods initial licensing can be granted at an earlier stage. According to the commentators, a problem is that it is not clear whether regulators and payers will accept a 'small' evidence base that has to grow during the later stages of the life span by using monitoring of predefined patient usage groups and other observational data (Husereau, Henshall, and Jivraj 2014: 245).

Discussing the third factor, the sustainability of drug development, the commentators argue that adaptive licensing benefits from the changes in the pharmaceutical industry which currently moves from a blockbuster towards a niche-buster business model (Eichler and others 2015: 241). Adaptive licensing pathways are attractive for industry because they are based on clinical trials that include fewer patients. As a consequence, overall development costs are expected to decrease (Kocher and Roberts 2014).

Regarding the fourth factor—the rising influence of payers on drug accessibility—the commentators contend that a growing number of payers tend to conceive of health technology assessment and reimbursement as ongoing processes aiming at providing greater certainty about value for money as evidence accumulates (Henshall and Schuller 2013). Coverage with evidence development is the payer's equivalent to the regulator's concept of adaptive licensing (Eichler and others 2012: 435; Mohr and Tunis 2010).

Drawing conclusions, the group of influential commentators emphasizes that the four factors converge to make adaptive pathways a necessity in the future for the majority of new drug products (Eichler and others 2015: 241). The factors strongly facilitate the transformation of the existing authorization processes and 'mitigate some of the current disconnects between industry, regulators, and their stakeholders and engender public and political trust in the regulatory system' (Eichler and others 2012: 436).

3.4 Remaining Challenges and Potential Solutions

Proponents of adaptive licensing approaches admit that crucial feasibility questions remain. At this early stage of implementation, it is not yet clear whether there is (p. 943) enough awareness, competence, and commitment of stakeholders to make adaptive licensing a viable approach. Further development of evidence collection and evaluation methods is required and HTA methodology has to be harmonized. Although the first evaluation of the EMA's pilot project shows a learning curve and the NEWDIGS project provides indications for a growing commitment to a new communication model, it is not yet clear whether the stakeholders are equipped to cope with the complexities of the adaptive pathways and whether they are willing to closely cooperate, to provide the required

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resources, and to make alignments, as well as to accept changing roles, obligations, and responsibilities (Eichler and others 2015). Regarding the requirements of the proposed new social contract, it remains to be shown that regulators are able to accommodate differences in risk tolerance in different parts of society (Eichler and others 2012: 429). Will regulators be capable of managing a continuing deliberative process of data gathering, extensive vigilance and evaluation by an extended group of stakeholders? Will they be able to take the appropriate regulatory action in the event that promised studies are not performed or expected data do not become available (Eichler and others 2015: 434–436)? Will industry claim to restrict liability during the period of an initial authorization? Another crucial question is whether payers will fully embrace the approach. They are confronted with the risk that later evaluations do not confirm the early expectations of the value of the drug. It is likely that they will commit themselves to an adaptive licensing approach only if they can adapt reimbursement schemes according to the proven value for money.

To cope with these challenges proponents of adaptive licensing pathways have come with a number of suggestions to ensure good performance of adaptive licensing pathways together with the incorporation of good governance norms. As these proposals can inspire the lessons this chapter aims to draw we discuss them briefly. We already mentioned the proposal of a new social contract which functions to clarify and to give shape to the responsibilities of all stakeholders. Further proposals include the determination of patient needs, knowledge generation and management, management of the (post-) licensing process including vigilance and targeted prescription.

To determine patient needs, Eichler and others (2015: 235) suggest as a point of departure the concept of 'treatment window of opportunity'. This concept refers to the median period in months or years during which patients with a disease can potentially benefit from a novel treatment. Specifying the patient's benefits, Eichler and others (2015: 238) question the use of quantitative indicators (such as shortfall of quality-adjusted life years and capabilities) which have been proposed by some health decision makers (Coast 2013). Instead of quantification, Eichler and others propose to use a loss-of-health concept that takes into account the shortfall of quality of life. Regarding knowledge generation, it is proposed to include more real-world data through observational studies in the post-licensing period and to move to adaptive clinical trials (Eichler and others (p. 944) 2015: 241–244). Commentators recommend that the licensing process should start with early planning which involves a prospective agreement of the sponsor, regulator, and payers on the efficacy and safety evidence at each stage of the development and authorization of the new drug (Eichler and others 2012: 431). New sheets for informed consent of patients are recommended. Regarding the coordination of pre-licensing activities, advocates of adaptive licensing advise that we should learn from the experience with tripartite scientific advice procedures, in which regulators, healthcare providers, and payers agree on an adaptive clinical development plan (Eichler and others 2012: 435).

Preventing off-label use is said to be a crucial requirement for the success of adaptive licensing (Eichler and others 2015: 244). Regarding the common off-label use in the prescription practice of physicians, commentators emphasize that systematic restrictions and

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monitoring of practice may be required, at least during the initial authorization stage (Eichler and others 2012: 430). Further measures are specific packaging and labelling information and agreements with industry not to engage in general consumer advertisements during the initial marketing period. Disincentives of payers are recommended to discourage off-label use (Eichler and others 2012: 435). Recently, specific managed entry agreements have been introduced (Eichler and others 2015: 240). These are voluntary formal agreements between payers and manufacturers with the aim of sharing the financial risk due to uncertainty around the clinical and cost-effectiveness of new technologies at the time of introduction.

4. Conclusion

This chapter has explored the lessons that can be drawn from how adaptive drug licensing processes cope with legitimacy issues of regulatory connections. The chapter assumes that a responsive approach to technology regulation offers opportunities to meet legitimacy requirements. It builds on Nonet and Selznick's ideas which focus on how regulation can be connected to its environment in order to contribute to the solution of social problems. Nonet and Selznick advocate a prudent stance to regulation that includes critical weighing of interests, continuous learning, experimenting, and co-regulating. Their ideas provide much inspiration to tackle various uncertainty problems of technology regulation in the context of rapid technological development and demands for more stakeholder involvement. This chapter has set up a theoretical frame that organizes and specifies Nonet and Selznick's ideas. The frame connects performance legitimacy with process legitimacy.

(p. 945) Looking at existing and proposed adaptive drug licensing pathways with the lens of this theoretical frame we see a truly responsive approach to regulation. Regulators like the European Medicines Agency and the US Food and Drug Administration make continuous efforts to get connected with new scientific development (e.g. adaptive clinical trials), unmet patient needs and changes in the pharmaceutical sector. They aspire to balance potentially conflicting interests of quick access to beneficial (efficacious and safe) medicines with the industry's and payers' demand for value for money. Adaptive drug licensing pathways involve stakeholders at an earlier stage than in the conventional drug approval mode. At present, adaptive approval approaches are tested to get evidence on their viability in terms of effects, stakeholder competence and commitment.

Although adaptive drug licensing appears to be a well-underpinned and viable approach that shows that the claim that law is stifling innovation is a myth, there are still many difficulties to overcome. Crucial questions refer to how to prioritize unmet patient needs in the context of limited budgets, whether patients, physicians, and payers will accept uncertainties concerning risks and benefits in the initial stage of market entry, whether doctors will stick to the restricted prescription rules, whether restrictions of off-label use can be enforced, whether demanding vigilance requirements can be met, and whether all stakeholders are competent enough and will be committed to their new responsibilities.

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Regarding the norms of process legitimacy, it seems that there is not much attention paid to the integrity of regulatory decision making in adaptive licensing pathways. It is not clear how transparency and accountability are ensured and how regulatory capture is tackled. In this context a notorious problem seems to be the tension between transparency and commercial secrecy.

Yet, despite this large number of difficulties, adaptive licensing seems to be a promising way forward to provide earlier patient access to beneficial drugs. The interactive model of decision making has the potential of trust building, thereby lending legitimacy to and public acceptance of the decision. Adaptive licensing does not need to begin from scratch. It can build on existing experience with multi-stakeholder decision making, co-regulation, adaptive authorizations, clinical trials, and reimbursement. It follows a promising realistic responsive approach that learns from experience, takes account of the difficulties, sets priorities in the measures that serve to improve the performance and the quality of regulatory processes and makes efforts to implement them carefully in the next stage of the regulatory development.

At this early stage of the implementation of adaptive drug licensing pathways only very tentative lessons can be drawn with regard to legitimacy issues of technology regulation. *First*, the case shows the importance of a broadly shared interest accompanied by strong 'drivers' and 'enablers' in order to make the technological innovation a success. In the example of adaptive licensing all stakeholders seem to have a strong interest in bringing medicines earlier to the market. Strong drivers and enablers are certain patient expectations, as well as progress in science (p. 946) (e.g. innovative clinical trial designs), and changes in the pharmaceutical sector and health systems (Eichler and others 2015: 235). As the shared interest is based on different concerns of the various stakeholder groups prudent coordination seems to be crucial.

The *second lesson*, the necessity of ongoing prudent coordination, is also underpinned by the challenges to achieve acceptance of temporary uncertainty as to the effects of the product in the initial authorization stage, to stay connected with evolving evidence, to keep vigilance going and to make alignment happen. The case shows that prudent coordination requires interdisciplinary competence, financial resources, regulatory authority, and trustworthiness. Considering these requirements, it seems that a regulatory agency is better equipped to take on this demanding coordination task than an organization that lacks formal regulatory authority (for example, the International Standardization Organization). Enforcement of stakeholder obligations (e.g. to refrain from off-label use) and (early) withdrawal if therapeutic value cannot be confirmed require regulatory authority. Regarding the coordination activities that are employed in adaptive drug licensing, it seems that regional regulatory agencies like the EMA and FDA are ready and capable to take the lead.

The *third lesson* is about how to ensure that new responsibilities and the norms of participation, transparency, integrity, and accountability are taken seriously in practice. The case reaffirms Nonet and Selznick's critique of the responsive perspective ('high-risk' ap-

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proach). It indicates that special attention should be paid to integrity issues in order to anticipate the perils of regulatory capture. To enhance the legitimacy of technology regulation, the case offers inspiration on the formation of a new social contract. The case suggests that legitimacy would be strengthened by the formalization of crucial obligations and interactions of stakeholders using pre-agreed pathways for continued evidence generation, new informed consent sheets and voluntary formal agreements between payers and manufacturers with the aim of sharing the financial risk ('managed entry agreements'). It reaffirms that the flexibility of regulation is accompanied by formalization. It demonstrates that formalization is due to the demand of all stakeholders for legal certainty to ensure safe and efficacious drugs or value for money. Regulators have the challenging task to counterbalance the demand for open regulation and legal certainty interests. In this context, the case indicates that open regulatory norms like the benefit-risk balance principle of medical products regulation contribute to the resilience of regulation. Open norms facilitate *and* restrict regulatory change. Regarding the formation of a new social contract it has to be noted that formalization is only a limited part of the story of legitimate technology regulation. In practice, legitimacy is the result of ongoing interactions between the formal and informal structure (Selznick 1992: 235). Attention to the processes of embedding technological innovation into society ('deep institutionalisation', Polanyi (1944) can provide lessons on how to institutionalize the new social contract.

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Notes:

- (1.) For an overview of the various approaches, see, Eichler and others (2012).
- (2.) Although the term 'adaptive approach' does not yet have an agreed definition, this understanding seems to be the most influential in terms of numbers of citations.
- (3.) In order to clarify the variety of applications, and to better reflect the idea of a life-span approach to bring new medicines to patients with clinical drug development, licensing, reimbursement, and utilization in clinical practice and monitoring viewed as a continuum the European Medicines Agency (EMA) presently speaks of adaptive licensing *pathways* (European Medicines Agency, 2014a).

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(4.) NEWDIGS has named the enhanced scenario design methodology the Janus Initiative after the Roman god of transitions who was honoured in all temples, but had none of its own, see, Trusheim and others (2014).

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Human Rights in Technological Times

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Abstract and Keywords

Is there enough to say about the law and regulation of technology from the standpoint of international human rights law and practice? And if there is, is anyone interested? These questions are addressed in this chapter. Overall, the aim is to show why, in these technological times, more of us should be interested in international human rights law and practice. To that end, the chapter sketches both what is blocking interest and what could and should be of interest. In so doing, it examines both international human rights law and practice in general, and questions of population, reproduction, and family in particular.

Keywords: human rights, international human rights law, right to science, right to respect for private life, right to know, reproductive rights, reproductive health, ART, Assisted Reproductive Technology, population

1. Introduction

THE invite to contribute to this handbook came with a three-word steer—population, reproduction, family. The words did not exactly jump off the page: the logic of the editors' selection was plain to see, but for me there was no spark. I thought about using just one word or at most two, and substitute words seemed attractive, too: gender or race, for instance, or identity, culture, or markets. But in no time at all I dropped these options. It was, I realized, my field of expertise, not the words, that was the problem. This expertise is human rights (specifically, international human rights law and practice; more specifically, health and human rights) and, in discussing science and technology, and especially the life sciences, it presents two problems. One is minor, the other worryingly major, and I give full details of both in section 2. Overall, however, the chapter is a push back against the problems, and in particular against the ways in which they lock out, and lock down, the relationship between science, technology, and human rights.

(p. 954) 2. Minor and Major

So, the minor problem is whether there is enough to say about this book's overall theme—the law and regulation of technology—from the standpoint of international human rights law and practice. I am in two minds on this. On the one hand, there has been an assortment of law-making on the life sciences over the last decade or so, mostly from the United Nations, notably UNESCO, and from the Council of Europe.¹ In more or less the same period, standards have been set by case law, too. The European Court of Human Rights, for instance, has warned states that the take-up of technologies in the criminal justice sphere must not compromise the right to respect for private life (*S and Marper v UK* 2008: para 112), and the Inter-American Court of Human Rights has held that banning in vitro fertilization violates the American Convention on Human Rights (*Artavia-Murillo and Others v Costa Rica* 2012).² This standard-setting is not wholly secure or wholly satisfactory, and there are biting dissents in several of the cases cited in this chapter (*Evans v UK* 2007; *SH and Others v Austria* 2011; *Parrillo v Italy* 2015). The point, however, is that it is a clear and present trend.

Improved clarity on existing standards seems imminent, too. Both the UN High Commissioner for Human Rights and the Inter-American Commission on Human Rights have stressed the need to define the human right to science so that it may be applied in practice, and at a session in 2015, the UN Human Rights Council agreed to appoint a human rights expert, known as a special rapporteur, on the right to privacy in the digital age. Previously there was a special rapporteur on human rights and the human genome,³ and there have been hints that, in the future, there might be one on biotechnology.

Standard setting in other human rights law contexts is also relevant here. The 2003 African Women's Rights Protocol⁴ was, for instance, the first human rights treaty to recognize HIV as a women's rights issue, and the first to recognize abortion as a human right. Access to essential medicines, particularly to antiretrovirals, is also widely acclaimed as a human rights success story, with courts, NGOs, individuals, and generic-producing states helping to save lives and to challenge harmful pharmaceutical and intellectual property practices. More broadly, there has been a buzz about the greening of human rights law,⁵ and a new general comment, elaborating on the right to life in article 6 of the International Covenant on Civil and Political Rights, is imminent too. Information and communication technologies have also been drawing high levels of interest. Some say that these technologies will make human rights reporting, traditionally the preserve of expert NGOs, part of the everyday. Others focus on human rights violations, insisting that they will be easier to identify, to document, and to prove with the benefit of extant, and emerging, science and technology. However, others again point to a range of risks, including (p. 955) new modes of exclusion that may be engendered by the digital divide (UN Human Rights Council 2015).

I am aware that all of this—even the sheer number of developments I have been able to list—could make my headline concerns seem overstated, even silly. That would be a misreading: the developments I have outlined are both thoroughly preliminary and in parts

more than a bit peculiar. Most peculiar of all was the attempt, from 2001–2005, to agree a binding international treaty that would ban the reproductive cloning of human beings:⁶ as Larry Gostin and Allyn Taylor asked at the time, ‘How precisely did human cloning become a global health issue?’ (2008: 58).⁷ What’s also peculiar is the ongoing shortfall of interest in the array of international human rights standards on science and technology. Thus, the Council of Europe’s Convention on Human Rights and Biomedicine, commonly known as the Oviedo Convention, has rarely been invoked in the European Court of Human Rights,⁸ and work is only recently underway on a general comment on the right to science in article 15 of the International Covenant on Economic, Social and Cultural Rights (Mancisidor 2015).⁹ Equally, the first report on this latter right from a UN Special Procedure was written just a few years ago (UN Human Rights Council 2012) and, as I write this, UNESCO is only part way through its update of the 1974 Recommendation on the status of scientific researchers.

Scholarship has the same preliminary feel. There might be longstanding engagement with the question of health professionals who torture,¹⁰ and also engagement with scientific freedom, but there is very little on the responsibilities of scientists (Wyndham and others 2015). Equally, bioethicists, rather than lawyers, have been the principal commentators on UNESCO’s Universal Declaration on Bioethics and Human Rights (and as Ashcroft (2008) explains, their views have largely been critical). The Declaration has, however, fared better than the Oviedo Convention, which has hardly registered at all either within law or within bioethics. There is, I accept, a body of work on the right to science (Schabas 2007; Chapman 2009; Shaver 2010; Donders 2011; AAAS 2013; Besson 2015), including the 2009 Venice Statement created by a group of experts, at the behest of UNESCO, as a first step towards a general comment on article 15 ICESCR (Müller 2010).¹¹ Overall, however, there continues to be little engagement with what seem like obvious topics—from public participation in science and technology (Galligan 2007), to the meaning of terms such as ‘conservation’ and ‘diffusion’ found in article 15, and whether today’s biological citizens, genetic citizens, and moral pioneers (to use the terms coined by sociologists and anthropologists of science and technology) identify with the language, and the law, of human rights.

These issues can, of course, be fixed. So, what I described earlier as the major problem, is where the real trouble lies. Put simply, if there is something to say about the law and regulation of technology from the standpoint of international human rights law and practice, is there an audience for this? I picture two audiences, one comprising international human rights law insiders, the other outsiders. The difficulty (p. 956) is that I picture both audiences as hostile: the insiders will dislike my focus within human rights, and the outsiders will be disparaging about my focus on rights. Thus, the insiders will ask: if population, reproduction, and family are what interest you, why not look at preventable maternal death and morbidity? Or at health or poverty? Or at rights-based approaches to development? There will undoubtedly be some insiders with longstanding interests in reproductive rights, and an overlapping but, by and large, different group with longstanding interests in reproductive health, or perhaps reproductive and sexual health and rights. For the most part, however, for international human rights law insiders, science and technolo-

gy will be niche and non-pressing matters. And I suspect there will be a sense, too, of wanting to stay away from science's technicalities and from its different worldview on questions of enquiry, evidence, and proof.

My imagined audience of outsiders will see it differently—though they will be no more encouraging than the insiders. The outsiders' position, which they reach in different ways, is that international human rights law is a sideshow. Some, for instance, will insist that international human rights law is an odd sort of law, a hotchpotch, encompassing both human rights proper (mired in worldly politics and international relations, and thus not really law-like at all) and endless pitches for new rights. Others will dismiss international human rights lawyers as court-obsessed, and for others again international human rights law will be akin to poor-quality moral or political theory. Still others will pillory both international human rights institutions and international human rights lawyers for their attachment to statism and to legalism.

If we then drill down to rights themselves, there will be a further layer of criticism. Rights are, it seems, too abstract and too likely to conflict both with each other and with public goods to be useful in practice. It is also said that they lead us to give undue weight to individual decisional autonomy, which has corrosive effects on professional judgement, morality, and the possibility of reaching consensus. Those who engage explicitly with social justice are generally among the most sceptical. So, for example, I have been told that reproductive rights are too bound up with the 'right to choose' (which in turn generally signifies the choice to have an abortion), more limited than reproductive health and reproductive health rights, very likely to suppress sexual and sexual health rights, and no guarantor of reproductive justice. Where, these social justice critics ask, is the complementary focus on the right to be a parent, and to parent with dignity, particularly for those groups that have faced controls and prohibitions?

Drilling down in this way generally exposes radical disinterest, too. In my experience, those who study science, technology, and society have almost no interest in human rights law, and a low level of interest in human rights talk.¹² Even ethicists seem only intermittently and unevenly engaged: as the American Association for the Advancement of Science has pointed out, 'Human rights *per se* (p. 957) are often viewed as irrelevant to the practice of ethics' (AAAS Science and Human Rights Coalition 2012: 2).

3. Mustering a Response

These complaints are fearsome, both in substance and also, by and large, in tone. Some are misrepresentations, but many contain considerable, if inconvenient, truth. Parrying these complaints, or cheerleading for rights, would be predictable and thus no riposte at all. Calling for more international human rights standard-setting would be equally predictable; it would also have limited impact, at least in the short term. So, how should I respond? Specifically, what can I propose that will separate complaints of substance from those that are hot air, prejudice, tunnel vision, and the like?

For starters, looking to actual practices might help. We know that in other contexts, human rights are cast as a discourse of resistance, so we might ask if that is true of new health technologies, too. How do, say, advocates of reproductive justice see reproductive rights and reproductive health rights, and are there variations from state to state, and between the domestic and the supranational (Luna and Luker 2013)? Similarly, how is human subjects' protection viewed by individuals, families, and groups who want to sign up for clinical trials (Epstein 2007)? Relatedly, does the discourse of 'vulnerable populations' resonate with all those who were human subjects before the current era of protection—or are there some who recall their experience in other terms (Campbell and Stark 2015)?

Equally, how do scientists, scientific societies, and science funders see human rights in general, and international human rights law in particular? Is this body of law a constraint, a source of protection, or perhaps a waste of time in that it seems to duplicate extant professional standards and modes of ethical clearance? Probing more deeply, is there evidence of differences in view as between junior and senior scientists, and how easy are these to articulate amid the strong senior-junior relationships that are characteristic of laboratories? Also, given that in most fields, understandings shift over time, are there instances where scientists today are engaging actively with rights language? For example, is the development of race-specific medicines being promoted via the language of rights—as a means, say, to address past racial discrimination (Roberts 2013)?

Other potent sites come to mind. It would be fascinating to learn how ethics committees—both international and local—position human rights and human rights law (Murphy and Turkmendag 2014). Do they see international human rights law as akin to or different from other fields of law? What do they make of the claim by the former UN Special Rapporteur on cultural rights that 'Developing codes of conduct explicitly informed by human rights ... seems essential' (2012: para 53)? More broadly, shouldn't there be ongoing scrutiny of the shared origins story of bioethics and international human rights law, the story that traces their rise from the Nuremberg Trials after the Second World War, via civil rights movements in the 1960s, to the ascent of autonomy from the 1980s onwards? Origins stories are rarely robust. Moreover, given the strongly emergent calls for responsible research and innovation (is this bioethics and human rights in new guise, or something different?), now seems an excellent time to re-engage the past.

Going blue skies would be another option. Here we might pursue a question asked recently by Glenn Cohen: '[I]f it becomes possible to use enhancement to increase respect for human rights and fidelity to human rights law ..., and in particular in a way that reduces serious human rights violations, is it worth "looking into?"' (2015: 1). We also need ongoing engagement with a question asked by Allan Buchanan and others at the turn of the century: should there be a 'genetic decent minimum' for all? (Buchanan and others 2000). Missing populations are, of course, the antithesis of human rights. Thus, the prospect of a loss of human diversity as a result of technologies of genetic selection, particularly prenatal testing and preimplantation genetic diagnosis, sits badly both with human rights in general and with the rights of persons with disabilities, and of women and girl-children,

in particular. These commitments, however, do not prevent new and difficult questions, nor provide us with easy or immediate answers.

Some will not be keen on either blue skies or ethnographic modes of enquiry, so more standard lawyerly fare will be needed as well. In this mode, the pertinent questions include how human rights institutions frame both specific technologies and the broader technology/human rights law nexus (Murphy and Ó Cuinn 2010; 2013). How, for instance, do courts respond to claims for access to new drugs and therapies? And are there differences in court behaviour across health systems with different mixes of public and private finance (Flood and Gross 2014)? Also, who is going to court and for what reason, who is representing these litigants, and who is intervening in this sort of case (Montgomery, Jones, and Biggs 2014)?

4. A Three-Word Pivot

However, I am not going to pursue any of these modes of enquiry here. The plan instead is to continue in broader consciousness-raising mode, adding the editors' (p. 959) three words—population, reproduction, and family—as the pivot going forward. For each word, I shall sketch lines of enquiry: straightaway, I should say that these will not cover the field and that they will be short form. But taken as a whole, there should be enough to scupper what I described earlier as the lockdown, and lockout, of international human rights law and practice.

4.1 Population

By beginning with 'population', I immediately picture almost all of the outsiders shrugging and saying: 'But rights are all about within that, they are mostly about individuals versus individuals, and individuals versus the state, with lots of to and fro, and lots and lots of sad, sentimental stories'. In essence what these outsider-critics are saying is that human rights may use the language of 'vulnerable populations', but overall its focus is individuals, not populations. Where, for instance, is the human rights discussion on the potential, and the limits, of public health approaches to sexual and reproductive rights?

It is a fair point. There has been very little discussion of this question within human rights (Erdman 2011; Parmet 2011) and there ought to be more, not least because abortion rights, seen through a public health lens, have tended to concentrate on safe motherhood. Safe motherhood is crucial: unsafe abortions continue to kill and injure too many women. Safe motherhood's focus on health-related risks and harms has also had exceptional traction. Nonetheless, a public health approach to abortion is not the same as a rights-based one—it misses, in particular, the value of autonomy and the dignity-based harms that follow when access to abortion is obstructed or denied (Erdman 2014).

Part of the explanation for the general shortfall of interest in public health approaches could be that, within international human rights law, 'population' does not signify public health. Instead it signifies *particular populations*—specifically, populations that are mar-

ginalized and vulnerable. Thus, in a 2012 report on the right to science, the UN Special Rapporteur in the field of cultural rights noted: 'Marginalized populations with limited financial or political power and scientific awareness run a greater risk of violations as human research subjects' (UN Human Rights Council 2012: para 52). She also called on states to ensure that 'the benefits of science are physically available and economically affordable on a non-discrimination basis' (UN Human Rights Council 2012: para 30). Similar concerns with discrimination, both de jure and de facto, are spread through the work of UN agencies and UN treaty monitoring bodies, the latter being the key interpretative bodies of international human rights law.¹³ Thus, the UN Human Rights Committee, one of the treaty bodies, has emphasized that article 7 of the International Covenant on Civil and Political Rights bans medical or scientific experimentation without (p. 960) the free consent of the person concerned, and it has called for special protection in the case of persons not capable of giving valid consent, in particular those under any form of detention or imprisonment (UNHRC 1992: para 7). More recently, in 2014, a group of UN agencies came together to issue a statement that calls on states to respect, protect, and fulfil the reproductive rights of women with disabilities. The statement urges states to eradicate forced and coerced sterilization of women with disabilities, and to take positive measures to guarantee their sexual and reproductive rights (World Health Organization 2014). More broadly, at the UN there is also growing appreciation of the particular harms of sex stereotyping (UN CEDAW 2014: paras 42–43) and multiple discrimination (e.g. *Alyne da Silva Pimentel Teixeira v Brazil* 2011) in reproductive and sexual health contexts.

I am aware that this must look like standard international-human-rights-law fare; a list, and more so an insistence on listing, each of which is guaranteed to turn away the curious and bolster the complaints of the outsiders. Moreover, some will insist that listing international human rights law is worse than listing domestic 'law on the books' and ignoring that law 'in practice'. International law, as these critics will point out, is not particularly law-like: it lacks the enforcement machinery we expect with law—international law, by and large, has to work with states: it cannot dictate to them, it has to socialize them (Goodman and Jinks 2013). Not surprisingly, this inability to be law-like is generally presented as a problem, but what if we were to see it as a form of potential? Specifically, what if we could use it to cut through not just the Latin terms and gadgets, and the other technicalities of law, that can be off-putting for outsiders, but also the widely-held view that law is only about proscription? What if we could use it to encourage more sociological ways of seeing that would draw out the particularities of international human rights law as a socio-cultural process?

Seeing in this way might liberate rights from what Amartya Sen calls the 'juridical cage' (2004: 319). It would, for instance, help us to learn more about when and why states have invoked human rights and public health in equality-forcing ways, recognizing the circumstances of marginalized and vulnerable populations, and also challenging discrimination. We could perhaps look at what prompted Brazil to push both for a development agenda at the World Intellectual Property Organization, and for both the recognition of sexual rights and the creation of a special rapporteur on the right to health at the

UN. We might also look at what prompted Indonesia to stand up to the World Health Organization (WHO) during the 2006 H5N1 avian flu epidemic, refusing to continue to share virus samples when it became clear that the company to which WHO had passed the samples was disclaiming any benefit-sharing responsibilities (Murphy 2013). Overall, we might ask: are these activist states, and are there others like them?

In similar vein, we could look at when and why other actors at the heart of the machinery of international human rights law shift their focus. For instance, in finding forced sterilization to be a violation of the right to be free from cruel, inhuman, (p. 961) or degrading treatment, international human rights courts and UN treaty bodies have started to make detailed reference to the mental pain or suffering of the victim (e.g. *NB v Slovakia* 2012: para 80). We could ask what prompted this, and what are its likely effects, both positive and problematic? Relatedly, restrictive abortion laws are now scrutinized, not just by the UN Committee on the Elimination of Discrimination against Women and the UN Committee on Economic, Social and Cultural Rights, but also by the UN Human Rights Committee, the UN Committee against Torture, and indeed the European Court of Human Rights. The jurisprudence and concluding observations from these bodies demonstrate that denying or obstructing a woman's access to abortion can be a violation of the right to be free from cruel, inhuman, or degrading treatment (*KL v Peru* 2005; *Tysiąc v Poland* 2007; *LMR v Argentina* 2011; *RR v Poland* 2011; *P and S v Poland* 2012).¹⁴ Here, too, we ought to ask what prompted the shift—in particular, what encourages a new interpretation of an existing right, and what effects is it likely to have?¹⁵

States, courts, and treaty bodies will not provide the full picture, however. We should also look at the practices of social movements concerned with public health issues and with reproductive ones, particularly the reproductive choices of marginalized and vulnerable populations. Here we might ask who the repeat players are in these fields, and what are their strategies? Are they more likely to mobilize after rights-denying decisions from national and international courts and UN treaty bodies, or do they prefer to focus on paving the way for rights-affirming decisions? Equally, how do they proceed when developments stall? Also, have different waves of social movements—including feminism, LGBTI, and AIDS activism—adopted different positions vis-à-vis international human rights law?

Today, facilitated in part by information and communication technologies, many social movements co-operate across borders. In terms of transnational litigation and advocacy, one of the key actors is the Center for Reproductive Rights, founded in the US in 1992 and collaborating today with more than 100 organizations in over 50 countries. Forced sterilization has long been one of the Center's key foci, generating both litigation and extra-legal strategies, and currently the Center is partnered with a Chilean NGO, Vivo Positivo, on what it describes as 'the first-ever forced sterilisation case for a person living with HIV in Latin America to be decided by an international human rights body' (Center for Reproductive Rights 2014). The case, *FS v Chile*, will be heard by the Inter-American Commission on Human Rights and, in their petition, the NGOs argue that the forced sterilization of FS violated a range of her rights, including the right to be free from torture or cruel, inhuman, or degrading treatment, the right to privacy, the right to be free from dis-

crimination, and the right to an effective judicial remedy. If they win it will be a landmark, but as the Center appreciates all too well, even when there is a win, judicial remedies differ (p. 962) and judgments never enforce themselves. At best, a win in court is a stepping-stone, sometimes a really slippery one.

The point is well demonstrated by another of the Center's cases, *María Mamérita Mes-tanza Chávez v Peru*, concerning the death of an indigenous woman who was forcibly sterilized as part of a 10-year national population control programme that affected nearly 350,000 women and 25,000 men, drawn mainly from poor, rural, and indigenous communities. A friendly settlement agreement was reached before the Inter-American Commission on Human Rights in 2003, with Peru pledging *inter alia* measures to address structural discrimination in the healthcare sector and an investigation into the mass sterilization. But that investigation has been opened and closed several times and no prosecutions have taken place.

Forced sterilization is not, I want to emphasize, a 'Latin American problem'. Local factors, be they regional, national, or more local still, are of course significant: acknowledging and understanding these factors is an essential part of preventing violations and increasing respect for reproductive choices (Cook, Erdman, and Dickens 2014). Yet it is also crucial to remember that state, and non-state, attacks on marginalized and vulnerable populations, and on reproductive choices, persist *across* the globe. Recall too that the first decision on forced sterilization from the UN Committee on the Elimination of Discrimination against Women involved a European state (*AS v Hungary* 2006). And recently, within a single 12-month period, the European Court of Human Rights issued three decisions against Slovakia for forced sterilizations which violated the reproductive rights of Romani women (*VC v Slovakia* 2011; *NB v Slovakia* 2012; *IG and Others v Slovakia* 2012). The decisions are absolutely clear: sterilizing a woman without her informed consent is degrading treatment in violation of article 3 ECHR, in part because it interferes with a woman's autonomy in her reproductive choices (e.g., *NB v Slovakia* 2012: paras 71–88).

4.2 Reproduction

By this point some will be asking: *where is the technology*—IVF, preimplantation genetic diagnosis (PGD), prenatal genetic testing, and the like? International human rights law and practice does feature these reproductive technologies; below I introduce highlights from the leading cases. Mostly, however, within this field of law, 'reproduction' triggers discussion of the modern, as opposed to the technological. Thus, both the UN treaty bodies and international human rights courts call for states to ensure affordable access to 'modern methods of contraception',¹⁶ as well as related information and services (*Open Door* 1992; UN CEDAW 2014). In addition, as we have seen, forced sterilization and safe motherhood have been key foci for these and other international human rights law actors.

(p. 963) What this means is that certain aspects of stratified reproduction are very evident in international human rights law and practice, whereas others (say, commercialization versus altruism in gamete procurement) are not. Similarly, the concept of 'responsible

parenthood' generally signifies the Catholic Church's promotion of natural family planning methods (UN CEDAW 2014); within international human rights law and practice it doesn't yet encompass the challenges that face those who are encouraged, or directed,¹⁷ to use technology in the exercise of reproductive rights. A broader focus, bringing all forms of responsible parenthood into view, would be desirable, but it will not be easy to achieve or to navigate. The emphasis is likely to be on autonomy or self-determination (typically cast as the 'right to respect for private life'), yet most working versions of autonomy do not readily capture all that is involved in assisted reproduction (Löhmus 2015). Part of the challenge is that prenatal screening, IVF, and the like produce a powerful sense of reproductive responsibility, particularly for women, many of whom make decisions informed by a strong sense of family and broader social structures. Autonomy, as conventionally understood, does not readily capture their decision-making processes. Additionally, with assisted reproduction—and in particular with storage of gametes and embryos, and a range of donation possibilities—we are dealing with far more than the pregnant body on which much of our thinking about autonomy has been based (Ford 2008). Of course, another part of the challenge is that 'family' is highly contested terrain at the UN today, with a range of states promoting resolutions championing 'family values' that actually seek to justify LGBT discrimination.

So one important question is how we might craft autonomy for repro-technological times. In any recrafting, international human rights law will insist that we notice not just legal standards but also the following: first, repro-genetic technologies are not accessible by all. Second, in some states choosing to use them is quite explicitly a familial, community, or national responsibility, not simply an individual decision. Third, the activities of non-state actors (say, the businesses that promote repro-genetic technological solutions) have to be considered, too. Fourth, these technologies, where available, are being used to select against sex and against disabilities: is this selective reproduction compounding powerful prior practices of discrimination? Fifth, any re-crafting of reproductive rights, health, or justice must not neglect either safe motherhood or parenting with dignity: too many women continue to die or experience injury every year during pregnancy and childbirth, and too many parents are forced to bring up families in poverty.

A deliberate, deeply complex shift is needed. Prior experience might help here, but it needs to be recognized as mixed. At a series of UN conferences in the 1990s, in particular the Cairo International Conference on Population and Development, states agreed to move from controlling fertility towards respecting, protecting, and fulfilling *reproductive rights*. At the Cairo Conference it was also agreed that these rights:

(p. 964)

embrace certain human rights that are already recognized in national laws, international human rights documents and other consensus documents. These rights rest on the recognition of the basic right to decide freely and responsibly the number, spacing and timing of children and to have the information and means to do so. It also includes the right of all to make decisions concerning reproduction free

of discrimination, coercion and violence (International Conference on Population and Development 1994: para 7.3)

However, as we have seen, post-Cairo attention settled on particular concerns. Safe motherhood, forced sterilization, and affordable access to modern contraception and associated information and services became the key foci. Preventing mother-to-child transmission of HIV was central, too (Murphy 2013). In part these foci, notably safe motherhood, emerged and developed in order to work around the objections of some state and non-state actors to seeing abortion as part of rights, health, or justice. The perceived need to work around such objections may also help to explain why, within international human rights law, the right to life has developed without much attention to reproductive matters. Increasingly, however, there are potent opportunities for clarification of existing standards and for engagement with under-discussed questions. For instance, in recent Concluding Observations, the UN Committee on the Rights of Persons with Disabilities seems to be raising the question of whether it is discriminatory to treat foetal disability differently to other legally-sanctioned grounds for abortion, say by imposing shorter time limits on the latter (e.g. UN Convention on the Rights of People with Disabilities 2011: paras 17–18). The proposed general comment on the right to life in article 6 of the International Covenant on Civil and Political Rights offers a further opportunity for clarification and consolidation of existing approaches—though fierce battles should also be expected given the stance of some states and NGOs on the protection of ‘unborn’ life.

It is possible to provide some pointers concerning rights-based approaches to ART and other repro-genetic technologies. There is a cluster of cases from the European and Inter-American human rights courts; specifically, at least six ART cases from the European Court of Human Rights (*Evans v UK* 2007; *Dickson v UK* 2007; *SH and Others v Austria* 2011; *Costa and Pavan v Italy* 2012; *Knecht v Romania* 2012; *Parrillo v Italy* 2015), and one from the Inter-American Court, *Artavia-Murillo and Others*. There are also cases on homebirth from the European Court of Human Rights (e.g. *Ternovszky v Hungary* 2010), which is a useful reminder that non-medicalized, non-technological options are valid reproductive choices, too. And there is a further case from the same Court, concerning a woman, RR, who was repeatedly denied access to prenatal genetic testing and then refused an abortion on the grounds that it was too late. RR was forced to continue with her pregnancy and give birth to a daughter with a rare genetic condition that leads to abnormal development. She brought a complaint before the European Court of Human Rights, which held that the state had violated her right to be free from cruel, inhuman, or degrading treatment (*RR v Poland* 2011).

(p. 965) Turning now to the highlights of international human rights law’s seven ART cases. First, the right to respect for private life, a qualified right,¹⁸ encompasses the decision to have or not to have a child and to make use of ART to that end. Thus, in the Americas, Costa Rica’s complete ban on IVF was held to be contrary to the American Convention on Human Rights: the Inter-American Court stated that the right to private life is related to both reproductive autonomy and access to reproductive health services, which includes

the right to have access to the medical technology necessary to exercise this right (*Artavia-Murillo and Others* para 146).¹⁹

Second, in Europe, in the recent case of *Parrillo v Italy* wherein the applicant sought to donate IVF embryos to scientific research, the European Court of Human Rights surprised many seasoned observers when it held that because the embryos contained the genetic material of the applicant, they represented ‘a constituent part of [her] genetic material and biological identity’ (2015: para 158). The Court went on to hold that, as a result, the applicant’s ability to exercise a ‘conscious and considered choice regarding the fate of her embryos [concerned] an intimate aspect of her personal life’ and thus fell within her right to self-determination and, in turn, within the right to respect for private life in article 8 ECHR (2015: para 159). Ultimately, the applicant lost the case: the Court accorded a wide margin of appreciation to the contracting state and relatedly emphasized that the facts involved neither prospective parenthood nor a crucial aspect of the applicant’s existence and identity. Thus, the applicant’s desire to donate the embryos to science following the death of her male partner was frustrated, and they were left instead in indefinite storage. The intriguing point, however, is the Court’s finding that the embryos were a ‘constituent part of [the applicant’s] identity’; this, as the joint partly dissenting opinion pointed out, will be seen by some as an ‘unacceptable pronouncement on the status of the human embryo’ (2015: joint partly dissenting opinion of Judges Casadevall, Ziemele, Power-Forde, De Gaetano, and Yudkivska, para 4).

Third, although many of the ART cases from the European Court of Human Rights have involved a wide margin of appreciation for the contracting state, there have been pointers concerning the Court’s view of good law and good law-making on ART. In *SH and Others*, although Austria’s complete ban on egg donation survived scrutiny, the Court warned that going forward, such bans would not be Convention-compliant unless they had been ‘shaped in a coherent manner’, allowing ‘the different legitimate interests involved to be adequately taken into account’ (2011: para 100). Meanwhile, in the earlier case of *Evans*, in weighing private and public interests to determine if a fair balance had been achieved, the Court emphasized two particular public interests served by the impugned ART law. First, it upheld the principle of the primacy of consent and, second, its ‘bright-line’, no-exceptions approach, promoted legal clarity and certainty.

As regards law-making, in *SH and Others*, Austria was applauded for an approach that was ‘careful and cautious’ (2011: para 114), and in *Evans* the Court emphasized that the law in the United Kingdom was ‘the culmination of an exceptionally (p. 966) detailed examination of the social, ethical and legal implications of developments in the field of human fertilisation and embryology, and the fruit of much reflection, consultation and debate’ (2008: para 86). Similarly, in *Parrillo* the Court highlighted the inclusive drafting process behind Italy’s ban on scientific research on human embryos (2015: para 188).

In *Knecht v Romania* by contrast, although no violation of article 8 ECHR was found, the Court made reference to the ‘obstructive and oscillatory attitude’ (2012: para 61) of the regulator. In similar vein in *Costa and Pavan v Italy*, the Court’s decision centred on ‘the

incoherence of the Italian legislative system'. Holding for an opposite-sex married couple carrying cystic fibrosis who had been barred from using IVF and PGD to screen their embryos, the Court highlighted how Italy, on the one hand, banned implantation of only healthy embryos while, on the other, it allowed abortion of fetuses with genetic conditions. Italy's law, the Court said, 'caused a state of anguish for the applicants' (2012: para 66), and its inconsistency created a disproportionate interference with their article 8 rights to respect for private and family life.

Fourth, on the whole, the Court has given a wide margin of appreciation to contracting states in the ART cases, generally giving two related reasons for this: first, the lack of a European consensus, 'no clear common ground amongst the member States', on the issues raised; and second, 'the use of IVF treatment gives rise to sensitive moral and ethical issues against a background of fast moving medical and scientific developments' (*Evans* 2007: para 81). At times the Court has made reference, too, to the lack of consensus in international texts. It has also made reference to the need to balance competing private and public (or general) interests, and to the state being best placed to do this. In *SH and Others*, to the dismay of the dissenting judges, it made reference to an *emerging* European consensus on ART regulation. This, the Court said, exists where there is '*not yet* clear common ground': an emerging consensus, in other words, is not based 'on settled and long-standing principles established in the law of the member States but rather reflects a stage of development within a particularly dynamic field' (2011: para 96). It seems then that when both law and science are particularly dynamic, the Court needs its own hope technology—the 'emerging European consensus', a tool that embodies not just the Court's faith in law but, uncannily, a sort of 'not yet' sensibility that is familiar from both ARTs, and science and technology more generally.

Going forward, we should expect more cases, initially within Europe but also more broadly. We should also expect these cases to be challenging. The decisions outlined above are not the final word, and as we have seen they have thrown up an array of difficult issues. For instance, if ART law is to be rights-respecting, should it distinguish between women and men gamete-providers? Should it recognize the ongoing differences between egg and sperm storage? Should a rights-respecting ART law mandate regulatory schemes that downgrade clarity and certainty in favour of an assessment of competing interests in individual cases? (p. 967) Equally, although the majority in *SH and Others* avoided comment on cross-border reproductive care, we should expect the difficult issues it raises to recur (possibly in combination with surrogacy). Put differently, both the European Court of Human Rights and international human rights law more broadly are only beginning to grapple with the issues raised by ART. It is accordingly very early days in the construction of rights-based approaches to genetic, gestational, social, and legal parenthood. To emphasize this point, and the opportunities and challenges it presents, I turn finally to a question of family life, and more broadly kinship, that has been thrown up by ART: does the donor-conceived child have a right to know her genetic identity?

4.3 Family

Some of those who claim that the donor-conceived child has ‘a right to know’ point both to Strasbourg case-law and to provisions of the UN Convention on the Rights of the Child, which say that a child should be able to know her parents as far as possible. However, so far as I know, there has been no case concerning the donor-conceived child’s ‘right to know’ at Strasbourg. The cases from the European Court of Human Rights that invoke the importance of knowing one’s genetic identity concern either paternity testing or the practice of anonymous birth (*Mikulić v Croatia* 2002; *Odièvre v France* 2003; *Godelli v Italy* 2012), neither of which seems akin to donor conception. Additionally, in *SH and Others*, which concerned prohibitions on access to donor conception, the Court expressed the view that the contracting state’s anxiety about ‘split motherhood’ (following from egg donation) added a ‘new aspect’ not present in the adoption context (2011: para 105): this suggests that the Court might not endorse the analogy between adoptees and donor-conceived people that is popular in claims-making on the ‘right to know’.

More broadly, we should recognize that, although the right to respect for family life in article 8 ECHR is underdeveloped by comparison with its private-life counterpart, and a similar underdevelopment characterizes article 12 ECHR, the Court has been open to social change as regards the meaning of family (e.g. *X, Y and Z v UK* 1997; *Schalk and Kopf v Austria* 2010; *X and Others v Austria* 2013). True, the Court continues to uphold policy choices by contracting states that give particular protection to the ‘traditional family’, allowing for instance differential treatment of unmarried couples who wish to pursue second-parent adoption following the birth of a child using ART (*Gas and Dubois v France* 2012; *X and Others* 2013). Yet change feels close at hand, led perhaps by some of the contracting states and thereby giving the Court scope to find a new European consensus on what family and kinship are today.

(p. 968) But I need to add that what cases say is only one part of what rights are and are not, and of what they might be. Thus, the claims that are being made for the donor-conceived child’s ‘right to know’ might not be convincing in terms of the law as it stands today, but that does not detract from their power. Indeed, being *against* a ‘right to know’ seems a peculiar position: it suggests that one is against truth and knowledge, and also against family and self-determination. Few of us, not least those of us who advocate for international human rights law and practice, would willingly sign up to secrecy and lies, or to stances that damage individuals or families. For me then this is where lived detail comes in; where we need to have both knowledge of actual kinship practices and, more broadly, the sociological way of seeing I mentioned earlier. That way of seeing, far more than the law, can help us to unpack different forms of secrecy and truth. Should we, for instance, be using different frames for family secrets and official secrets? We also need to unpack the relationship between genetic relations and family or kinship ones. The question of what is in the ‘best interests’ of the child needs to be pursued, too.

5. Conclusion

That may seem a strange place for a lawyer to draw to a close—all the more so given that throughout this chapter I have tried to build interest in thinking about science and technology through the lens of international human rights law and practice. For me however, neither interest in rights as law, nor actual law and practice, will flourish if we insist on treating rights as absolutes or conversation-stoppers. Too often today, perceptions of rights as law seem terribly adrift of what such rights have been, are, and can be. As I see it, addressing the gap calls for action on two fronts. First, as I have emphasized in this chapter, we need to be better at conveying the details of rights as law; conveying, for instance, that the right to respect for private life found in the ECHR is a qualified right, not an absolute one, and that, though widely neglected, there is a body of international human rights law and practice on questions of science and technology. Second, and far harder for lawyers, we need to accept and acknowledge that rights as law are not the whole of rights. ‘The law’ will only take us so far; we need in addition to attend to the ways in which rights are constituted, to the rest of the lived detail of rights. How rights become law (or not), how they ebb and flow as law, and how their legal form translates into reality—and into personal identity—are part of that detail, and as I have shown in this chapter, science and technology are an excellent site for drawing this out and developing our understanding of it.

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Notes:

(1.) From the Council of Europe, see in particular the Convention for the Protection of Human Rights and Human Dignity of the Human Being with regard to the Application of Biology and Medicine (1997), and its subsequent protocols; from UNESCO, see the Universal Declaration on the Human Genome and Human Rights (1997); International Declaration on Human Genetic Data (2003); Universal Declaration on Bioethics and Human Rights (2005), and relatedly the concept notes and reports on these produced by the organization's International Bioethics Committee. Other dedicated human rights instruments include the Charter of Economic Rights and Duties of States (1974), and the Decla-

ration on the Use of Scientific and Technological Progress in the Interests of Peace and for the Benefit of Mankind (1975): both adopted by the UN General Assembly prior to the coming into force in 1976 of the International Covenant on Economic, Social and Cultural Rights, art 15 of which protects the right to science.

(2.) The Inter-American Court of Human Rights is the highest human rights court in the Americas and the ruling in this case is final and binding for the 22 states that have accepted the Court's jurisdiction.

(3.) Iulia Antoanella Motoc, who at the time of writing is a judge on the ECtHR, held this position from 2004–2007.

(4.) Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa (2000). At its 52nd and 55th ordinary sessions, the African Commission on Human and Peoples' Rights adopted General Comments on art 14 of the Protocol which enjoins states to ensure the realization of the right to health of women, including sexual and reproductive health. See also UN Committee on Economic, Social and Cultural Rights, 'General Comment No 22' (2016).

(5.) From the environmental side, see e.g. the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation to the Convention on Biological Diversity (2010), which entered into force in autumn 2014.

(6.) A nonbinding instrument, the UN Declaration on Human Cloning, was passed at the UN General Assembly in 2005, but the vote was sharply divided: 84 countries in support, 34 against, and 37 abstentions.

(7.) UNESCO's International Bioethics Committee has noted that mitochondrial donation/replacement therapy involving human embryos might make it necessary to revisit the issue of human cloning: see 'Concept Note on Updating the IBC's Reflections on the Human Genome and Human Rights' (15 May 2014) para 18.

(8.) One cannot make an application to the ECtHR claiming a breach of the Oviedo Convention; claims must invoke a right guaranteed by the European Convention on Human Rights.

(9.) Art 15 of the International Covenant on Economic, Social and Cultural Rights (1966) obliges states parties to: (1) recognize the right of everyone 'to enjoy the benefits of scientific progress and its applications'; (2) promote the 'conservation, the development and the diffusion of science'; (3) respect the 'freedom indispensable for scientific research'; and (4) encourage and develop 'international contacts and cooperation' in science.

(10.) Art 7 of the International Covenant on Civil and Political Rights (1966) provides that: 'No one is to be subjected to torture or to cruel, inhuman or degrading treatment or punishment. In particular, no one shall be subjected without his free consent to medical or scientific experimentation.'

- (11.) There is also a body of scholarship on the relationship between the right to science and intellectual property rights: e.g. Plomer A, 'The Human Rights Paradox: Intellectual Property Rights and Rights of Access to Science' (2013) 35 Human Rights Quarterly 143.
- (12.) One major exception is Jasanoff 2011; 2013.
- (13.) These are bodies of independent experts created by states parties' agreement under the treaties. They monitor state compliance, craft authoritative interpretations of treaty provisions and, in some cases, hear individual communications and conduct inquiries on alleged violations.
- (14.) States can be responsible for cruel, inhuman, or degrading treatment inflicted on women who are denied or obstructed in using abortion services that are legally available to them under the state's laws; additionally, the application of restrictive abortion laws has been held to inflict cruel, inhuman, or degrading treatment.
- (15.) See also UN Human Rights Council, 'Report of the Special Rapporteur on torture and other cruel, inhuman or degrading treatment or punishment, Juan E Méndez' (1 February 2013) UN Doc A/HRC/22/53; a report on torture and ill-treatment in health care settings, including the mistreatment of women seeking reproductive health care.
- (16.) Including those methods listed on WHO's Model List of Essential Medicines.
- (17.) Genetic carrier testing is voluntary in most states but mandatory in some.
- (18.) Interference with the right can be justified where this is 'in accordance with the law' and 'necessary in a democratic society' in the pursuit of particular aims.
- (19.) The Court continued: 'The right to reproductive autonomy is also recognized in Article 16(e) of the Convention for the Elimination of All Forms of Discrimination against Women, according to which women enjoy the right "to decide freely and responsibly on the number and spacing of their children and to have access to the information, education and means that enable them to exercise these rights." This right is violated when the means by which a woman can exercise the right to control her fertility are restricted.' Similarly, in Europe the ECtHR has said 'that the right of a couple to conceive a child and to make use of medically assisted procreation for that purpose is also protected by Article 8 [ECHR], as such a choice is an expression of private and family life' (*SH and Others v Austria*).

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Population, Reproduction, and Family

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Abstract and Keywords

Both at national and international level, the right to reproduce and form a family has considerable personal and social implications. The policies that underpin the regulatory approach in this area need careful consideration for their supporting values and principles. While regulation of reproductive decisions may be direct or indirect, it is virtually universal. Reflection on the importance of the decision whether or not to reproduce, irrespective of the sophistication (or not) of the techniques used to effect it, demands attention to the human rights guaranteed by national laws and international agreements. This remains the case whether or not the decision concerns an individual, a couple, or a nation. Thus, both individual reproductive choices and policies on population control must be measured against human rights norms. As regulation is generally based on policy decisions, it is also important to explore how policy is made and the assumptions that underpin it.

Keywords: Reproduction, new reproductive technologies, policy, population, human rights

1. Introduction

UP until the mid twentieth century, reproductive decisions and practices were relatively straightforward. Procreation required sexual intercourse between a male and a female, and celibacy was the only certain way of avoiding unwanted pregnancies. Over the last century, and particularly the second half of the century, all that was to change as assisted reproduction ushered in expanded opportunities for the infertile or those without a partner of the opposite sex to embrace parenthood and form families distinct from those that were available in the past. The availability of safe abortion and sophisticated contraception allows individuals the opportunity of active sex lives without procreation.

Policy making in this area engages intimately with regulation, which may be liberal or intrusive of individual choice. Making policy, however, is often more complex, and less transparent, than it might appear, influenced as it may be by unstated bias or untested assumptions. An example of arguably intrusive policy, briefly considered in what follows,

is China's one-child policy. On the other hand, the United Kingdom's regulatory framework, while sometimes regarded as heavy handed, (p. 977) nonetheless rests on relatively liberal presumptions and retains a certain amount of flexibility, allowing regulators to react to innovation in science and medicine.

Increasingly, reproduction is seen as an area in which human rights language has an important role to play. Not only should policy, and any regulatory mechanism derived from it, conform to these norms, but its nature and extent should be tested for legitimacy against them.

2. Family, Marriage and New Reproductive Technologies

The right to marry and found a family is found in numerous international declarations and treaties, recognizing the very real significance that becoming a 'family' can have for many individuals throughout the world. Indeed, the importance of the family is directly recognized by the United Nations (UN). Article 16(3) of the Universal Declaration of Human Rights says: 'The family is the natural and fundamental group unit of society and is entitled to protection by society and the State'. In fact, very significant aspects of the UN's work relate, directly or indirectly, to the family, whether it be by way of concern for the welfare of children or the reproductive health of women (United Nations 2015).

Traditionally, the right to marry has been restricted primarily by prohibitions on consanguinity, although some unusual limitations also exist, such as the prohibition on members of the British royal family from marrying a Catholic! Apart from these limits, it is clear that the legal ability to form a marriage is of both historical and contemporary significance. As a legal institution, marriage has been traditionally viewed as the union of a male and a female, generally (although not always) who are not currently married to anyone else, who are of appropriate legal age, and who are competent and free to make the decision to marry. Since for many, the desire to marry was intimately linked to the foundation of a (legally legitimate) family, and to the legitimacy of any offspring, the traditional marriage was heterosexual and the presumed intention—or at least part of it—was procreation. However, while procreation is often central to the decision to marry, as McCarthy notes '[t]he human wish to be married reflects core values of commitment, personal dignity and respect' (McCarthy, 2013: 1178).

The comfortable picture of the heterosexual couple, with their 2.4 children formed the traditional perception of marriage. How things have changed! The so-called reproductive revolution has helped to bring about, or at least influence, these changes, which will be discussed further in this chapter. On the other hand, however, (p. 978) the changing nature of the family can be traced to international concerns about discrimination and human rights in general. If marriage is about 'commitment' and 'personal dignity', then we must ask why marriage should be restricted to heterosexual couples. Failure to recognize the legitimate interests of same sex-couples in precisely the same values seems as dis-

criminatory as laws prohibiting inter-racial marriages, such as formerly existed in apartheid South Africa and some US States. Of course, powerful voices—often from faith-based groups—would take a different position, and indeed they did so in the UK debate on legalization of same-sex marriage, which concluded with the passing of the Marriage (Same Sex Couples) Act 2013. The first same-sex marriages in the United Kingdom took place the following year.

Despite this, and the fact that other jurisdictions within Europe (as well as elsewhere in the world) have legislated to permit and recognize same-sex marriages, what might have been anticipated as likely support from the European Convention on Human Rights (1950) was defeated by application of the doctrine of the margin of appreciation. In *Schalk v Austria*,¹ for example, the Court declined to ‘substitute its own judgment in place of that of the national authorities, who are best placed to assess and respond to the needs of society’ (Schalk 2010: para 62). Noting that ‘marriage has deep-rooted social and cultural connotations which may differ largely from one society to another’, the Court held ‘that Article 12 of the Convention does not impose an obligation on the respondent Government to grant a same-sex couple like the applicants access to marriage’. Thus, states within the Council of Europe cannot be obliged to permit same-sex marriages, but may do so if this is appropriate to their morality.

Beyond the notion that marriage demonstrates commitment, it is also in many cases accompanied by the desire to found a family. As mentioned, creating a family by heterosexual intercourse is no longer the only way of doing this. While fostering, adoption, and so on, can lead to the creation of a family, modern assisted reproductive technology also permits the creation of a family, and in many cases offers the opportunity of establishing a family unit in which one or both parties in the relationship have a genetic link to their offspring. This genetic link has been central to the law’s understanding of parenthood in the past. However, as McAvoy points out, this ‘emphasis on genetic parenthood has been made to appear inappropriate by scientific advancements in the field of assisted reproduction’ (2013: 1422).

Therefore, what constitutes a family is of considerable contemporary interest. Recognition of new forms of marriage, the availability of assisted reproductive technologies (ART) and the lawfulness of (generally non-commercial) surrogacy arrangements all conspire to challenge traditional notions of family and parenthood. This challenge is not to the family unit itself, but rather to the very meaning of the words themselves. As Barton points out:

Procreation and ‘legal’ parenthood are a different matter. Same-sex couples cannot achieve the latter together via the former but, like different-sex pairs, can use, in some order of biological and genetic involvement, assisted reproduction, surrogacy and adoption of partner’s or other’s child ... (2015: 400)

(p. 979) Thus, traditional notions of who is a ‘mother’, a ‘father’, and so on have become more complex. In same-sex families, for example, are there two mothers/fathers? Cas-

tignone points out that what she calls 'a constellation of diverse figures' now appears on the scene (2006: 86). This, she claims, means that

[t]he traditional moral and legal categories no longer exist and judgement as to who is the real mother or father are at times in deep conflict according to whether weight is put upon one characteristic or another, on one phase or another in the process of assisted reproduction (2006: 86).

For this, among other, reasons, Cohen says that

it can be argued not just that assisted reproduction should be acknowledged, but that it should be singled out for special regulation because it is distinctively different from other kinds of medical treatment. The major purpose of use of new reproductive technologies is to create human beings, and only incidentally to alleviate infertility (1997: 359).

Arguably, and somewhat optimistically, Anne Donchin recently postulated that '[n]o democratic state is likely to push for comprehensive legislation if it can achieve its ends in less cumbersome ways' (2011: 96). While this contention may be accurate in some, if not many, contexts, it has potentially less resonance where freedoms, choices, and practices that can profoundly affect both individuals and societies as a whole are at stake. Baird, for example, reflects on the way(s) in which 'scientific knowledge about human reproduction is applied', and concludes that it has the 'potential to change and affect how our societies view women, children and procreation' (1995: 491). Thus, a number of states have indeed opted for 'comprehensive legislation' in the area of assisted reproduction.

The social, cultural, ethical, and legal implications of human reproduction (including, of course, the decision not to reproduce) are some of the most complex, nuanced, and sometimes irreconcilable of issues. For example, the liberal commitment to liberty of action without state intervention absent evidence of harm (Mill 1859), may collide with the state's interest in a more precautionary approach, which is essentially suspicious of change. The former approach can be described as optimistic; the latter as inherently pessimistic. While the former approach is often used to facilitate innovation, the latter, developed from environmental law, 'permits the imposition of restrictions on otherwise legitimate activities, if there is a risk of environmental damage, even if that risk has not yet been fully demonstrated by science' (Murphy 2009: 12). Yet even in those states that regard themselves as aligned with the liberal, Western, democratic camp, the temptation to rein in, or at least monitor, human reproduction—particularly where it is assisted—can seem irresistible, even responsible. For Gorowitz, '[o]versight of these technologies is essential ... if we are to have a reasoned influence on the consequences of their development' (2005: 8). Cohen broadly agrees, justifying 'some regulatory limits on the use of the new reproductive technologies' (1997: 350) based on '[s]ocial and moral concerns about the health and welfare of those involved in the use of the new reproductive (p. 980) technologies, as well as about the nature of the family and the value of children' (1997: 350).

Furthermore, religious, social, and cultural sensitivities may point in diametrically different directions. Mandel, for example, says that '[o]ne obstacle to earlier and more adaptive governance is that new technologies are often met with highly polarised debates over how to manage the development, use and regulation of the technology' (2009: 76).

Warnock goes further, saying

[i]t is tempting for the press (and they are certain to fall for the temptation) to turn the announcement of any new biomedical technique into a shock/horror story; and the public will probably accept what they read and put pressure on Parliament to take steps either to prohibit further research altogether or at least to subject it to non-scientific regulation (1998: 174).

Thus, either directly (as in the United Kingdom) or indirectly, it would seem that most national jurisdictions agree that the state has some role to play in managing the so-called reproductive revolution. There is nothing terribly surprising about this given that other (non)reproductive decisions unrelated to infertility (for example, abortion and access to contraception) have long been regulated by the state in most, if not all, countries. While Mill's harm principle has sometimes been used as a justification for intervention in otherwise private choices, arguably more often there has been a tacit assumption that this is a domain legitimately of significant interest to law-makers and policy-makers. Indeed, in recommending legal regulation of assisted reproduction in the United Kingdom, the Committee of Inquiry into Human Fertilisation and Embryology (Warnock Report 1984) elevated regulation to an almost supreme level, claiming that by recommending legislation they were 'recommending a kind of society that we can, all of us, praise and admire' (Warnock Report 1984: 3, para 6).

Yet, the occasionally knee-jerk decision to legislate in the face of innovation (McLean 2006: 245) is subject to two fundamental questions which are not always asked and, even more regularly, not answered. Castignone, however, poses them starkly. The first concerns whether or not 'these activities can be disciplined by law, and what limits can be imposed' (2006: 81). The second 'questions the internal limits of the legal system, the inadequacy of its categories and its concepts, and the necessity of formulating new ones' (2006: 81). These questions are fundamental, even if it is not the law acting for the state that is directly involved in regulation. Any system capable of controlling human behaviour—e.g. economic, social, cultural, religious—needs to acknowledge the possibility that either it is inadequate to perform the task, or that it lacks the conceptual clarity adequately and appropriately to manage what is novel and challenging.

Without seriously addressing these questions, however, a consensus seems nonetheless to have emerged among a number of commentators and commentaries. Cohen, warning that 'private moral choices have public consequences' (1997: 364), (p. 981) concludes that accordingly there is a role to be played by the state, while at the same time there is an obligation to 'reject attempts by government to coerce or unduly influence the choices that people make about whether to have children' (1997: 364). It is unclear how the balancing act between individual choice and public regulation is to be achieved, and—for in-

dividuals and regulators—it is often a conundrum. The Warnock Committee, while recommending legislation for ‘protection of the public’ (Warnock 1984: para 13.3) conceded that this might ‘be regarded by some as infringing clinical or academic freedom’ (Warnock 1984: para 13.1). Those who shape policy, therefore, must take into consideration a number of interests and concerns.

3. Policy Making in the World of Human Reproduction

To date, much of what has been said has focused on issues raised by assisted reproduction, but many other reproductive issues exist that are of concern (primarily) for women, albeit not exclusively so. These matters will be discussed presently, given that they too are, or may be, subject to (some form of) regulation. Equally, the question of what form governance or regulation may take will also be discussed, as the law is by no means the only vehicle that controls people’s freedoms, choices, and reproductive lives. While this is extensively and eloquently covered by Julia Black, Roger Brownsword, and others elsewhere in this Handbook, it is important to consider briefly what underpins regulation and how the policy backdrop might affect this particular area.

Let us consider regulation as policy. Irrespective of what form regulation takes, somewhere—however (in)articulately—a decision has lain behind the process that shapes it; indeed, perhaps multiple decisions have been taken. In the areas of family, reproduction, and population, these policy decisions can be hidden, self-serving, other-regarding, opaque, pragmatic, misunderstood, and more.

Bochel and Duncan, for example, postulate that making policy ‘rarely proceeds in ... an orderly fashion’, because making policy ‘involves many different actors, and it involves conflict over aims, goals and values’ (2007: 3). Page also challenges the scientific basis of policy determination, saying that:

Insofar as they arise from conscious reflection and deliberation, policies may reflect a variety of intentions and ideas: some vague, some specific, some conflicting, some unarticulated. They can ... even be the unintended or undeliberated consequences of professional practices or bureaucratic routines (2007: 207).

(p. 982) ‘In practice’, says Oliver, ‘public policy is not a single act of government but a course of action that involves individuals and institutions in both the public and private sectors, and encompasses both voluntary activities and legal injunctions’ (2006: 219). Thus, the processes by which policy and regulatory frameworks emerge need also to be examined. In a slightly different context, for Brownsword and Somsen, this suggests that ‘[p]articipatory processes ... are a step in the right direction, signalling that policy decisions in relation to key new technologies are not to be left to the technocrats and the supposedly impartial and unproblematic judgments of “sound science”. However, the legitimacy of such processes will fall into question unless innovative ways are found of neutral-

ising the implicit conditioning pressures and those various framing features that can insidiously shape decision-making' (2009: 19). These 'implicit conditioning pressures' can derive from ignorance, knowledge, or skewed information, yet any or all of these characteristics can shape policies that affect individual liberties profoundly, without being evident, transparent, accountable, or even informed. Lee, Scheufele, and Lewenstein suggest, for example, that even where hard facts are not known or available to members of the public, this will not prevent them from making assumptions about new technologies (2005). Rather, they say 'citizens will use cognitive shortcuts or heuristics, such as ideological predispositions or cues from mass media, to form judgments about emerging technologies' (2005: 241). Thus, it seems plausible that policy makers will react in an equivalent manner.

Irrespective of how policy in this area is made and how robust it actually is, and regardless of how people reach conclusions about what is or is not permissible, there is little doubt that reproductive decisions have consequences that are both personal and social. A ban on abortion, for example, may result in increasing injuries—even death—among pregnant women; failure to assist those with fertility problems, whether physically or emotionally generated, may result in depression and other psychological problems. Each of these examples points to the possibility of personal tragedy, but they also clearly have broader, societal consequences that go beyond nation states. While different cultures may prioritize different issues, the international community also has an interest in reproductive practices.

4. Never Mind the State—What about the Community of Nations?

A quick search of the Internet will show just how many treaties, declarations, reports, and so on, have been dedicated to the subject of human reproduction. Often they (p. 983) appear under the umbrella of women's rights, but can be wrapped in the mantle of human rights in general—rights of the vulnerable or specific communities—exploitation, environment, population control, professional rights and responsibilities, commercial and patent rights, etc. Given the incredibly broad range of actors, people with interests, differing organizational and professional views, the realities of international and supra-national negotiations, and the enforceability problems of even apparently binding international laws, it is hardly surprising that the impact of these instruments, while important, is of less direct relevance in many cases than what states actually do. Nonetheless, in terms of the significance of their rhetoric and its ability to become part of the *lingua franca*, these instruments neither can nor should be ignored.

In this area, arguably the most significant international contribution followed the International Conference on Population and Development (ICPD) in 1994, when '179 countries came together and adopted a Programme of Action, in which they agreed that population policies must be aimed at empowering couples and individuals—especially women—to make decisions about the size of their families, providing them with the information and

resources to make such decisions, and enabling them to exercise their reproductive rights' (Centre for Reproductive Rights 2013: 1). This recognition of the importance of human rights in the arena of reproductive decision-making represented a major step at the international level in endorsing the reproductive liberties for which individuals and groups have fought over many years. Given the United Nations' interest in reproductive health and rights, further instruments have also contributed to a pattern of agreements that seek to oblige states to respect and enhance their citizens' enjoyment of these rights (Cook and Dickens 2015: 3–24).

5. To Reproduce or Not: Who Cares?

Before addressing the role of the state as regards reproductive rights, it is worth noting that there are other interests that may affect the ability of individuals to make uncoerced reproductive decisions. Of course, it is not only states that may have an interest in, and/or power over, human reproductive practices. Levitt, for example, points to the pressure applied by what she calls the 'fertility industry' (2004: 42) to expand available services, leading, according to Castignone, to a situation where 'traditional moral and legal categories no longer exist' (2006: 86).

Baird is concerned about the likely commercialization of human reproduction, a real possibility in some countries, arguing that '[i]f market forces were allowed (p. 984) to drive how reproductive technologies are used, it would undermine important social values and harm people by leading to inappropriate, unethical or unsafe use of technology' (1995: 492). Donchin asserts that 'institutionalization shifts the focus of reproductive decision-making from individual consumers of ART services to the medical and legal institutions that determine access' (2011: 99). As Sherwin puts it bluntly, '[a]lthough the new reproductive technologies can provide individuals with greater power to determine their own procreative choices, actual control may belong to others' (1992: 120).

Economic, informational, religious and cultural pressures may also pragmatically prevent genuinely free reproductive decisions. In response to the question 'Who cares?', we discover that apparently quite a lot of people and organisations 'care'. What seems to emerge in this area is an untidy mixture of issues. While there exists the almost instinctive desire to permit individuals to make competent and authentic decisions about their reproductive practices, cultural, faith-based, and other arguments may also point to different, but nonetheless powerfully and honestly held, conclusions. An additional concern is that science may move too quickly, or in undesirable directions, thus posing a threat to individuals or society as a whole. This confusion of pragmatics and ideologies poses serious threats to the actual freedom that human rights rhetoric seeks to validate and enhance.

It must be reiterated that non-regulatory influences can influence reproductive decisions just as effectively as formal regulation can. Even if the state were not to interfere directly with reproductive choice, e.g. by deregulating such decisions, other forces, e.g. economic ones, will inevitably influence how 'free' a choice can be. In jurisdictions where health-

care is not free at the point of delivery, the economic imperatives can be major controlling factors. Even where a national health service exists, some reproductive choices may not be made available freely due to inadequate funding or competition for resources. Equally, subtle or explicit pressures can arise from cultural, religious, or social norms. Arguably, each of these forms a kind of regulation, albeit not necessarily a formal one in that they influence behaviour, restrain (or enhance) choice, and point to specific conclusions.

Complete absence of what can loosely be called regulation, then, is unlikely. In some countries, the state has chosen a *laissez-faire* approach, allowing market and other forces to dictate availability of resources. Yet even in these states, it is not uncommon to find some regulatory intervention, most commonly in the area of pregnancy termination. For example, while there is an absence of federal activity in the United States, there is considerable judicial, and sometimes legislative, activity in the area of abortion; there are apparently increasing efforts being made to limit or hinder access to pregnancy terminating services. Additionally, financial capacity may affect whether or not those with fertility problems can access ART; adoption restrictions may prevent some from forming a family; restrictions on same-sex unions, albeit increasingly rare, may preclude the establishment of legal relationships.

(p. 985) In other jurisdictions, the decision has been made that a legislative structure is needed, although the form and content of the legislation may vary. Legislation is possibly the most recognizable form of regulation, and may be either permissive or restrictive. The United Kingdom has had relatively liberal legislation in place since 1990, which was updated in 2008, and was recently modified to allow for the possibility of mitochondrial DNA transfer (McLean 2015). That the latter was possible is testament to the relatively liberal approach taken in the United Kingdom. It is tempting on occasion to criticize the legislative approach as being too inflexible to be suited to sensitive matters such as human reproduction. However, the recent passing of the Human Fertilisation and Embryology (Mitochondrial Donation) Regulations 2015, which came into effect in October 2015, would suggest that legislation is capable of sufficient flexibility to capture technological progress. That being said, even flexible legislation can be criticized.

Mandel, for example, suggests that '[h]igh-potential/high-risk emerging technologies present a social and regulatory quandary' (2009: 75). That much should be evident from what has already been said here. The alleged 'growing gap between the rate of technological change and management of that change through legal mechanisms' (Marchant 2011: 19) is of concern to a number of commentators. If this gap is real, it may pose a threat both to reproductive liberties and what may be called the moral tone of societies. States which are inadequately equipped to respond appropriately and competently to rapidly developing technologies are likely to fail both as regulators and as guardians of individual freedoms.

The history of state involvement in reproductive decisions is fraught with controversy. For early feminists in the nineteenth century, the main struggle revolved around the right of

access to contraception. Failure to obtain contraception, however elementary it may have been, resulted in multiple pregnancies, with high rates of child and maternal mortality. In the early part of the twentieth century states as diverse as the United States and Nazi Germany adopted eugenic policies designed to ensure that only the 'strong' or the 'racially pure' were encouraged or permitted to reproduce. For these reasons, as well as a growing concern for individual rights, it became customary to couch reproductive or non-reproductive aspirations in the language of human rights, which has become arguably the most powerful social and political tool at the disposal of individuals. Human rights permit individuals and groups to challenge the behaviour of states that overstep their authority or impose unacceptable or unreasonable limitations on private and/or social behaviour.

Yet, the fact that there is a social aspect to reproductive decisions is taken by some commentators to mandate or imply standard setting by a central agency—usually, the state. For example, Freely and Pyper suggest that '[a]ny fertility decision that involves the co-operation of public agencies will be subject to standards set by those agencies, as well as limits dictated by the law' (1993: 3). However, it is problematic that while regulation, from whatever source 'can expand what is available ... it can also close it down by prohibiting certain practices' (McLean 2006: 241). Two criteria (p. 986) are paramount; first, the mind-set or motivation(s) of the organization/individuals wielding the authority and setting the policy agenda; and second, the weight accorded to arguments based in human rights.

While this chapter does not specifically discuss United Kingdom policy, relatively recent events there can provide powerful examples as to how policy makers and regulators can influence social attitudes. From the partially precautionary approach of the Warnock Report, experience has suggested that the reins of control might reasonably be loosened. The House of Commons Select Committee on Science and Technology in its Human Reproductive Technologies and the Law report took a liberal approach to reproductive decisions, saying

there should be balance between the freedom of individuals to make their own reproductive choices and the legitimate interests of the state, but that any intervention into reproductive choice must have a sound ethical basis and also take into account evidence of harm to children or to society' (187, para 97).

In fact, they went even further, concluding that 'rather than adding to the list of regulated fertility treatments, we should be decreasing the level of state intervention. ... We have not been persuaded ... that regulation should demand anything more than the highest technical standards' (40, para 83).

Decision making must also consider the strength of human rights claims. In many parts of the world, supra-national courts have been established whose function is to examine and adjudicate on human rights claims. For example, the European Court of Human Rights has jurisdiction over all member states of the Council of Europe. Not only must legislation in Member States be certified as compatible with the rights laid down in the Convention, but individuals who perceive that their rights have been impeded can also challenge state

decisions at the Court of Human Rights. Even where no such supra-national body has authority, e.g. in the United States, the Supreme Court is ostensibly the buffer between the individual and egregious state behaviour. For it to be legitimate for a US state to intervene in otherwise private choices, a compelling reason must be shown. In the example of preimplantation genetic diagnosis (PGD), in which embryos that do not carry genetic problems are preferred to those that do, some argue this practice harms both society and the children who will not be born; the state may claim a compelling interest in preventing its use. Yet, as Peters points out:

When the legislature's restrictions protect identifiable future children from serious harm, the government will be deemed to have a compelling state interest. However, many proposed limitations on the use of reproductive technology would not protect identifiable children from harm. Instead, they would reduce future suffering by changing the identity of the children who are born. (2009: 319)

While human rights language is seen by some as overused and human rights law by others as 'no more than the universalization of the particular' (Murphy 2009: 10), there remains reason for optimism that both philosophically and pragmatically (p. 987) each retains its benign core purpose and its place in the panoply of the 'good'. Even if not as effective as some might wish, the mere existence of human rights norms demands that states consider their role and provides individuals with a vehicle to force recognition of their legitimate interests and liberties.

6. Population

This section briefly considers population control. In a world in which overpopulation in certain geographical areas is a matter of genuine concern, it is perhaps inevitable that states take a strong stance in an effort to prevent it. In May 2015, for example, Myanmar's president signed into law a measure prohibiting women from having children within three years of each other (ABC/AFP 2015).

However, the best known, and possibly most controversial, reproductive policy is China's 'one-child' policy. While generally considered as heavy-handed and illiberal, Nie's thoughtful 2005 study, based on extensive interviews with Chinese women and sociological analysis, makes a number of important points. First, he notes that—despite the West's position—for many Chinese families, the restriction to one child is seen as a socially responsible limitation accepted, however reluctantly, in the interests of the state; Nie also notes, however, that it is regularly ignored in rural communities. Second, he argues that in terms of both this policy and the question of abortion:

The international debate over Chinese population control and abortion practices has ... proceeded without paying sufficient attention to Chinese views and experiences. In fact, due to the absence of serious studies and the influence of stereotypes of Chinese people and culture—both in the West as in China—the moral and sociocultural dimensions of abortion in Chinese society are surrounded by unex-

amined assumptions, superficial observations, misunderstandings, and myths (2005: 6–7).

Nie is not an apologist for the unacceptable aspects of Chinese population control, such as forced pregnancy terminations and sterilizations. Rather, he points to the tragedy that follows such policies. Given how relatively rare his analysis is, it is worth quoting Nie again at some length on this point:

The coercive element in China's birth control program, including pressuring and forcing women to have abortions against their wishes, often at the late stage of their pregnancies, has brought about devastating consequences, such as damage to the physical health of women, emotional and psychological injuries to women and their family members, disproportionate abortions of female foetuses, and an increase in the killing and abandoning of female infants. Coerced abortion is a tragedy in the sense that, although it is human made, that is, a (p. 988) direct result of birth control policy, policy makers never meant to produce this consequence (2005: 189).

Finally, he rejects what he sees as a false form of moral argument, which involves 'justifying the means by the ends', arguing that this 'can seriously undermine the moral foundation of the whole of society' (2005: 220). To reflect on our earlier discussion of policy making, this seems a clear example of how the perceived over-arching necessity of population control can come to dominate, apparently without full reflection on the wider picture or the implications of its implementation. Indeed, it was precisely policies such as forced abortions, sterilizations, and discriminatory population policies that ICPD felt required 'recognition that compelling individuals to carry out states' coercive population-based laws, policies, or practices constitutes a human rights violation and should be abolished (Centre for Reproductive Rights: 3). Sadly, it would appear, this assertion has not yet seemed to affect Chinese policy, and the recent law reform in Myanmar suggests that the battle continues.

7. Conclusion

How we respond to the challenges posed by the claims of individuals for human rights in respect of forming families and reproductive decisions needs to be sophisticated, nuanced, proportionate, and appropriate. Therefore, those effecting regulation in whatever form it takes need to weigh and balance a perhaps surprising array of issues, and as suggested by Julia Black, to act as facilitators (1998). This means more than simply being permissive; rather, it means making an effort to ensure that regulation is effective 'in connecting the arguments of participants, in facilitating the integration of the wide range of views as to the appropriate course that the technology and its regulation should take' (Black 1998: 621). Advocating for 'really responsive regulation', Baldwin and Black describe this as occurring 'when it knows its regulatees and its institutional environments, when it is capable of deploying different and new regulatory logics coherently,

when it is performance sensitive and when it grasps what its shifting challenges are' (2008: 94).

Baldwin and Black make an important point, despite it demonstrating clearly the very real difficulties associated with reproductive regulation. For one thing, not all reproductive choices are facilitated by sophisticated technologies. Abortion, for example, has been safely practised for many years using relatively elementary medical skills. Nonetheless, abortion is generally regulated by criminal law, a form of regulation unusual in the health-care setting. In vitro fertilization is increasingly perceived as standard medical practice, but is treated differently from other routine (p. 989) medical acts, e.g. surgery to remove a gall bladder. To be sure, there are some aspects of assisted reproduction that remain at the more complicated end of the reproductive range, yet in all probability they, too, will one day be seen as routine.

A 'one size fits all' regulatory regime is inappropriate to accommodate the various aspects of human reproductive and familial choices. When concerns about population control or the protection of vulnerable individuals or groups are added to the equation, it seems clear that there are many 'regulatees', making coherence in policy or regulation problematic. In sum, we are left to speculate on how, if at all, we should regulate human reproduction or the right to form binding legal relationships. It may be that any effort to do so is doomed to failure, or only limited success, by the very nature of the activities under consideration. In addition, there is the risk that we either over- or under-regulate, or as Gorowitz says 'of inventing capacities we lack the wisdom to handle responsibly, or being so wary of what research can yield that we foreclose the prospects of those very developments that can empower us to thrive' (2005: 6). Perhaps, with the UK Science and Technology Committee we should reconsider *what* and *why* we regulate, as seen by the Committee's considered, albeit not unanimous, opinion that regulation should not demand 'anything more than the highest technical standards' (House of Commons Select Committee on Science and Technology 2004–2005: 40, para 83).

In the modern world of family, reproduction and population control, little is simple. Traditional understandings of parenthood, legal status, and reproductive liberty have changed almost beyond recognition. It would appear that some legal regulation or management is necessary, if for no other reason than to ensure that relationships between partners and parents and children are protected. How far into otherwise private decisions the state (or others) should intrude will be affected by a variety of implicit, overt, opaque, and transparent decisions. Too often, the small, rather than the big, picture is the focus of debate, which also tends to be true in population control policies. It is not tenable to do something, to develop policies, simply because we *can*. Instead, we must ask 'why', and not 'how'. Therefore, the issue is not *how* we can control reproductive behaviour, but *why* we would want to. In doing so, we must also avoid what Hart calls 'moral populism' (1963: 79) and concentrate on respecting the autonomy rights of individuals where these cause no demonstrable harm. Like Freeman, we should bear in mind when contemplating interventions in the rights of individuals to marry and found a family that '[b]asic liberties apply to all persons equally (or at least all citizens) without regard to social or economic sta-

tus. The equality of basic liberties is the primary way that equality is recognized in liberal institutions' (2002: 108).

The pursuit of equality, non-discrimination and justice in this arena is consonant with international norms and the aspirations of many individual states. Freeman reminds us that 'limits on the exercise of basic liberties are to be imposed only to protect and maintain others' basic liberties and the rights and duties of justice needed to sustain them' (2002: 109). As suggested here, this requires attention being (p. 990) paid to the big picture. We must ask what our motivation is to regulate, and what the policies are that underpin such regulation as exists. Furthermore, we must query how basic human rights are impacted by these policy decisions, and what, if anything, will be the impact on society of any decisions taken.

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Reproductive Technologies and the Search for Regulatory Legitimacy: Fuzzy Lines, Decaying Consensus, and Intractable Normative Problems

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For a variety of reasons, assisted reproductive technologies (ARTs) have posed significant challenges to regulators seeking normative legitimacy. While some of those challenges relate to the sort of value pluralism common to many areas of life, it has been suggested that the challenge is made significantly harder by the presence of genuinely intractable normative problems. This chapter examines one of the most significant of these problems in relation to reproductive choices, the infamous Non Identity Problem. I examine a number of proposed solutions and regulatory strategies that have been examined to circumvent or resolve such problems, and conclude by suggesting that the extent of the challenge posed by non-identity is just beginning to become apparent.

Keywords: reproduction, regulation, embryo testing, non-identity problem, assisted reproductive technology, ART

1. Introduction

*[A]S technology matures,' Brownsword and Goodwin have written, 'regulators need to maintain a regulatory position that comports with a community's views of its acceptable use' (2012: 372). For those charged with regulating emerging reproductive technologies, this has proved an unusually demanding task. Thirty years on (p. 993) from the Warnock Report, and 25 years after the UK Parliament became the first to attempt to provide a legislative framework for such technologies, significant doubts persist not only about the extent to which regulatory positions regarding assisted reproductive technologies (ARTs) still comport with such views, but indeed, also about what it means for them to do so.

Even as the prospect of next generation technologies, such as genome editing, looms on the ethical horizon (Lanphier et al. 2015; Savulescu et al. 2015), uses of well-established techniques such as egg freezing (Baylis 2014), prenatal screening (Sullivan 2013), and pre-implantation diagnosis continue to generate passionate opposition and debate. At both procedural and substantive levels, regulators have been subjected to a seemingly re-

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lentless barrage of criticism, for inactivity (Snelling 2013: 194), overreaching their remit (Science and Technology Committee 2005), excessive liberalism (Quintavalle 2010), undue conservatism (Harris 2005), or for reaching their decisions on questionable grounds (Gavaghan 2007).

This chapter considers some of the reasons that regulation of ARTs remains, if not uniquely, then at least particularly, difficult to comport with community views. Some of the difficulties, unsurprisingly, are common to other areas of technology regulation. Within almost any community, regulators will encounter a plurality of values and priorities, some of which are likely to prove genuinely irreconcilable, even after protracted negotiation. They will also encounter the well-documented struggle to get, and keep, regulation connected to technologies that are rapidly evolving, both in their nature and in terms of the uses to which they are put (Brownsword 2008).

Other difficulties, I suggest, derive from ambivalence as to what we mean by ‘a community’s view’. Should regulators be concerned with reflecting the views of the majority of people in their jurisdiction? Or with seeking some common ethical denominator? Should some perspectives be privileged—perhaps those with more expertise on a topic, or personal experience of an outcome, or those most likely to be affected by a decision?

If regulators are able to determine which population to consult, a further question is around what precisely to ask them. Even if we assume that the population whose views are solicited are sufficiently informed about a particular ART to understand the questions (which has not invariably been the case), care must be taken when framing questions and interpreting answers if an accurate picture is to be formed. Questions about the desirability of a particular technology will not invariably provide answers about its *permissibility*, and regulators could come unstuck if they conflate the two.

Finally, regulators must consider what use should be made of public opinion. Even if regulators are confident that public opinion is in favour of prohibition, will that fact alone provide sufficient justification to deny the technology to those who dissent from that majority? In a society that aspires to be both liberal and democratic, how are the views of the many to be balanced against the dissenting opinions (p. 994) of minorities? Can regulators leave room for a sphere of private decision making, while still maintaining the confidence of the majority of citizens?

The challenge is made no easier by the novel character of some of the choices presented by such technologies. Faced with decisions about saviour siblings, multi-‘parent’ embryos, or ‘grandparent pregnancies’, it may be that many people (including those of us paid to think about such things!) simply do not have clear views as to their permissibility, but instead find themselves wrestling with half-formed or competing intuitions. It is easy to see how translating these into the clear and predictable language of rules, laws, and guidelines can prove a challenge.

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Even after considered reflection, it is plausible that some issues in reproductive and intergenerational ethics are genuinely hard, perhaps even examples of what David Heyd has called ‘intractable normative problems’ (2009). This does not just mean that they result in polarized responses which are difficult to reconcile, but that they pose hard questions—and possibly even genuine dilemmas—for almost everyone who spends time thinking seriously about them. The second part of this chapter considers perhaps the most troubling of these problems, Parfit’s (1984) infamous Non-Identity Problem. I suggest that, despite some commendable recent attempts at novel solutions, the Problem remains genuinely problematic.

I will briefly map out the various challenges of legitimacy faced by ART regulators. In the main part of this chapter, I consider a range of responses to these challenges. First, I consider a selection of suggestions from theorists and commentators. A range of recent publications offer a variety of new approaches to these questions, in the hope of finding new routes through the ethical impasse. The more ambitious among these have purported to answer the challenge of non-identity. I consider some of the more promising of the new candidates, but suggest that, however enterprising and ingenious, they ultimately fail to dispose of the problem. Finally, I argue that, with the emergence of gene-editing technology, the question of non-identity promises to become both more vexing and more difficult to ignore.

Secondly, I consider a range of legislative and regulatory responses, focusing on two common strategies in particular: deliberative democracy and imperfectly theorized agreements. While both of these may have a part to play in pursuit of regulatory legitimacy, I attempt to illustrate some of the limitations and even dangers they can present.

2. The Elusive Goal of Consensus

It is not surprising that a broad plurality of ethical views exists around ARTs. The use of such technologies touch on some of our deepest intuitions about family and (p. 995) parenthood; about sex, sexuality, and gender; about disability; and about the value of embryonic human life. At the same time, discussions are often backlit by dramatic, even lurid, cultural depictions of such technologies.¹

It would be misleading, however, to suggest that it is only emotive considerations that render consensus elusive. Considered ethical values are also very much in conflict. Some of these are familiar from a host of other bioethical conflicts: the sanctity of human life and the value of bodily integrity are as relevant to debates about abortion or voluntary euthanasia as they are to in vitro fertilization or pre-implantation genetic diagnosis.

Others, however, have emerged more recently, and are less established features on the ethical landscape. Concerns about hubris and openness to the unbidden, for example, vie for attention with appeals to dignity and authenticity, while ‘relational’ obligations are pitted against duties of procreative beneficence. While these seem to resonate instinctively with many people, it is arguable that their implications and nuances have yet to be

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thought through and worked up in a manner that will allow them normative, rather than merely descriptive, value. To put it another way, they may presently be more useful in describing how we feel, rather than telling us how to act.

It is easy to understand why some of these normative newcomers seem to resonate with a wide audience. We might think it plausible that prospective parents have a right—perhaps even a duty—to act so as to maximize the likely well-being of their future children. At the same time, though, we may agree that there is something to be said for limiting the extent to which parents can pre-determine the characteristics and potentially the life choices of those future children. We disapprove of parents who deny medical treatment to their children, but also disapprove of those who discriminate against disabled people. These very same intuitions are in tension in many more mundane domestic scenarios.

While we may find it virtuous or desirable to cultivate inclinations both of concern for our children, and of respect for their own choices and characters, we are on less familiar terrain when asked to translate such sentiments into solid rules for other people. The fallible, messy business of balancing competing obligations that constitutes much of family life is very different from the precise, predictable matter of crafting laws or guidelines. Attempting to base precise legal rules on general positive dispositions has presented a significant challenge.

This challenge of translating the messy rules that govern family relations into the precise terms of legal statutes is only one reason why ARTs have proved such an elusive regulatory target. It is also at least arguable that such technologies pose uniquely difficult ethical and philosophical problems. While many other areas of ethical, legal, and political controversy involve competing rights, interests, and duties, reproductive issues add a unique dimension in that they explicitly² involve consideration of the rights, interests, and arguably even duties of people whose existence is contingent on the content of the decisions that we make.

(p. 996) The ‘hard’ nature of the questions posed in this area is perhaps best summarized in Derek Parfit’s infamous Non-Identity Problem (NIP). In his ground-breaking *Reasons and Persons*, Parfit considered the implications of personal identity for a range of reproductive decisions, including a 14-year-old girl and a woman taking a short course of medication that temporarily is likely to cause birth defects. While our intuitions might suggest that both should delay pregnancy until a later date, Parfit challenges us to consider precisely who would be harmed were they to elect to become pregnant now. The children they would actually have may have poorer lives than the alternative children they might have had in future. But for those children, they are the only lives they could possibly have had. As such—provided those lives are not so unremittingly miserable as to be worse than non-existence—it is difficult to sustain the claim that they have actually been harmed by the decision on which their existence was dependent.

Equally, the alternative child that she might have had is not harmed by her decision, because it never exists as any more than a theoretical possibility, and therefore cannot be the subject of harm.³ If all that is so, then those decisions seem to be—at least from the

perspective of her various possible future offspring—morally neutral, a conclusion that struck even Parfit as highly counterintuitive.

This philosophical conundrum continues to attract considerable philosophical attention (Roberts and Wasserman 2009; Taylor-Sands 2013; Boonin, 2014). Its impact on policy-making in this area, however, has been negligible. Indeed, it would not be inaccurate to characterize the standard regulatory and legislative response to non-identity as ignoring it in the hope that everyone else will do likewise.

The issue, however, shows no sign of going away. If anything, as I discuss in the final part of this chapter, the sorts of possibilities afforded by gene editing could potentially render it more relevant than ever. Other than simply ignoring it, though, what are regulators to do when faced with an intractable problem like non-identity?

David Heyd has identified four possible responses to the non-identity problem:

1. Denying it is a problem to begin with.
2. Aspiring to solve it in some (yet unknown) integrative moral theory in the future.
3. Attenuating it so as to make it more palatable to our moral intuitions and theories.
4. Biting the bullet; i.e., accepting all the implications of the nonidentity problem (2009: 5).

While regulators have largely adopted the first approach, academic commentators have proposed a variety of the other alternatives. While few have accepted *all* of the implications of non-identity, some have suggested that regulatory policy should be less inclined to restrict parental choices when it is unclear whether they serve to harm anyone (Gavaghan 2007). Of those who seek to avoid the more (p. 997) counterintuitive implications, appeals have commonly been made to some form of impersonal approach, whereby the morality of a choice is judged not only by reference to its effects on identifiable people, but by its contribution to a concern for the amount of happiness or well-being in the world.

Such attempts, while appealing, bring with them their own distinct problems, which I have discussed at length elsewhere (Gavaghan 2007). Of recent interest, however, is Heyd's third category. As he describes it, this 'tries to adhere to a person-affecting view by interpreting it in a wide sense or by supplementing it with impersonal features' (2009). There have been many attempts to do this, but two of the more interesting recent attempts have involved either relational views of identity, or virtue-based approaches.

3. Relational Identity

One influential attempt to resist the implications of non-identity, while remaining within a person-affecting paradigm, involves a challenge to the notion of personal identity upon which the NIP relies. In perhaps the most discussed recent example (it was the subject of a special issue of the *American Journal of Bioethics*), Malek and Daar proposed an alter-

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native approach to non-identity, one that relies on the increasingly influential tradition of relational ethics. Their argument is that 'in reproductive contexts ... it may be more appropriate to take a relational view of the identity of the future child', according to which:

the morally relevant characteristics of a future child are not genetic but are instead related to the role that that future child will play in the world ... In describing parental duties, it is appropriate to use a relational understanding of the future child and to focus the ethical analysis on duties of the potential parent. This approach provides a continuity of identity among possible future children, making it possible to say that a potential parent can, in fact, increase the well-being of her or his future child (in a standard person-affecting way) by using PGD to prevent ARPKD [Autosomal recessive polycystic kidney disease] (Malek and Daar 2012: 5).⁴

'Relational' approaches to identity are not unique to the realm of reproductive ethics. In discussing continuity of identity in the context of neuroethics, Françoise Baylis has advanced a similar concept:

we are constituted/constructed in and through personal (intimate) relationships and public (impersonal social and political) interactions... we are embodied selves situated in particular social, cultural, political and historical contexts... My identity is not in my body or in my brain, but in the negotiated spaces between my body and brain, and the bodies and brains of others (2013: 517).

(p. 998) Baylis distinguishes this account of personal identity from 'both the somatic (or biological) account of personal identity, as well as the psychological account of personal identity' (2013).

It is easy to find something appealing in this approach. For one thing, it provides some balance in the face of what may be seen as an approach to personal identity that has become overly focused on biological and particularly genetic factors, to the exclusion of the environmental and relational factors that may play at least as important a role. Witness, for example, the popular British television programme *Who Do You Think You Are*, each episode of which follows a celebrity as they discover details of their family history—often with quite emotional results. Implicit in the show's title is that one's sense of self could in some sense be mistaken, a mistake that could be corrected by accurate genealogical data.⁵

In as much as Malek and Daar, and Baylis, remind us of the important contribution relationships and experiences make to identity, their argument fulfils an important role. It is less clear how far it provides us with a response to non-identity. For one thing, 'the role that that future child will play in the world' may depend significantly on their genetic attributes. Of course, in one sense, their 'relational identities' will be interchangeable, in that both children could be described as the 'children of X and Y'. But that is only one way in which our 'role ... in the world' could be described. Many other aspects of that role could depend on the respective attributes of those candidate embryos. Most obviously, a

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choice between a male or female embryo will determine whether that child comes to be the 'daughter of X and Y' or the 'son of X and Y'.

Other attributes may also play a role. A child born with profound cognitive disabilities, for example, will not experience the same relationships with their parents as an alternative child; for one thing, the former child may well remain in a relationship of dependency with those parents for a far longer period, perhaps for their lifetime.

More fundamentally, though, it is hard to accept that whether X and Y *are* the same person can be determined wholly by reference to whether Z *views or treats* them as the same person. The imposter who pretended to be Martin Guerre did not become Martin Guerre merely because his wife, family, and neighbours appear to have viewed and treated him as such.⁶ Recognition by others may be a part of 'who we are', but it surely cannot be the whole of the story.

A more plausible way of integrating relational considerations into a theory of personal identity may be to stipulate that identity depends to some extent on a variety of factors, and that a sufficiently radical change to any of them could result in a 'different' person. Thus, an embryo created from the fusion of different gametes would develop into 'a different child'—as per the assumptions underlying the NIP—but equally, a future child's identity might depend on the circumstances into which it is born. A cryo-preserved embryo gestated by and born to a different mother—or perhaps even to the same mother⁷—many decades later, in very different circumstances, could plausibly be considered to develop into a 'different' person than the child into whom that embryo would develop were it to be implanted today.

(p. 999) Acknowledging that identity might depend in part on non-genetic factors does not, however, mean that it does not *also* depend on genetic factors. It draws our attention to some interesting considerations, but it does not, I suggest, solve the NIP. Indeed, if anything, it might be thought to render it even more vexing. After all, if personal identity depends on relationships and environment as much as genetics, then we might conclude that Parfit's hypothetical 14-year-old girl would have done nothing wrong even if she had the opportunity to become pregnant with *the very same embryo* ten years later, when she was more emotionally mature and financially secure. That 'better-off' child might be seen as a different child, despite being the product of precisely the same combination of gametes.

4. Virtue

In his response to Malek and Daar's paper, James Delaney argues for a different response to the NIP, one that derives instead from virtue ethics:

my own thought is that perhaps such obligations should be understood in terms of the virtues of parents rather than harms and benefits to future children. If parenting is a particular kind of human practice, and a practice that has corresponding

virtues, I wonder about the lack of virtue that a parent might have if he or she is indifferent, all other things being equal, as to whether or not his or her child might be born with ARPKD (2012: 25).

Virtue ethics are certainly an established part of the bioethical terrain, but the extent to which they could guide us out of the regulatory impasse is less clear. For one thing, as Delaney notes, 'We generally do not impose obligations on people for the sake of restricting their bad character. We may therefore be wandering into somewhat new territory in this' (2012).

Even were we to agree that it is a legitimate regulatory purpose to promote virtue, rather than pursue more conventional objectives such as preventing harms and upholding rights, we would be left with the question of which virtues should be promoted. Certainly, if some prospective parents were simply callously indifferent to their future children's suffering—or (however implausibly) actually relished the prospect of their suffering—these would certainly be vicious dispositions that we may have good reason to condemn and discourage. For one thing, as Heyd suggests, 'If parents are completely indifferent to the welfare of their planned future child, they are liable to become bad parents and to violate their parental duties *to the child once she is born*' (2009: 16).

What is less clear is that a prospective parent who has thought hard about the options, and has decided that neither choice is ethically preferable to the other, while making a firm commitment to care for whichever child is born, is failing to (p. 1000) display any virtue that we would expect from a parent. Indifference as to which of two possible children is actually born is not the same as, and is likely a poor predictor of, indifference towards the well-being of a child once it is born.

Perhaps, though, the regulatory objective might go further than discouraging vicious or callous dispositions, and attempt to promote those which are actually virtuous. There is more to being a good parent, we might think, than the absence of cruelty or utter indifference; rather, a good parent would seek to promote the best outcomes for their child.

It is plausible that many people believe that good parents ought to possess and cultivate benevolent dispositions towards their children. Unfortunately for regulators seeking a popular consensus, however, it is unlikely to be the only disposition that good parents are expected to possess, and some of the others may sometimes pull in opposite directions as action guides.

Indeed, other writers have appealed to desirable parental dispositions to support precisely the opposite conclusion to Delaney. Michael Sandel has written of an alternative virtuous disposition that we may value or encourage in parents: an 'openness to the unbidden' that would require parents to 'appreciate children as gifts is to accept them as they come, not as objects of our design, or products of our will, or instruments of our ambition' (2007: 45).

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This view seems to resonate with a substantial cohort of the UK population. Research conducted by Scully, Shakespeare, and Banks found a strong element of support for ‘the idea that children should be a “gift” ’ that ‘should be accepted as they are’ (2006: 753). (While it should be noted that their research was concerned with sex selection rather than choices about disability, it is not obvious why such a disposition should be specific to particular attributes.)

With which of these ‘virtues’ should regulators be concerned when prospective parents are faced with such choices? Which disposition should they be attempting to inculcate: openness to the unbidden, or a commitment to bring about the ‘best’ result? In the absence of any clear mechanism for adjudication, it seems that virtues are no more promising than principles or values as a guide through the contested ethical terrain in which ARTs are situated.

5. Strategies and Solutions

If novel academic approaches have been unable to find a way through the normative log-jams and intractable problems, have regulators themselves had more success? A range of strategies and solutions have been employed in the pursuit of regulatory legitimacy.

(p. 1001) 5.1 Direct Democracy: The Slovenian Solution

One approach to reconciling competing normative positions would be to resort to direct democracy. In June 2001, Slovenia submitted the issue of whether unmarried women should be allowed access to reproductive technologies to popular vote. The referendum, which was widely boycotted by progressive and liberal portions of the population, resulted in a 73.3% ‘no’ vote.

The legitimacy of determining access to such services on the basis of a referendum is open to question on several levels. Most obviously, there is the fact that only 35.7% of the Slovene electorate participated in the referendum. Can it really be legitimate to base such a major decision on the disapproval of just around a quarter of the adult population?

Other concerns go more to the fundamental basis of this model of decision making. As Darij Zadnikar, a Slovenian political activist, objected at the time: ‘This referendum is for us illegitimate, as you cannot decide human rights [issues] on the [basis of] referenda’.⁸ Whether there are certain decisions that are not legitimately subject to popular opinion is a matter that seems of high importance to the matter of regulatory legitimacy, and it is one to which I will return later in the chapter.

5.2 Unilateral Executive Decision Making

At the other end of the participatory spectrum, a normative impasse could be resolved by executive fiat. Between 2007 and 2014, reforms to the New Zealand position with regard to the use of PGD for tissue typing were held back by the opposition of one man, Health

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Minister Tony Ryall. The reformed guidelines had been presented to the Minister by the Advisory Committee on Assisted Reproductive Technology (ACART), one of New Zealand's two regulatory bodies on reproductive technologies, in compliance with their statutory obligations under the Human Assisted Reproduction Technology Act 2004.

Doubts may exist as to whether this situation met the standards even of procedural legitimacy (Brownsword and Goodwin 2012: 48). There is reason to doubt whether the New Zealand Parliament intended to vest so much power in the Minister. The ordinary meaning of 'consult' would more likely imply an obligation for ACART to discuss their guidelines with him before publishing them, but to infer from that a need for ministerial approval seems something of a stretch.

Again, though, this manner of resolving a normative impasse may be open to question at a more fundamental level. To what extent are the aims of normative legitimacy met if proposed reforms resulting from a detailed consultation process can be held back on the basis of one minister's personal reservations? (For a fuller discussion of this case, see Snelling 2013.)

(p. 1002) These alternatives may be seen to lie at opposite ends of a spectrum encompassing varying degrees of regulatory-community engagement. In the middle exist a range of potentially more promising approaches, which would seek to involve a range of perspectives in more nuanced manners.

6. Imperfectly Theorized Agreements and Decaying Consensus

Perhaps in part as a response to the intractability of the underlying philosophical questions, many of the ethical stances and regulatory positions adopted towards ARTs have been predicated on 'pragmatic' compromises between a range of differing perspectives. At best, these serve to cut through the Gordian (or Parfitian) knot of non-identity, presenting solutions that, while perhaps dissatisfying to the more philosophically minded, serve very well in practice.

Such pragmatic compromises may take the form of what Cass Sunstein refers to in another context as 'imperfectly theorized agreements':

When people disagree or are uncertain about an abstract issue—Is equality more important than liberty? Does free will exist? Is utilitarianism right? Does punishment have retributive aims?—They can often make progress by moving to a level of greater particularity (2007: 2).

This approach has drawn considerable support in the area of technology regulation. New Zealand bioethicist Mike King, for example, has written that: 'For policy purposes, there is much that can be said for an approach that tries to find common ground to help shape consensus so as to move the discussion forward, particularly in a pluralistic and democra-

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tic society like New Zealand' (2006: 194; see also Brownsword and Goodwin 2012: 51). The idea, then, is that adherents to a range of views may agree on where line should be drawn, without necessarily agreeing on why it should be drawn there.

Regulators in the area of ARTs have often sought to avoid explicit engagement with competing ethical principles and theories, preferring to formulate policies that will attract approval, or at least acceptance, across a range of ethical perspectives. In the context of PGD, consistent attempts have been made across various jurisdictions to restrict the technology's use to a limited range of 'therapeutic' purposes, while prohibiting 'social' uses.

The UK's Human Fertilisation and Embryology Act 1991 (as amended in 2008) restricts the use of embryo selection on this basis. Schedule 2 exhaustively (p. 1003) lists the purposes for which embryo testing may be permitted. These can be summarized as:

- (a)** determining whether the embryo has a condition that may affect its ability to result in a live birth;
- (b)** establishing whether the embryo has any gene, chromosome, or mitochondrion abnormality;
- (c)** where there is a particular risk of a sex-linked medical condition, establishing the sex of the embryo;
- (d)** tissue typing for saviour siblings;
- (e)** establishing parenthood (Paragraph 1ZA(1)).

With regard to (b), Schedule 2 further stipulates that testing cannot be authorized unless the Authority is satisfied 'that there is a significant risk that a person with the abnormality will have or develop a serious physical or mental disability, a serious illness or any other serious medical condition' (Paragraph 1ZA(2)).

The Act also explicitly prohibits certain uses of PGD. Paragraph 1ZB prohibits 'any practice designed to secure that any resulting child will be of one sex rather than the other', except for the 'therapeutic' purposes set out in Paragraph 1ZA(c). Section 13(9) (as added by the 2008 Act) requires that:

Persons or embryos that are known to have a gene, chromosome, or mitochondrion abnormality involving a significant risk that a person with the abnormality will have or develop –

- (a)** a serious physical or mental disability,
- (b)** a serious illness, or
- (c)** any other serious medical condition,

must not be preferred to those that are not known to have such an abnormality.

It is not difficult to gauge the intent of such stipulations. They uphold the distinction between 'medical' and 'social' uses of PGD, and hold the line against trivial or cosmetic uses

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of the technology. They may also be thought to acknowledge the value of several of the parental virtues and favourable dispositions discussed in the previous section. Good parents will want to protect their children from avoidable disease and disability, but they would not want to exercise an inappropriate degree of control over other aspects of their lives.

While pro-life campaigners and feminists may not agree on much in the area of reproduction, they may be expected to agree that PGD for the purposes of social sex selection is unacceptable. Conservatives concerned about PGD in general may disagree with adherents to ideas of 'procreative beneficence' about the permissible limits of such choices, but they may agree that, at very least, such techniques should not be used to reject 'healthy' embryos in favour of those which carry genes for illness or disability.

(p. 1004) Such pragmatic compromises and imperfectly theorized agreements can probably be counted a partial success in aligning regulatory stances with community views. They are, however, subject to (at least) two reservations. First, it is often genuinely difficult to form an agreement—however imperfectly theorized—that does not exclude some significant interest group. The medical/social distinction may have enjoyed a broad acceptance and accorded with common intuitions, but it has also alienated and caused significant offence to many within the disabled community. The so-called expressivist critique draws attention to the message implicit in such a policy: that technologies like prenatal screening and PGD are not morally neutral, far less commendable, but are nonetheless tolerated for the purpose of preventing the existence of certain kinds of lives.

In discussing the use of PGD in the context of Down's syndrome, Timothy Krahn explains how this sort of message may be perceived as especially stigmatizing to populations who have already been subject to widespread discriminatory attitudes and practices:

by allowing access to PGD testing for only 'serious genetic conditions' and labelling Down's syndrome as one such condition, in effect the current regulatory system in this instance risks participating in a form of social discrimination, possibly compounding forces of stigma, prejudice, and general misinformation about the capacities and quality of life possible for person's living with Down's syndrome (2011: 191).

A similar line of argument emerged from a series of complaints laid before various New Zealand bodies by the lobby group Saving Downs.⁹ New Zealand law does not allow women a universal right to abortion, but it does allow them to abort certain pregnancies on the basis of certain traits and conditions, including those affected with Down's syndrome. It is not hard to see how people living with these conditions can discern an offensive message from that position.

Secondly, as the technologies evolve, these compromise positions are being placed under increasing strain, leading in some cases to possible examples of regulatory disconnection (Brownsword 2008: 166). This strain has increased, for instance, as the range of genetic conditions for which testing is possible, and hence, the range of possible reproductive

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choices, has increased. The value compact that underpinned previous compromise policies, while never wholly satisfying, now looks unlikely to provide even generally satisfactory practical outcomes.

A recent example of the same challenge concerned the HFEA's decision to permit PGD to be used in cases of rhesus disease/haemolytic disease of the new born.¹⁰ This problem, which can result in foetal death or permanent developmental problems in children, results from an incompatibility between the blood type of Rhesus negative pregnant women and their foetuses, resulting in the woman's immune system attacking the 'intruder' foetus. The use of PGD can ensure that only RhD-negative embryos are selected for implantation, thereby avoiding the problems associated with alloimmunization.

(p. 1005) There is no doubt that the incompatibility results in significant health problems (although these can often be prevented medically). It is difficult, however, to characterize those embryos which are deselected—that is, those without the RhD-minus blood type—as having any kind of 'gene, chromosome, or mitochondrion abnormality' as seemingly required by the governing legislation. In fact, their blood types are considerably more common (for more detailed consideration of this example, see Snelling and Gavaghan 2015).

It is unlikely, we might think, that many people who approve of PGD for the avoidance of serious genetic disease would object to its use in these circumstances. The challenge, we might think, related to a mismatch between the wording of the rule and the ethical compact upon which it was premised. Nonetheless, it illustrates the sort of difficulty that can arise when the line-drawing rationale is not made sufficiently explicit. If the moral objective is to allow PGD for 'therapeutic' purposes, that objective might sometimes involve going beyond the stated legislative condition that it be used only in cases of embryonic abnormality.

Pragmatic and economic costs aside, it is plausible that the agreement around permissible uses of PGD could be redrawn to accommodate RhD disease without undue fragmentation of the ethical compact. Arguably, a more challenging example was seen in the context of tissue typing. An attempt to limit the use of PGD to the avoidance of serious genetic disorders could potentially be justified from a range of perspectives, but what does that agreement have to say about its use in a situation like that of the Whittakers? Here, the existing child, Charlie, was affected by a non-hereditary condition (diamond blackfan anaemia) which was very unlikely to affect any future siblings he may have. Charlie's parents sought to use the tissue typing technique to ensure that the next child they had was a suitable tissue match for Charlie. As distinct from previous uses of tissue typing, there was no risk to the 'saviour sibling' himself that could justify the use of PGD (for further discussion, see Gavaghan 2007: 162).

If the reason for the original agreement is that PGD is justified only when it can be seen as bestowing benefit on the resulting child (subject, of course, to the concerns raised by the non-identity problem), then this may seem problematic. If, on the other hand, the agreement was aimed at, for example, preventing trivial, cosmetic, or other non-'therapeutic' uses of the technology, then a use aimed at curing a sick child may fit

squarely within the original regulatory objectives. The resulting renegotiation of that agreement has been long and difficult, and—as discussed earlier—was only recently concluded in New Zealand.

None of this is to dismiss altogether the possible value of imperfectly theorized agreements. It may be churlish to pass up solutions to today's problems for fear that they will prove inadequate for the possible problems of tomorrow. We should be aware, however, that such agreements come with limitations and reservations. In the face of fast-evolving technologies, it seems inevitable that shallow agreements are likely to require frequent renegotiation. Revisiting and reforming regulatory (p. 1006) or legislative solutions is not a cost-free process; it may involve further meetings, consultations, possibly parliamentary sessions, or select committees. Whether a short-term solution that avoids the harder questions is an example of regulatory pragmatism or false economy will depend on a range of factors, including how certain it is that the agreement will require negotiation, how soon that is likely to be required, and the ease with which such changes can be implemented.

At least as importantly, regulators should take care that imperfectly theorized agreements do not satisfy a broad consensus of the relatively uninvested, at the expense of alienating those minorities who actually have more at stake in a decision. Engaging with 'difficult' perspectives may frustrate the aims of compromise, but excluding those perspectives may result in a solution that satisfies everyone except those on whose lives it most impacts.

7. Deliberative Democracy and Public Engagement

Brownsword and Goodwin have written of a 'renewed emphasis in past decades on the importance of public involvement at all levels of regulatory governance of science', according to which 'direct dialogue with the public has become a key aspect of procedural legitimacy in technology regulation' (2012: 247-248).

While some form of connection between regulatory strategies and their normative underpinnings is doubtless essential for the reasons given, this gives rise to a number of further questions about the role of 'the community' in regulatory decision making. For example:

1. Who, for these purposes, is 'the public'?
2. What should they be asked?
3. What weight should be given to their views?

7.1 Which Public?

If regulatory legitimacy is to be judged, in part, relative to community values, then it seems important to consider who, for these purposes, qualifies as the 'community'. Does this refer to the community of stakeholders who stand to be directly affected by the content of the decision? That part of the community sufficiently interested in (p. 1007) a decision to take the time to contribute to a consultation process? The community of informed and engaged individuals who are familiar with the technologies and the ethical questions in issue, perhaps due to attendance at 'citizens' jury' or focus group events? Or the community in the widest sense, comprising everyone within a given society?

Recent exercises in 'deliberative democracy', for example by the HFEA, have involved multiple 'communities', involving various combinations of opinion surveys, public workshops, and focus groups (HFEA 2013). But how is a regulator to apportion weightings to the views of these different 'communities' if it transpires that, for example, the stakeholder community is more positive about a new technology than the public at large? The HFEA has certainly acknowledged the challenge in seeking to balance such perspectives:

people seeking treatment are in many ways best placed to judge the seriousness of the condition. However, many would argue that there should be limits to the types of conditions for which PGD is offered, stopping short of what some might consider to be a trivial use of the technology. The HFEA needs to find the correct balance between respecting the views of those seeking PGD whilst preventing the use of the technology for purposes which are widely considered to be unacceptable (2005: paragraph 4.4).

Those hoping to use or benefit from a technology will not be the only population likely to be affected by decisions about its acceptability. As discussed above, disabled people may feel that the use of screening techniques to prevent the birth of other similarly affected people might impact on their lives in various significant ways. Furthermore, it is sometimes argued that the perspectives of such people and their families should be accorded particular attention for another reason. Aside from being likely to be affected by such technologies, it is possible that such people may have particularly valuable insights into what it means to live with such conditions, insights that may be at odds with more mainstream or medical narratives.

7.2 What Should They Be Asked?

Secondly, the consultation must be clear what it is asking. 'Do you approve of X?' is not at all the same question as 'would you permit X?' Various consultations and studies have revealed that, among other values, many respondents have spoken of the value of respecting other people's views and choices. Participants in the public workshops on mitochondrial replacement attached considerable importance to 'personal and individual choice'; many 'did not think it was appropriate to prevent access to these new techniques to indi-

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viduals and families simply because some people (and groups) are opposed to their clinical use' (HFEA 2013: 5).

A similar reticence to impose values on others was shown by the HFEA's earlier consultation into preimplantation sex selection. Although a majority of those (p. 1008) consulted expressed opposition to social sex selection, 'parents in particular felt that it was very difficult to argue the case against giving one couple their heart's desire when no-one was harmed—however uncomfortable it made them feel personally' (HFEA 2002: para 6.4).

As I discuss below, this tolerance for diversity may in itself count as an important public value; but, for present purposes, the point to emphasize is simply that, if public opinion is to be used to legitimate a particular regulatory position, care should be taken to ensure that it actually supports that position.

A more complex question, perhaps, relates to the depth of the inquiry into community values. Is it adequate for regulators to enquire about attitudes to specific technologies or specific uses to which they could be put? Or would it be more appropriate to explore values at a more general level? Mike King has suggested that the most productive use of public opinion seems 'to require a depth of knowledge about public opinion that extends beyond mere expressions of approval or disapproval for certain practices and conduct':

an attempt must be made to characterise the moral frameworks used by members of the public, since this is likely to be of broadest ethical use and will most usefully inform the development of public policy. Simple surveying of public approval or disapproval of technologies and practices is likely to provide a weak basis for justification of any normative conclusions reached (2006: 203).

This is a suggestion that merits serious consideration. The search for regulatory legitimacy, one might think, should involve an attempt to distinguish genuinely principled concerns and objections from intuitive aversions to practices or choices that are merely counterintuitive, unpopular, or unfamiliar.

7.3 What Weight Should Be Given to Public Views?

Assuming that the extremes of regulatory populism or regulatory elitism lack normative legitimacy, what should regulators be seeking? I would suggest that, at a minimum, regulation that seeks legitimacy in terms of community values should seek to comport with ethical or political convictions that are widely (if not necessarily universally) shared, strongly held, and applied with a degree of consistency across a range of situations. Mere distaste for a novel practice—even strong distaste—would not satisfy the demands of a liberal or pluralistic regulatory regime, unless that distaste can be located within something more normatively substantive. Certainly, as some commentators maintain, that could be found in the harm principle, but there is no reason why other values could not play an important role. Even where such values can be identified, however, a case exists for respecting a realm of private decision making. Where a decision impacts significantly upon the rights and interests of an individual or family, and where it has no equivalent im-

pact upon the rights or (p. 1009) interests of anyone else, then it is plausible that this may be seen as a truly private decision, notwithstanding the fact that many or most other people may disapprove. As noted in the preceding section, autonomy and privacy are themselves values that are widely shared in Western democracies, and they should not lightly be interfered with. If we are to take those seriously, then we must recognize that not every decision need be subject to the peer review of our neighbours. As John Harris has said, 'The liberty to do only those things of which the majority approve is no liberty at all' (2007: 73).

My own perspective is that this recognition should often be reflected in a regulatory tilt (Brownsword 2008) that is permissive in character. If we require that our laws and regulations have normative legitimacy, and require further that this legitimacy is rooted in the views and values of the community, then they must be located in values that are widely shared, relatively settled, strongly held, and consistently applied. Where there is no evidence of consensus, or where attitudes are ambivalent or relatively indifferent, the regulatory default should be towards respecting individual choices. Where there is no evidence of those values manifesting themselves in more familiar or mundane settings, then we may be rightly suspicious that they are manifestations of techno-exceptionalism or even techno-phobia, rather than anything more normatively substantive.

A permissive regulatory tilt is, of course, just one possible strategy. It would be unrealistic to imagine that it will command universal appeal, or be equally applicable in all circumstances. Nonetheless, my suggestion is that, in the absence of clear sense of societal disapproval of a practice, and particularly when that practice provokes contradictory or ambivalent intuitions, or poses intractable problems, a case exists for a certain degree of normative humility. We should be slow to impose our choices and answers on others when our own responses are uncertain or contradictory.

8. Non-identity Revisited

I have suggested that Heyd is right to characterize the issue of non-identity as an intractable normative problem, to which no solution is readily available. I have also suggested a number of ways in which regulators may approach this problem. The challenge posed by this problem, however, is likely to become even more pressing and more vexing with the emergence of gene-editing technologies.

When considering the obligations of prospective parents faced with the option of implanting Embryo A or Embryo B, it is possible to characterize their choices (p. 1010) (in the vast majority of circumstances) as morally neutral. Their choice will result in the birth of either Child A or Child B, and provided neither would have a quality of life so abject as to be 'worse than nothing', it cannot reasonably be said that either child has been harmed by the decision. Regulators charged with safeguarding the 'the welfare of the future child' should arguably engage with this implication, and be slow to interfere with parental decisions that will harm no one.

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For prospective parents faced with the option of gene editing, however, the implications of non-identity are far less clear. Implanting one embryo rather than another will result in the birth of one person rather than another, but what are the implications for continuity of identity if changes are made to the genome of an embryo? Could there come a point when those changes have such a profound effect on the character, values, priorities, and relationships of that future child that it becomes intelligible for us to think in terms of that embryo as having been replaced rather than repaired? And if so, what should we think of—and more importantly, require of—prospective parents who wish to decline such interventions? Would that be equivalent to a parent declining beneficial treatment for a child, a choice that the law rarely permits? Or to a decision to implant one embryo rather than another?

Even those of us who have attempted to follow through the implications of non-identity in the context of currently available ARTs are likely to find our views challenged by the next generation of technologies.

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Notes:

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(1.) Prominent examples include the film *Gattaca*, and Jodi Picoult's novel—also later adapted for the screen—*My Sister's Keeper*.

(2.) I mean 'explicitly' in the sense that some pieces of legislation make specific reference to the requirement to consider these. It is also worthy of note that some conceptions of personal identity and inter-generational justice would hold that a great many other decisions will also impact on the identities of those generations yet to come, albeit such considerations are less commonly in the forefront of such discussions. Policy decisions about anything from immigration to family tax credits might plausibly impact upon which children come to be born, though such policies are rarely considered through the lens of personal identity.

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- (3.) This implication also seems to strike some people as counter-intuitive. In the Parliamentary debate of the HART Act, New Zealand Green MP Sue Kedgley warned that technologies such as pre-implantation genetic diagnosis (PGD) 'threaten those with disabilities and we threaten their right to be born in the future.' Sue Kedgley, (25 August 2004) 65 NZPD 15064.
- (4.) For another purported solution to the non-identity problem from a relational perspective, see Taylor-Sands 2013: 18–19, and for a critical response, see Wilkinson 2015.
- (5.) Though interestingly, television presenter Nicky Campbell used his appearance on the show to learn more about his *adoptive* family, suggesting that he at least rejected a straightforwardly genetic explanation of identity.
- (6.) Davis NZ, *The Return of Martin Guerre* (Harvard UP 1983).
- (7.) Lest it should be thought that I am begging the ontological question as to whether the same mother many decades in the future is 'the *same* mother'! It is worth noting, though, that the sort of gradual change that accompanies normal ageing is consistent with most notions of continuity of identity, including that of Parfit.
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Technology and the Law of International Trade Regulation

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Abstract and Keywords

With regards to global trade, where new technologies impact both on what is traded and how, this chapter sketches the current regulatory landscape and projects the implications of emerging technologies for future regulatory approaches. While the regulation of technology mainly rests with domestic law, it is international trade law that addresses problems of regulatory diversity, overcomes unnecessary barriers to international trade and investment, and articulates common standards. Apart from general principles of non-discrimination and transparency, technology is particularly addressed by rules of intellectual property protection and by technical regulations and standards for industrial and nutritional products. For international trade law to respond to the challenges of legitimacy and democratic accountability, there need to be new approaches to regulatory cooperation and coherence, operating within a proper framework of multi-level governance that harnesses the process of globalization which is much driven by technological advances.

Keywords: International law, World Trade Organization, technical barriers to trade, harmonization, equivalence, mutual recognition, regulatory convergence, intellectual property, transfer of technology

1. Law and Technology

1.1 A Dialectical Relationship

Technology has been a prime driver of commerce, both domestic and international. The evolution of means of transportation allowed for and accompanied trade, from local trading to global trading, to today's global value chains. From the advent of the wheel to horsepower, from land to sea lanes, modern shipping, road, rail and aviation, telecommunications and the Internet, the scope of the International division of labour and commerce was largely facilitated, if not determined, by technology and its progress. The bulk of traded products are defined by technology and go with its advances. The same holds part-

ly true for services which increasingly depend on and benefit from modern means of communication.

Technology thus has also been an important driver of law, accompanying life and commerce. Yet ever since, the law in general and of international trade in particular (p. 1018) has been behind technological evolutions, calling for adjustment in order to address new risks and their management. It brought about new claims to jurisdiction. The evolution of the law of the sea and of maritime zones reflects technological advances in the extraction of natural resources (Cottier 2015a, b). The body of international trade law increased with the growth of trade and its share of GDP. Technology shaped the laws of liability beyond wilful harm and negligence. It brought about the need for technical regulation and standards in addressing such risks and preventing harm. It shaped labour laws. The proliferation of such regulations in domestic law, in great variety, in turn led to new trade restriction and in international trade it led to the type of so-called non-tariff barriers which essentially, but not exclusively, consist of regulating technology and its products and processes (Mercurio and Kuei-Jung 2014).

Law, and indirectly, international trade regulation, in turn, has not remained without impact on technological developments itself. The legal framework of company law, competition, and intellectual property rights largely defines the domestic legal environment of producing, developing, and using new technologies. It defines levels of cooperation and the pooling of capital and talent. Legal framework conditions shape competitiveness, which again is a main driver to bring about new technologies. Quality and safety requirements for products not only follow from technology, but also influence new technologies, their contours, and how they are used. Levels of risks and safety standards defined by law shape and define new products and their acceptance. Technological impact leads to new needs in human health and the environment, and in turn, to new technologies, for example, in climate change and the need for mitigation mainly by recourse to new technologies. The goal of a carbon-free economy drives investment and development in new technologies informed by ideals of sustainable development.

In conclusion, law and technology find themselves in a dialectical process, constantly interacting, but leaving the lead with technological advancements as the main driver of the process (Abbott and Gerber 1997). Law has been and remains largely reactive to this evolution, yet not without having an impact on technological advances. This is true both domestically, and even more so, on the level of international law and cooperation.

1.2 Key Functions of International Trade Law

While the core of technology regulation rests with domestic law and concerns, the core of international law addresses the problem of regulatory diversity and the trade restrictions resulting from it. It seeks to bridge different legal regimes, to provide a core of common standards, and to overcome unnecessary barriers to international trade and investment. This chapter essentially addresses these disciplines and rules, (p. 1019) and projects the implications of modern and emerging technologies for future regulatory approaches.

Apart from general principles of non-discrimination and transparency, technology is particularly addressed by rules of intellectual property protection and by technical regulations and standards for industrial and nutritional products. It is increasingly intertwined with regulation of services. We try to combine these fields, normally dealt with in separate and different legal traditions. While intellectual property rights (IPRs) forms part of commercial and private law, technical regulations and standards pertain to the field of public law, and so mainly does the regulation of services. Yet, international law does not separate these categories of private and public law and opens the way for an integrated approach to international technology law.

All of international law is indirectly relevant for technology, from state responsibility to the law of treaties, from the law of the sea to principles of permanent sovereignty over natural resources. It is difficult to single out a specific body of law of technology. In trade regulation, trade remedies against unduly subsidized or dumped imports, as well as safeguards measures relate to technology without being limited to it. Government procurement indirectly affects technological advances as much as public funding of research and development. There is no point in seeking to single out an exclusive law regulating technology.

More specifically, international law essentially addresses four distinct key functions in technology regulation, beyond the relevance of the general body of law. Firstly, international patent law and partly copyright provide the legal basis for the allocation of property rights to technology (Abbott and Gerber 1997; Maskus and Reichman 2005). This function is important in creating incentives for technology development and in allocating the use and licensing of such products, and it may define private industry standards. Secondly, it seeks to establish and secure interconnections and thus provides the interface, often by means of harmonization of technological standards—witness, for example, telecommunication and the Internet, but also the early regulation of postal services (Burri and Cottier 2014). Thirdly, technical regulations and standards serve the goals of protecting consumer safety and health and avoiding harm to people and the environment (Delimatsis 2015). They also are of increasing importance in the field of government procurement (Arrowsmith and Anderson 2011; Gervaglia 2016). It is in these areas that different levels of social and economic development, as well as societal perceptions, including human rights, play out. And finally, international rules and disciplines seek to bridge resulting differences to avoid unnecessary barriers to international trade.

These four functions of specific technology regulation cannot be clearly separated and often interact with each other. Interfacing different technical systems often requires harmonization and the evolution of international, and even global, standards. At the same time, protecting safety and health explains the existence of a wide array of divergent standards, reflecting different attitudes to risk or different approaches to risk management. For example, while the US relies upon product (p. 1020) liability, the European Union follows the precautionary principle and often standards of strict liability. Avoiding unnecessary trade barriers recognizes the legitimacy of different regulatory approaches and policy goals and seeks to minimize the impact of such diversity on international trade and

market access. Intellectual property finally may assume the role of private industry standards and may raise questions of excessive monopoly powers, calling for compulsory licensing or the application of the doctrine of essential facilities (Larouche and Van Overwalle 2015).

1.3 International Law and Technical Regulation

International law does not formally distinguish between law and regulation. The latter forms part of the law and mainly applies to products and services. Distinctions between regulations and law cannot be readily made, except for private standardization, and these distinctions depend on the particular context. Dealing with regulations in international law does not allow limiting the scope to technical regulations properly speaking, but rather encompasses a wider field of relevant principles and rules.

International law distinguishes relevant principles, in particular non-discrimination (most favoured nation, or MFN, national treatment) or transparency rules which apply across the board. Yet, there are specific features and challenges relating to regulation narrowly defined. Firstly, the World Trade Organization (WTO) Agreement on Technical Barriers to Trade (TBT) specifically defines technical regulations as mandatory prescriptions, and technical standards as voluntary prescriptions; both are subject to a different set of rules. Secondly, a distinction is made between public and private regulations or standards. Technical regulation is often delegated to private standard-setting bodies and is enacted both domestically and internationally by these bodies, which are largely controlled and funded by the respective industries. Delegated norms and standards in turn need to be distinguished from purely private standards adopted by companies and industries on their own. Non-governmental standards, so far, are not subject to international law disciplines. Thirdly, technical regulations transgress particular jurisdictions. Products that are traded internationally have life cycles affecting different jurisdiction. This complicates effective regulation on the international level. These are issues this chapter seeks to briefly address.

1.4 'Behind the Border Issues'

With the decline of tariff barriers to technology and other products, non-tariff barriers moved centre stage with the focus on what traditionally were matters of (p. 1021) domestic law. These so-called 'behind the border issues' constitute the modern regulatory complex and raise new issues of legitimacy and accountability. They invite some rethinking of the classical distinctions of domestic and international law, such that we come to understand and conceptualize the issues in terms of multilevel governance (Joerges and Petersmann 2011), or of global administrative law (Kingsbury, Krisch and Stewart 2005) in seeking appropriate allocations of powers in the production of public goods, such as communication and safety. Efforts at regulatory convergence and appropriate procedures of cooperation are at the forefront of regulatory theory in international law (Mathis 2012); again this raises interesting issues of legitimacy and democratic accountability in pluralist societies. Importantly, technical regulation increasingly focuses on process and pro-

duction methods (Conrad 2011; Holzer 2014). Beyond the quality of the product, ways and means of production become the focus when enforcing and realizing labour standards and environmental standards in the age of climate change mitigation and adaptation. The impact of technology on human rights and the normative impact of human rights are of increasing importance. This indicates a major impending paradigm shift, which will have a significant impact on how law deals with technology, and vice versa.

2. A Brief History

Early efforts at bridging and interfacing domestic jurisdictions in public international law relating to commerce and trade began in the nineteenth century. Although the focus was on tariff reductions in bilateral agreements—originating in the 1861 Cobden Chevalier Agreement between France and the United Kingdom—and at the time mainly relating to industrial and thus technological products of the emerging industrial age, regulatory issues gradually developed in international law (Bairoch 1989). The advent of the telegraph brought about the first technical harmonization with the 1884 International Convention for Protection of Submarine Cables, which was eventually superseded by the 1982 UN Convention on the Law of the Sea. The same period sees the first multilateralization of international economic law with the 1883 Paris Convention for the Protection of Industrial Property and the 1886 Berne Convention for the Protection of Literary and Artistic Works. Amalgamating existing bilateral agreements that touched on or extended domestic protection of IPRs, these conventions provide minimal standards of intellectual property which were to inform domestic levels of protection, and were of particular relevance to technological advances with patent law (p. 1022) (Pottage and Sherman 2010; Cottier, Sieber, and Wermelinger 2015). The nineteenth century also sees the first efforts at reducing health-related barriers to international trade. The precursors of today's WHO International Health Regulations, the International Sanitary Regulations adopted at the International Sanitary Conference in Paris in 1851 were designed to prevent and avoid excessively restrictive barriers to trade in goods and travel following the outbreak of pandemic diseases, long before trade agreements addressed non-tariff barriers (Howard-Jones 1975). From the nineteenth century to the 1930s, trade regulation agreements were essentially limited to border measures and tariff reductions in particular (Bairoch 1989; Kindleberger 1989). Regulatory affairs beyond trade started in labour relations, and sought to combine social justice and the need for international level playing fields. The Bureau International de Travail (BIT) was created after the First World War to adopt minimal standards of labour protection, both to create level competition, to protect the workforce more effectively, and to avoid further Bolshevik revolutions (Van Daele 2005, International Labour Organization 2016). After the Second World War, technical regulations were primarily assigned to functionalist international organizations: the International Telecommunication Union (ITU) interfacing telecommunications, the WHO/United Nations' Food and Agriculture Organization (FAO) Codex Alimentarius on food standards, the World Intellectual Property Organization (WIPO) on intellectual property, and the 1947 General Agreement on Tariffs and Trade (GATT) on trade in goods. Eight subsequent multilateral trade rounds brought about specialized agreements on technical barri-

ers to trade and on phyto-and phytosanitary measures (Scott 2007; Gruszczynski 2010; Wolfrum, Stoll, and Seibert 2007). On the private side, international associations and non-governmental organizations turned to interfacing and harmonizing technology standards, in particular International Organization for Standardization (ISO), or European Committee for Standardization (CEN) and the National Electrotechnical Committees of European Countries (CENELEC) in Europe (Delimatsis 2015). Today, all the technologies—in particular, mechanical, chemical, pharmaceutical, telecommunications, transportation, biotechnology, and genetic engineering—are accompanied by trading rules, which extend also to new technologies, in particular nanotechnology and synthetic biology.

While trade agreements essentially seek to avoid unnecessary barriers to international commerce, advanced efforts to harmonize technical regulations or to bring about mutual recognition were first pushed in the context of regional integration, in particular the European Free Trade Association (EFTA) Tampere Convention and the New Approach of 1984 within the European Economic Community.¹ Eventually, the principle of equivalence, based upon mutual trust, emerged and became a leading philosophy within the EU. With third countries, it led to mutual recognition agreements (MRAs) beyond regional integration. It provides a foundation of today's efforts at regulatory convergence, in particular in transatlantic relations between the US and the EU.

The history of technical regulation thus is characterized by moving from border measures to matters essentially pertaining to domestic regulation and equally (p. 1023) affecting domestic and imported products. The shift to 'behind the border issues' accounts for the enhanced importance of international trade regulation beyond the trade constituency as it affects the regulation of other policy areas, such as health, environment, and culture, and raises questions of democratic accountability.

In academic research, the relationship of international law and technology, it would seem, was introduced more specifically in the context of the emerging space science and law in the 1960s (Seneker 1967), albeit with important precursors relating to interfacing different national railways and related standard setting in and regulation of international aviation in respective agreements. Today, the relationship of international law and technology mainly focuses upon issues of intellectual property protection, patents and undisclosed information (Abbott/Cottier/Gurry 2015), genetic engineering and biotechnology (Francioni and Scovazzi 2006; International Law Association 2010, 2008; Wüger and Cottier 2009), nanotechnology (Karlagnanis and Liechti-McKee 2013), and to Internet communication (Burri and Cottier 2014) and the process of standardization (Delimatsis 2015). It has become the topic of specialized interest groups and journals in the field.²

3. Regulatory Approaches to Technology in International and European Law

Interfacing technical regulation in domestic and international law ranges from informal cooperation to full-fledged harmonization. The Organisation for Economic Co-operation and Development (OECD) identifies no less than 11 different steps of increasing intensity of international cooperation in the area of technical barriers to trade, ranging from informal dialogue to full-fledged harmonization. This section begins with international co-operation and depicts the main approaches to levels of international integration and harmonization of international economic law relevant for technology.

3.1 International Co-operation

The ground floor in interfacing different regulatory standards consists in mutual cooperation. Cooperation does not affect the national autonomy of decision-making and regulation, but allows for informal and formal exchange of views and (p. 1024) concertation in research, education, and testing. Schemes of cooperation may entail specialization of research and testing institutions of two or more countries. It is generally carried out among specialized agencies and regulators, but does not reach the political level. The most significant aspect is mutual information and hearings. Technical regulations and standards is the first field to open draft proposals to comments by other countries. Article 2.9 TBT Agreement requires Members to circulate proposed national regulations and take into account views expressed by other Members on the potential impact of the norm (Wulfrum, Stoll, and Seibert 2007).³ The extension of hearings beyond the realm of domestic constituencies was a landmark in law-making in globalization, and as of today, while it does not extend beyond the realm of technical regulations, it shows the path to enlarging mutual consultations in particular within the emerging concept of regulatory convergence. International cooperation requires a minimum of common understanding and perceptions of issues and values. Where this is lacking, cooperation tends to fail in light of different regulatory priorities (Pollack and Shaffer 2009).

3.2 Minimal Standards

International law may define minimal legal standards which States are obliged to respect, while leaving the space to grant additional protection to technology. This is the approach taken with intellectual property rights. The WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) essentially defines minimum standards, and allows Members to grant enhanced protection (Cottier 2005).⁴ For example, the TRIPs agreement requires at least twenty years of patent protection, but does not exclude extensions for regulatory approval in pharmaceuticals. More recent preferential trade agreements build upon this approach and contain so-called TRIPs plus provisions, for example, Chapter 18 on Intellectual Property of the Transpacific Partnership Agreement concluded in

2015.⁵ While this often results in harmonization, levels of protection vary among countries and are not uniform.

3.3 Maximum Standards

Minimal standards fail to address the overshooting regulations and the excessive protection of intellectual property rights, which in turn may hamper international trade in its own ways. Recent scholarship therefore suggests that the introduction of ceilings and the concept of maximum standards will limit levels of protection by international law, support competition, and avoid excessive monopoly rights (p. 1025) (Cottier and Meitingner 2005; Grosse Ruse-Khan and Kur 2008). Maximum standards so far have only been rarely used in the field of the law of enforcement of intellectual property rights, but not yet in relation to substantive standards. There is no common body of competition policy pertaining to international law, with the exception of telecommunication regulation and the so-called General Agreement on Trade in Services (GATS) reference paper (Mathew 2003).⁶ However, other areas of international trade law, in particular trade remedies (anti-dumping, subsidy regulation, and safeguards) as well as the impact of general principles, may be understood as maximum standards as they limit domestic policy space and do not allow domestic law to trespass beyond these boundaries (Cottier and Oesch 2005; Van den Bossche and Zdoug 2013; Mathusitam, Schoenbaum, Marvroidis, and Hahn 2015).

3.4 Mutual Recognition and Certification

Mutual recognition entails the explicit recognition of specific foreign standards on the basis of reciprocity. The policy is implemented by means of bilateral Mutual Recognition Agreements (MRAs) (Schroder 2011). These agreements imply mutually accorded privileges which are not extended to third parties outside the MRA. These agreements thus operate as inherent limitations to MFN status, and which are justified by Article 6.3 of the TBT Agreement. The agreement is essentially based upon mutually trusting the reliability of recognized bodies of certification and testing. Thus, the testing and approval of products by these bodies on the basis of relevant regulations or standards of the importing country by the body of the exporting country is recognized. Accordingly, costs are reduced as no further testing upon importation is required.

Trade dependent upon certification by such bodies may deploy substantial trade diversions for other products which do not benefit from 'one stop shop' certification, but are subject to inspection and approval upon importation. MRA agreements are in place mainly among industrialized countries and form part of a free trade.

3.5 Equivalence of Regulations

Equivalence of law and technical regulations entails the general recognition of product and process requirements enacted by another state as being of equal value, despite existing differences. Once a product is lawfully placed on the market of a country in accordance with its norms, the importing State recognizes the lawfulness of marketing on the

ground that the foreign rule brings about comparable levels (p. 1026) of protection, despite the fact that its own norms vary. Equivalence presupposes a relatively high level of mutual trust. It is not product specific, but applies across the board. Hence, it is not based upon product specific reciprocity.

Equivalence was coined in the European Union by the landmark *Cassis-de-Dijon* ruling of the European Court of Justice.⁷ It is subject to a compelling interest test (Craig and de Burca 2015). Member States of the EU and the European Economic Area (EEA) are entitled to invoke their own regulations if it is considered essential to protect compelling public interests. Equivalence, therefore, is subject to a great number of exceptions, in particular in the field of pharmaceuticals and foodstuffs, which thus implies considerable market access restrictions. These can only be overcome by moving to formal mutual recognition or harmonization, although it is important to note that equivalence is not mandatory under WTO rules. Art. 2.7 TBT Agreement recommends operating equivalence and thus accepts an implied MFN restriction. Within the EU, however, equivalence is limited to the Member States of the EU and the EEA Agreement. It does not extend to partners of Free Trade Agreements or Association Agreements.

3.6 Regulatory Convergence and the Transatlantic Trade and Investment Partnership

The shift towards non-tariff barriers in the wake of tariff reductions and the experience within the European Union, in seeking regulatory convergence among the Member States, encouraged the idea to expand this concept to other efforts of preferential trade and regional integration. Instead of static trade agreements that set regulations and standards, the idea is rather to create a framework of cooperation for dynamic rule-making. While the WTO agreements continue to provide the very foundations of a common law of international trade, preferential schemes seek to install processes towards harmonization and equivalence beyond existing mutual recognition (Chase and Pelkman 2015; Mathis 2012). Draft proposals submitted by the EU in the EU-US Transatlantic Trade and Investment Partnership negotiations (TTIP) in 2014 and 2015 propose enhanced regulatory cooperation on the following premises, set out in 2013:

The TTIP provides a historic opportunity for the EU and the US to substantially enhance regulatory co-operation. Such co-operation should be guided by both Parties' right to develop and maintain, policies and measures ensuring a high level of environmental, health, safety, consumer and labour protection, fully respecting the right of each side to regulate in accordance with the level of protection it deems appropriate. Closer regulatory co-operation is not only important to progressively achieve a more integrated transatlantic marketplace but also to ensure that the EU and the US jointly and actively promote the development of international regulations and standards in co-operation and dialogue with other partners, as well as ensure together in the most effective way the objectives at stake.

(European Commission 2013)

(p. 1027) The 2015 draft provisions (European Union 2015) provide for early information and hearings, and proposed and drafted regulations. They include extensive stakeholder consultations beyond the industries affected; provide for systematic impact assessment and exchange of results; and seek enhanced recourse to harmonization by recourse to international standards or approximation, to equivalence, and to mutual recognition. Focal Points serve as contacts between parties. A joint Regulatory Cooperation Body (RCB) was proposed to exercise the oversight and assures continued cooperation in the process of seeking sector-specific technical regulations mainly in the following sectors which are identified as priorities: textiles, chemicals, pharmaceuticals, cosmetics, medical devices, cars, electronics and information technology, machinery and engineering, pesticides, and sanitary and phytosanitary measures (SPS). In subsequent proposals, it was altered to a less institutional approach and termed Regulatory Cooperation Programme (RCP).

Enhanced regulatory cooperation bears the potential to effectively remove unnecessary trade barriers, and to create the foundations for new global standards, given that the EU and US are top mutual investors and trading partners; in 2013, they had a combined total of 26.04% of World Trade and 49.5% of World GDP.⁸ For example, enhanced transatlantic cooperation in the car industry is particularly promising for mitigating climate change (Holzer and Cottier 2015). At the same time, the effort needs to overcome institutional resistance, different regulatory traditions, cultures, and identities, different attitudes to risk, the fear of engaging in a race to the bottom (in particular relating to environmental standards), and persisting protectionist interest in maintaining diverging legal regimes. Both the US and the EU are accustomed to working on the basis of their own respective templates with third countries. They no longer can do so, and need to find new ground and compromise in a creative process. This is not utopian, as the TRIPs and other WTO agreements were developed during past multilateral trade rounds dominated by transatlantic relations (Watal and Taubman 2015). Regulatory convergence calls for new procedures of dynamic rule-making. Different from other regulatory approaches, regulatory convergence is not static, but rather evolves within a new framework for creating new laws in the future as mutual trust grows, and as new needs emerge in response to new technological advances. Securing democratic legitimacy and accountability is one of the major challenges in creating mutual trust when building a new system of international cooperation; this is a given in the coming decades as regards international trade and investment.

Clearly, the process of globalization and increased trade in components in global value chains calls for enhanced regulatory cooperation and harmonization and the search for new institutional arrangements of governance and democratic accountability. The process may be retarded by a return of more nationalistic policies and preferences in response to globalization. At the end of the year 2016, it is unclear whether TTIP, like the Transatlantic Partnership Agreement (TPP), will materialize. (p. 1028) In the long run, however, close interdependence of markets and global value chains will render higher levels of legal integration inevitable.

Regulatory convergence is not inherently limited to technical barriers to trade but may be applied in all fields of the law. While working towards convergence, governments may engage in a process of jointly developing legal frameworks and specific rules. Regulatory convergence in particular may take place in the field of intellectual property standards, competition policy, or liability rules.

3.7 Full Harmonization

Harmonization entails the adoption of a single and uniform norm for all participating jurisdictions concerned. As regulations and rules are the same and may only differ in terms of application, trade barriers and obstacles are effectively removed and level playing fields are created. Production and market approval is based upon similar standards and is sometimes operated with joint and central bodies. Harmonization requires the adoption of single standards by all parties and these standards either already exist, or must be created. It goes without saying that international harmonization is most difficult to achieve in the absence of majority ruling, and thus it is often left to second-best solutions. Harmonization has been mainly achieved within the EU, where common legislation has been adopted based upon directives or regulations. In international law, full harmonization has remained exceptional.

Where international and harmonized regulations and standards exist, international agreements oblige Members to take these into account as a basis for domestic regulations. Article 2.4 TBT Agreement stipulates that Members shall use such regulations where they exist, and the same holds true for food safety standards under Article 3.1 of the SPS Agreement (Scott 2007; Wolfrum, Stoll, and Seibert 2007; Gruszczynski 2010; Maidana 2015).⁹ Members remain free to adopt more stringent domestic standards, provided that they are able to support the need for higher levels of protection with scientific evidence where the level of risk as defined can only be met with more stringent, and thus trade-restricting, domestic standards (Cottier 2001). The case law of the Appellate Body of the WTO since *EC—Hormones* and *US—Continued Suspension* considers the latter option to amount to an independent alternative, thus resulting in a normative downgrading of existing international regulations.¹⁰

When regulations and standards are harmonized between two major markets, they often deploy spill-over effects and improve market access for other countries, sometimes to the extent that these other countries unilaterally adopt the regulations and standards for their own exported products. These spill-over effects are of particular importance for the TPP and TTIP Agreements. The deeper the regulatory integration among countries, in particular between the US and the EU, the more that third parties will benefit from spill-over effects, despite formal MFN exceptions. However, the more these types of agreements remain shallow and limited to (p. 1029) tariff reductions, the more trade distortive effects will result (Cottier and Francois 2014). Creating technical regulations and standards that link major markets result in new global standards that eventually will be formally multilateralized by standard-setting international organizations.

4. Basic Principles and Rules Relating to Technology Regulation

Technology is regulated by private or public standards, or a combination of both. It is important to distinguish between the two categories, as international law currently does not encompass disciplines on private standards issues by companies and associations although they deploy quasi-public functions in providing safety or consumer information. The disciplines set out in this section pertain to the realm of public regulations and standards issued by government authorities, or in delegation to private standardization bodies. They currently do not apply to private standards.

4.1 The Role of MFN and NT and of Exceptions

Within all regulatory functions, those specifically pertaining to technology are subject to the principle of non-discrimination, in particular the MFN obligation and national treatment (NT). The former obliges a nation to extend all privileges granted to one country to like products originating in all other members of the WTO. National treatment in turn obliges a nation to treat similar foreign products as favourably as domestic products. Both configurations of non-discrimination seek to establish equal conditions of competition for like and competing products (Cottier and Schneller 2014). These principles apply to all types of laws and thus also extend to IPRs, technical regulations, and standards. They are specifically addressed for IPRs in the agreement on TRIPS and for technical regulations in the TBT, as well as for food-standards in the agreement on SPS. These principles are subject to a number of exceptions, in particular for Free-Trade Agreements and Customs Union, which do allow restricting MFN treatment. They are subject to restrictions of national treatment in the pursuit of legitimate policy goals, provided that these restrictions are justified by a legitimate policy purpose and do not exceed what is necessary to achieve these purposes. Abundant case law has refined these conditions (Cottier and Oesch 2005; Van den Bossche and Zdoug 2013; Mathusita, Schoenbaum, Marvroidis, and Hahn 2015). Importantly, they equally apply to what (p. 1030) is *de facto* discrimination (Ehring 2002). It does not help to frame a regulation in general terms, if in the end it affects foreign products more than domestic products and producers. Other and implied exceptions allow mutual recognition and equivalence to be limited to specific and trusted partners.

4.2 Technical Regulations

Beyond general rules of law, WTO law applies specific disciplines to technical regulations. Annex 1 of the TBT Agreement defines the:

Document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory. It may also include or deal exclusively with termi-

nology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method.¹¹

Technical regulations are thus mandatory requirements imposed by law. They are not limited to product specifications, but also include production, marketing, and packaging requirements. The category includes, according to the WTO Appellate Body in *US—Tuna Dolphin II*, labels, the use of which is voluntary, but the conditions of which, however, are defined by law.¹² Whether or not a particular norm amounts to technical regulation or rather a rule to be dealt with under Article III GATT depends on its particularities and has to be assessed taking all of its components into account. Thus, the Appellate Body in *EC—Asbestos* considered the prohibition of certain asbestos fibres to constitute a technical regulation under the TBT Agreement¹³, while considering the restrictions of seal-related products to amount to a legal norm to be dealt with under the provisions of the General Agreement on Tariffs and Trade in *EC—Seals Products*.¹⁴ Technical regulations are subject to the core provisions of the TBT, in particular MFN and national treatment, and may privilege domestic products only to the extent that this serves legitimate policy goals. Regulations should be based upon international standards where they exist, but may also be deployed in the alternative. This is of particular relevance in the field of food standards, subject to appropriate scientific evidence that levels of risk defined in risk management warrant more stringent product regulation.

4.3 Technical Specification

Technical specifications also play an important role in government procurement. Art. I (U) of the 2014 Revised Agreement on Government Procurement (GPA) defines them as follows:

(p. 1031)

- (i) lays down the characteristics of goods or services to be procured, including quality, performance, safety and dimensions, or the processes and methods for their production or provision; or
- (ii) addresses terminology, symbols, packaging, marking or labelling requirements, as they apply to a good or service.¹⁵

Government agencies specify the quality and characteristics of products in terms of mandatory technical requirements and specifications with which the products need to comply, and which are based upon—next to the price—the overall most advantageous offer will be selected. Based upon these criteria, governments are also able to influence research and development in order to meet specific governmental needs, for example, in the sector of public transportation.

4.4 Technical Standards

Technical standards—as opposed to technical regulations—are voluntary in nature but similar in scope as defined in Annex 1 of the TBT Agreement (Wulfrum, Stoll, and Seibert 2007).¹⁶ While stringent disciplines of non-discrimination do not per se apply to standards themselves, but rather only to procedures of conformity assessment (Art.5), central government standardization bodies are obliged to prepare them in accordance with the Code of Good Practice for the Preparation and Application of Standards in Annex 3 of the TBT Agreement. The Code is not mandatory, but once accepted sets out disciplines on non-discrimination of foreign products. It essentially defines appropriate procedures in elaborating standards by central standardization bodies, including the right to comment on drafts (L). The regime is largely parallel to that adopted for binding regulations, but less stringent in its application.

4.5 Private Standards

WTO law, so far, does not extend to prescribing legal disciplines on private standards issued by the private sector, for example, by NGOs for social and environmental labels or large retail companies defining product and process qualities for their products. The Code of Good Practice for the Preparation, Adoption and Application of Standards in Annex 3 of the TBT Agreement extends to private standardizing bodies, such as ISO, but is limited to public law regulations and standards defined in Annex 1 of the Agreement. The scope of WTO law is limited to governmental or delegated action, and unless public authorities are directly or indirectly involved, the disciplines do not apply.¹⁷ Private standards, in particular (p. 1032) food standards and labelling, are issued by private associations under private law and deploy similar effects as governmental standards, but without being subject to the disciplines of the Code of Conduct. Private standards often entail additional trade barriers to developing countries. They are well-meant, often mainly serving the needs of consumers, but they may render conditions for producers, in particular in developing countries, more difficult and burdensome (Aerni 2013). At the same time, they offer the potential to enhance exports of developing countries where producers are properly organized and structured (Loconto and Dankers 2014). Private product standards are of increasing importance. The International Trade Centre, a joint Organisation of the WTO and the UN, operates a public registry with 170 private sustainability standards based upon which producers also may join a labelling scheme.¹⁸ The United Nations operates a discussion forum addressing these issues (United Nations Forum on Sustainability Standards, UNFSS).¹⁹

Legal disciplines on private standards essentially pertain to unfair competition rules, anti-trust, and, partly, intellectual property rights (Larouche and Van Overwalle 2015). WTO law deals with the latter and unfair competition in terms of consumer deception (Cottier and Jevtic 2009), but does not extend to anti-trust and abuse of dominant market powers. These areas have remained matters of domestic and European law, and are not yet properly addressed in WTO law.

Performance standards based upon disciplines of corporate social responsibility assume comparable functions to private standards contained in statements and pledges made by companies as sustainable development, human rights, labour, and environmental standards. Under Article 10bis of the Paris Convention, as incorporated into the TRIPS Agreement, Members of the WTO are obliged to make available disciplines against unfair competition which may be used to support the implementation and legal enforcement of these private standards relating to the production and processing of products (Cottier and Werme­linger 2014).

4.6 Process and Production Methods (PPMs)

Increasingly, WTO disciplines are applied to so-called Process and Production Methods (PPMs). Technical regulations and standards not only define the quality of a product, but may also address methods of production and production-related processes. These may or may not be reflected in the final product, but to the extent that they are, a product-related PPM exists. To the extent that the quality of the final product is independent of the ways of production applied, a non-product related PPM clearly separates products and process. Two products thus are the same physically, but resulting from different processes. Due to the obligation of treating like products alike, the case law and most authors consider non-product related-PPMs to be inconsistent with the principle of non non-discrimination and allow for them (p. 1033) only within the bounds of legitimate policy goals (Conrad 2011; Holzer 2014). Most of the PPM-related technical regulations and standards are associated with the protection of labour standards or the protection of the environment and of animals. In the landmark ruling *US—Shrimps*, the Appellate Body of the WTO recognized in principle the lawfulness of import restrictions based upon certain fishing methods endangering turtles.²⁰ In *EC—Seal Products*, it recognized, again in principle, the ban on importation of seal products due to the killing methods applied.²¹ The future may see enhanced linkage to human rights based upon the invocation of public morals, in particular, in enforcing core human rights by means of trade regulation (Cottier, Pauwe­lyn, and Buergi 2005). Other than prescriptions of product safety for human and animal health, PPMs seek to avoid harmful externalities caused by the making of the product. In the age of climate change mitigation and adaption, it is evident that these measures increasingly gaining prominence and practical relevance (Cottier, Nartova, and Bigdeli 2009; Kloeckner 2012; Leal-Arcas 2013; Cottier 2014; Cottier and others 2014; Holzer 2014).

4.7 Risk Assessment

Technical regulations and standards serve the purposes of protecting health of workers, consumers, and to secure sustainability of products and processes, and they form part of what is called risk assessment and management. International trade regulation defines risk assessment and the acceptable level of risk (appropriate level of protection, or ALOP) as follows in the WTO SPS Agreement, Annex A:

4. Risk assessment—The evaluation of the likelihood of entry, establishment or spread of a pest or disease within the territory of an importing Member according to the sanitary or phytosanitary measures which might be applied, and of the associated potential biological and economic consequences; or the evaluation of the potential for adverse effects on human or animal health arising from the presence of additives, contaminants, toxins or disease-causing organisms in food, beverages or feedstuffs.

5. Appropriate level of sanitary or phytosanitary protection—The level of protection deemed appropriate by the Member establishing a sanitary or phytosanitary measure to protect human, animal or plant life or health within its territory.²²

WTO law does not clearly distinguish between risk assessment and risk management.²³ Conceptually, however, they represent two different steps (Robertson and Kellow 2001; Maidani 2015). Assessment entails the scientific study of existing risks to health of humans or animals or the environment. Risk management relates to treatment of risk scientifically identified, and while scientific assessment should produce verifiable results, risk management depends upon the risks taken (p. 1034) into account. Thus, the acceptable level of risk varies from jurisdiction to jurisdiction due to different societal perceptions and social and economic development. (International Law Association 2008; Cottier and Delimatsis 2011). The third element is risk communication, which entails policies to informing the public and preventing panic; it is not addressed in WTO law. In practice, these three functions are often mingled and confused and should be clarified in the future.

Diverging levels of risk, in terms of legal liability, are related to risk assessment. This is not an area which has been addressed by international trade law except within the EU, where common standards of liability in the field of product liability (Directive 85/374 EEC)²⁴ or environmental hazards are defined (Directive 2004/35/EC).²⁵ Whether a country and jurisdiction operates on the basis of ex post product liability, leaving responsibility mainly with the private sector or courts, or whether it opts for strict or causal liability (and thus costly comprehensive insurance coverage) reflects different perceptions of risks and precaution. These differences may deploy trade-distorting effects and are one of the reasons why the EU adopted disciplines on product liability comparable to US law, but it is of much less practical importance due to a more elaborate network of social security and strict standards of liability in the field of environmental law. It is conceivable that these areas impacting on insurance costs, and risk may be subject to regulatory convergence in coming years between the US and the EU.

4.8 Patents and Copyright

Patents and copyright, which both are key to modern technology, mainly pertain to domestic or European law. International law, however, provides detailed minimal standards of protection binding upon WTO Members, while also allowing for exceptions, in particu-

lar under the doctrine of fair use and compulsory licensing.²⁶ Intellectual protection in international law not only amounts to the first area of harmonization, but also to one of the most prominent international regulatory fields essential to technology and innovation (Maskus and Reichman 2005; Cottier 2005). The TRIPs Agreement of the WTO, incorporating the Paris and Berne Conventions of WIPO, the Patent Cooperation Treaty for international registration, and additional agreements administrated by WIPO,²⁷ provide the backbone for interfacing patent and copyright law (Abbott/Cottier/Gurry 2015) and to bring about greater transparency not only on pertinent rules applicable to countries, but also in terms of patent information important to research, patent landscaping and technological advances (Cottier and Temmerman 2013).

Next to the fundamental principles of WTO law, the principle of territoriality and the principle of priority in the Paris Convention secure the international co-existence of different patent rights. The TRIPs Agreement further provides the (p. 1035) basis for scope of patents and copyright, duration of protection, use exceptions, and recourse to compulsory licensing. The TRIPs Agreement also provides for extensive rules for enforcing intellectual property rights and thus helps to implement exclusive rights and to secure return on investment, and thus on innovation.

Patent rights and copyright is complexly balanced by countervailing public interest seeking to avoid excessive monopolies and clustering of rights, which in return may hamper innovation (Federal Trade Commission 2003; WIPO R&D, Innovation and Patents 2016). The system depends upon a proper balance which may shift with the advent of new technologies. Thus, open source in information technology is an important movement to balance the system and is of key importance, in particular in the software industry and information technology. Patent pooling and patent pledges emerge as important instruments in the law of promoting inclusive technological advances in particular for climate change adaption and mitigation (Awad 2015).

Of particular importance for developing countries, which host more than 95% of the world gene pool and biodiversity, is a better protection of traditional knowledge. The combination of genetic engineering and traditional knowledge potentially leads to new products, including both medicines and agricultural seeds. The present system does not sufficiently reward knowledge holders and communities in bio-prospecting (Bieber-Klemm and Cottier 2006). Remuneration depends upon voluntary agreements under the Nagoya Protocol on Access and Benefit Sharing of the Convention on Biodiversity.²⁸ Efforts to introduce declarations of origin in patent applications are being made, while the creation of a new type of intellectual property right of the protection of traditional knowledge (Cottier and Panizzon 2004) has not yet made sufficient progress in the WTO and the WIPO Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge, and Folklore as of 2016.²⁹

4.9 Protection of Undisclosed Information and Data

A key feature for technology is the protection of undisclosed information and trade secrets. While technology may be protected by patents and copyright, undisclosed information is protected from appropriation and disclosure, subject to compensation and damages. Such protection was introduced in international law in 1995 with Article 39 of the TRIPS Agreement on the basis of protection against unfair competition (Abbott, Cottier, and Gurry 2015). Today, it amounts to one of the most important features of international technology laws. Many companies rather rely upon the protection of undisclosed information, partly in combination with patents, partly without (in particular SMEs), seeking to secure their first mover advantage until the technology is being copied in due course. Costs for protecting IPs are rather invested in R&D and marketing of products.

(p. 1036) New information technology aggravates the issue of data protection, in particular personal data made available by using internet browsers and cloud computing. Technological advances create a host of new problems and tensions in transatlantic relations, as perceptions to risks and data protection vary, partly due to different perceptions of national security and geopolitical roles assumed by the US and the EU. The European Court of Justice overruled the 2000 Safe Harbour decision of the Commission, which sought to implement the transatlantic Safe Harbour Privacy Principles.³⁰ It will be interesting to see to what extent these issues will be further developed in the process of regulatory convergence within the future framework of TTIP.

5. The Impact of Global Value Chains and Product Life Cycles

International technology law outlined in this chapter is largely based upon the premises of the international division of labour and the doctrine of comparative advantage. It is also based upon the traditional understanding of separating trade in goods from trade in services. Yet, the reality is altogether different. Trade in goods and trade in services are increasingly difficult to separate. Moreover, trade largely takes place as trade of components, rather than of finished consumer products with a life of their own. Finally, as products travel, their life cycles cross different jurisdictions. The regulatory implications of these emerging realities still need to be studied and appropriate answers developed. The idea of isolated national regimes and varying standards is likely to make way for a more integrated approach in international technology law.

5.1 Merging Legal Disciplines of Goods and Services

Modern products often intrinsically combine components of goods and services, but the two are not independent of each other, and cannot be dealt with in isolation. For example, a modern complex jet engine operates as a complex service system of the producer, and legally is not simply a physical component of the aircraft belonging to the airline. The operation of the engine is monitored and serviced from abroad (Morris 2014). Without these

integrated services, the engine will not reliably work. Technical standards relating to the engine thus need to be complemented by (p. 1037) standards on servicing the product. Recent research on global value chains shows that goods and services are generally much more closely interrelated than anticipated (Elms and Low 2013; WTO 2013). The product consists of a package containing several interacting elements, and while technical regulations and rules so far mainly relate to physical products, and separate rules apply for the component of services, Article III GATT and national treatment also applies to transportation and distribution of goods. Separate performance standards may apply to the service component of the product, if any.

The current shift to increased attention of Production and Process Methods (PPMs), supported by goals of climate change mitigation, but also interlinking trade, labour, human rights, and other environmental concerns, calls for a rethink of traditional definitions of like products, and the inclusion of process-related considerations which often relate to the provision of a service in the process of producing the goods. Technical standards relating to the product need to be combined with those relating to PPMs and service components. Future regulations thus need to adopt a more comprehensive approach to regulate products including both goods and services in a consistent and coherent manner. The classical distinction between goods and services in international trade agreements should be replaced by comprehensive disciplines as they can be found in the revised 2014 WTO Agreement on Government Procurement.³¹ The disciplines on government procurement apply to goods and services alike (Arrowsmith 2003). Such linkages will how the origin of products is defined (rules of origin) or are taxed at the border (customs valuation). It will require restructuring agreements on products standards, in particular on technical barriers to trade and food standards. Standards relating to production and services will form part of these disciplines. The future is likely to see more trade agreements which integrate goods, services, IPRs, and investment and labour in a particular sector, such as trade in electrical energy.

5.2 Trade in Technological Components

International trade regulation is based on the assumption that goods are internationally traded between businesses or between business and consumers, and are able to be used on their own. In the reality of high levels of division of labour and production of products in different sites, international trade is often within the same company and mainly shipping components in the process of assembly and production. Intrafirm and business-to-business (intra-industry) trade dominates, in particular among developed economies (WTO 2013). Different domestic standards thus may apply to different phases of production in different locations. Division of labour and geographical location obviously call for using similar regulation and standards. They strongly reinforce the need for harmonization, or at least (p. 1038) equivalence of technical standards, and for adopting similar levels of protection of intellectual property rights and liability rules. This division also calls for comparable regulations on services accompanying the chain of production. Trade in components also challenges rules of origin, as well as customs valuation and taxation.

5.3 Life Cycle Analysis

Goods traded internationally are produced, used, and often disposed in different locations. The life cycle of a product was conceptually identified some time ago (Day 1981), but has become relevant in technology regulation only in recent years. It affects different jurisdictions with different challenges. For example, a product based upon nanotechnology raises issues of labour standards in the country of production, issues of consumer protection in the market where it is sold, and issues of environmental degradation and water pollution in the jurisdiction where it is disposed of (Karlagnis and Liechti-McKee 2014). The regulation of each of these jurisdictions therefore calls for coordination in defining appropriate standards of the product and its related services in the process of production, consumption, and disposal of the product. Life cycle analysis and regulation inherently call for enhanced international cooperation in standard setting and again for harmonization, or at least equivalence of standards. The area is not currently well researched, and the legal implications of life cycle analysis still need to be fully developed in international economic law. Ideally, products will be produced in accordance with fully harmonized standards. This inherently, again, can only be achieved on the international level, either by way of private or public regulation or standards.

6. Regulatory Challenges

6.1 From Fragmentation to Coherence

The integration of goods and services, trade in components, and the life cycles of products across domestic jurisdictions calls for greater coherence and less fragmentation of the legal regimes (Cottier and Delimatsis 2011). However, this does not necessarily imply full harmonization and uniform standards. Different jurisdictions continue to have different attitudes to risk due to their having different needs and values. Within a common framework, differences and policy space still finds their place, but these should be embedded within an overall agreement (p. 1039) framework in international law. The model of multilevel governance, or the *Five Storey House*, offers an appropriate analytical framework (Joerges and Petersmann 2011). It allows assigning regulations to appropriate levels of governance, whether municipal, regional, national, continental, or global. Allocations essentially depend upon the public good to be produced. In a globalizing economy, rules, regulations, and standards often will need to be set, at least in principle, on the global level for the world market, or sometimes they remain continental and thus within the EU. Independent national, regional, and local regulations relating to technology will be exceptional. However, these levels of law continue to have an important function in implementing harmonized norms, partly because assignments and functions may vary among different levels of governance within the same regime. This is particularly true for risk assessment, risk management, and risk communication.

6.2 Multilevel Risk Policies

To the extent that goods and services are traded on a global scale, regulation in principle should also be of global reach and based upon internationally agreed and harmonized standards. Global rules, however, may delegate certain aspects to regional or national levels to allow for different perceptions and treatment. This distinction mainly applies to risk assessment and risk management, and as mentioned, the two functions are not clearly distinguished. Many would argue that this is not possible, but the main responsibilities may be assigned to different levels of governance. The theory of multilevel governance (Joerges and Petersmann 2011) offers an appropriate framework to develop different functions in dealing with technological risks (Robertson and Kelley 2001). Risk assessment and risk management is a matter suitable to be organized and structured in accordance with multilevel governance. The approach was endorsed in the field of biotechnology (International Law Association 2010). Other areas such as pandemic diseases, nanotechnology, and synthetic biology could be organized accordingly, instead of leaving such matters exclusively to national governments, which are often unable to discharge their duties in case of crisis.

6.2.1 Risk Assessment

Scientific risk assessment relating to products and services requiring sophisticated scientific laboratories and expertise should be undertaken within an international network led by an appropriate international organization, such as today by the Codex Alimentarius, a joint body of the WHO and FAO in respect to food standards. Similar models can be deployed for assessing health risks of pandemic diseases WHO (e.g. SARS, Ebola, Zika, HIV), and for technological risks in appropriate international organizations or non-governmental bodies dealing with the (p. 1040) respective technologies. The finding and determination of the existence of a risk—not more or less—should mainly be within the responsibility of these bodies. They alone are able to make the necessary scientific assessment, and should operate an international network of scientific institutions to guarantee a transparent and accountable operation. It is not advisable to assign risk assessment tasks to each and every nation state, as most have neither the expertise nor experience in most cases of new and unknown risks, nor the financial resources to entertain all the laboratory facilities required. This does not mean that national authorities never are engaged in risk assessment, in particular, when it comes to routine examination of risks the methodology and science of which are well established. Rather, more complex and new risks should be assessed within a specialized international network to which all countries may contribute in kind and resources.

6.2.2 Risk Management

Risk management dealing with the consequences of an identified risk identified depends upon attitudes to risk and the varying societal needs of a particular jurisdiction, expressed in terms of ALOP. Risk management in international trade, therefore, should take place on the domestic level. It does not require uniformity, but may vary from country to country. Thus, countries diverge in dealing with the risk of genetic engineering, biotechnology, nanotechnology, or synthetic biology. These differences may also entail legitimate trade barriers which rest in differences in the perception of risks and different ALOPs.

The only common point here relates to the identification of risk in the first place. Risk management, and subsequent governmental action, only takes place when risk is found within the international system and network in the first place. Such dependence induces governments to insist on their own risk assessment. Many refuse to clearly distinguish the two concepts, and argue that risk assessment is equally dependent on value judgments. Proper allocation of tasks is contingent on defining appropriate priorities.

6.2.3 Risks Communication

In a world of instant communication, risk communication relating to technological hazards is of key importance in preventing and combating panic and inducing appropriate reactions and conduct of operators, governments, and the public at large. Risk communication has not been sufficiently separated and conceptualized in the law of technology regulation. On the international level, it is not well developed beyond recourse to labelling (Kloeckner 2012), and it should be dealt with as a separate category and function, as shown in the start of climate change communication (Center for Research on Environmental Decisions and ecoAmerica 2014). Other areas, in particular in the field of technological and health risks, are less developed. Again, it is a matter of defining the proper level of governance. Global threats, such as pandemics, need communication on the part of international organizations, (p. 1041) jointly with the governments that are the most affected. Local and geographically contained risks, on the other side of the spectrum, will need to be managed by local authorities. Risk communication is a form of information policy and requires decisions on the nature and amount of information given to media and public at large. Choosing the appropriate level of risk communication will help avoiding conflicting messages, thereby reducing possible confusion in response to technological threats.

6.3 Research and Development

Much of applied research and development is, and can be, undertaken by the private sector on market conditions and operated within an established legal framework of intellectual property rights and contractual arrangements, subject to competition law. Basic research, however, produces public goods and thus depends upon public funding, either by means of public research institutions and universities, or tax-funded research grants. These two areas of research often cannot be clearly separated and are of a hybrid nature. The latter raises legal issues in the trade context. The WTO Agreement on Subsidies and Countervailing Measures³² no longer covers the category of non-actionable subsidies, which originally was included in a well-balanced agreement (Rubini, 2009). Governmental support for research and development was considered lawful to the extent that under certain conditions it did not exceed 75% of the costs of industrial research or 50% of the costs of pre-competitive development activities.³³ Today, such subsidies are not excluded, but can be challenged if they produce injury to foreign competitors. Currently, the law leaves much legal insecurity, and it will be necessary to review the suspension of this provision and to adapt it to the needs of promoting research and development of SMEs, in particular in developing countries. The challenge of climate change mitigation and adap-

tion offers additional arguments in favour of strengthening public support of research and development in addressing this and other common concerns of humankind.

6.4 Transfer of Technology

In a North-South context, the issue of transfer of technology and related knowledge amounts to perhaps the most urgent and unresolved challenge in technology law (Maskus and Reichman 2005). Established mechanisms of voluntary and contractual licensing of intellectual property rights and investment law often do not bring about transfer of knowledge and technology to developing countries, due to lacking markets generating adequate returns. Or, markets are being served by importation of consumer products, leaving importing countries without the benefit of accrued (p. 1042) skills and development. Governments are in the position to use fair use restrictions or compulsory licensing (Abbott, Cottier, and Gurry 2015). Arguably, they may impose local working requirements, albeit this practice is controversial and possibly outdated under WTO rules, taking into account global value chains (Cottier, Lalani, and Temmerman 2014). Specialized mechanisms to transfer green technology, such as the Clean Development Mechanism under the Kyoto Protocol of the UN Framework Convention on Climate Change (UNFCCC), have not yielded satisfactory results (IPCC 2014). The obligations to create incentives to transfer technology under Article 66:2 of the TRIPs Agreements to least-developed countries so far have remained without substantial solutions and returns. New mechanism need to be designed in order to correct existing market failures. The basic problem of transfer of technology to developing countries is that governments may make promises and pledges in international agreements, but in the end do not deliver the technology. It mainly is in the hands of companies and the private sector. Incentives thus need to address the needs of companies and compensate them for such transfers to non-lucrative markets, for example, by offering tax breaks for companies engaged in developing countries, and to avoid double taxation of investments made.

The achievement of the 2° Celsius limitation of global warming under the 2015 Paris Agreement on climate change urgently calls for the transfer of advanced technology to emerging economies that produce products for domestic consumption and exports to industrialized countries (Conick and Sagar 2015). Policies of keeping first-mover advantages and transfer only of second-best technology to these markets cannot achieve the goals of climate change mitigation and adaption, particularly in the field of agriculture. Only wide dissemination of the most advanced technologies can support the changes that are needed in order to achieve the goals being set. Moreover, carbon tariffs and carbon taxes will need to help create appropriate incentives and funding mechanisms in order to promote technological change and cooperation. PPMs will play a very important role in designing appropriate incentives. Recourse to Private Public Partnerships (PPPs) is emerging and which will include private Foundations, companies, and the governments in the pursuit of these goals beyond the field of access to medicines. Addressing common concerns of humankind, requiring cooperation and unilateral measures calls for a new approach to transfer of technology and technology-related knowledge.

6.5 Legitimacy and Participation in Rule-Making

While the broader legal and general framework for technology is defined by legislators, and is often based upon international agreements, the adoption of technical regulations and standards enjoys a high level of delegation to government agencies and to private standardisation organizations, in particular the ISO. (p. 1043) The same holds true on a national and regional level. The so-called New Approach of the EU, adopted in 1984, is a model of limiting legal provisions to essential product safety requirements, but leaves detailed regulations to private standard-setting bodies.³⁴ Compliance with such standards implies a presumption of compliance with basic legal rules applicable to the technology. This shift towards global product and process standards will increase the role of private standard-setting organizations. The ISO and other bodies will therefore play an increased role, and raise questions of democratic accountability and transparency (Delimatsis 2015). Recent research shows that the field is not well developed in terms of input legitimacy and appropriate procedures to bring it about, and related problems are generally not well-known in the legal profession in a time when accountability is of increasing importance as standard setting—the building upon these shifts to PPMs—increasingly addresses processes and thus ventures also into the field of corporate social responsibility. ISO standard 26000, which was adopted in 2010, goes far beyond product and process standards, and sets out rules of good corporate governance and sustainable development (Bijlmakers and Van Calster 2015). These standards need to be developed upon broad stakeholder consultations, going beyond the usual framework of industrial standard-setting and mainly involving the relevant industry and industry associations.

Accountability and participation in standard setting is a challenge because of increasing internationalization and globalization of these standards. Framing and harnessing the increasing role of non-state actors, in particular in the field of technology regulation, is an important task ahead (Peters, Koechlin, Förster, and Fenner Zinkernagel 2009). The concepts of regulatory convergence and accompanying structures and procedures allow developing appropriate substance-structure pairings, which bring together governments and non-state actors in a more transparent manner. Efforts made in EU/US negotiations offer the first steps in developing inclusive structures for an open and ongoing process of developing joint legal and technical standards in due course. As regulations move to international fora, traditional avenues of rule-making that have involved government agencies and parliament, but also interest of sub-federal and local levels, need to be re-designed in order to meet democratic accountability standards in the process of globalization of the law.

6.6 Respecting Human Rights and Sustainability

Output legitimacy of technical norms and standards depends upon their effectiveness and efficiency to achieve the goals of product safety for human and animal consumption, for the environment, and for sustainable development at large. From this angle, we are less concerned with procedural input legitimacy in law making (p. 1044) and application, but more with outcomes and effects of regulations. From the point of view of efficiency, these

standards are measured against their contribution to promote safety of products and processes, and the integrity and quality of services. However, they also need to respond to fairness and equity. These are broad standards, and norms will need to be assessed more precisely on their impact on promoting specific human rights, such as the right to health, to life, to food, etc. They offer broad guidance in order to assess the legitimacy of a particular technical regulation or rule, and are of particular importance in the field of patenting life forms (Temmerman 2012), regulating biotechnology (Francioni 2007; Cottier 2007), information technology, and data protection (Burri and Cottier 2014).³⁵ Further and more specific benchmarks are offered by WTO law, which assesses whether a particular domestic norm or standard is excessively restrictive and unnecessarily impairs international trade and commerce in the field of product and food standards.³⁶ The emphasis of recourse to international standards, wherever they exist, suggest that these should be primarily used as a reference for domestic regulations and standards. While these criteria are open to WTO dispute settlement, references to broader standards outside WTO law, in particular the contribution of product and process standards to enhance human dignity, human rights and sustainable development (Cottier, Pauwelyn, and Buergi 2005; Buergi 2015) still need to be developed in coming years and decades, overcoming fragmentation towards greater coherence designed within the model of multilevel governance and well-defined responsibilities to regulate technology and technology-related services.

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The relevant provisions were subsequently revised and a new Safe Harbour decision by the Commission issued on 2 February 2016.

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(36.) See also *supra* note 23.

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Trade, Commerce, and Employment: The Evolution of the Form and Regulation of the Employment Relationship in Response to the New Information Technology

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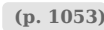
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Abstract and Keywords

The technology of production shapes the employment relationship and important issues in its regulation. The new information technology has transformed the organization of production replacing large vertically organized firms governed by the internal labour market with horizontally organized firms governed by a global labour market. These changes require policymakers to broaden the definitions of ‘employee’, ‘employer’, and ‘appropriate bargaining unit’ in the regulation of employment and find ways to incorporate the new information technology into that regulation. As profound as these changes have been, the speedy evolution of information technology and the development of artificial intelligence promise even greater changes in the future. Future regulation will require not only a more expanded notion of the employment relationship, but also increased education and retraining programmes, benefit programmes tied to citizenship rather than employment, increased regulation, subsidy of retirement programmes, and perhaps even a basic income programme.

Keywords: information technology, artificial intelligence, employment, labour unions, labour law, employment law, regulation

1. Introduction

THE technology of production determines the form of the employment relationship and thus the questions that have to be addressed in regulating that relationship. During the industrial period, the dominant engines of economic production were large vertically integrated firms, supported by a stable workforce (Cappelli 1999: 54–55, 60–62). Size and vertical integration allowed firms to coordinate production to ensure that the right number of parts was produced to meet assembly needs (Cappelli 1999: 54–55, 60–62). A stable workforce helped ensure that the  firm had adequate employees with the right skills to fulfil its production demands (Cappelli 1999: 54–55, 60–62). Employers encour-

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aged long-term employment relationships and employees of a single employer undertook work at one or perhaps a few physical locations so that employment relationships and bargaining units were stable and relatively easy to define. Within these bargaining units, employees regularly interacted with each other in the same physical environment and socialized together (Dau-Schmidt 2001: 5–6, 9). Moreover, employers encouraged and regulated these long-term relationships through a system of corporate policies and benefits that profited from employee voice and enforcement through collective bargaining (Dau-Schmidt 2001: 5–6, 9). This paradigm of long-term employment in large vertically integrated firms lent itself to the resolution of disputes through collective bargaining (Dau-Schmidt 2007: 909). Thus in industrialized countries this period was marked by regulation of the organization of employees and the conduct of collective bargaining, supplemented with various protective employment laws regulating wages, hours, and working conditions, largely for the benefit of the unorganized and prohibiting discrimination on the basis of race, gender, religion, or nationality.

The rise of the new information technology has changed the nature of the employment relationship complicating the relationships of production and requiring amendments or new interpretations of the laws governing the employment relationship and enlargement of the field of protective legislation (Herzenberg, Alic, and Wial 1998; Cappelli 1999; Dau-Schmidt 2001: 5–6, 9; Dau-Schmidt 2007: 909; Dau-Schmidt 2015). Beginning about 1980, the new information technology fostered a paradigm shift in the best business practices of firms and the nature of the employment relationship (Dau-Schmidt 2007: 913). During the ‘information age’, information technology allowed firms to organize production horizontally across multiple subcontracting and supplying firms and across the globe. Each of the firms in these horizontal relationships focused only on its ‘core competency’, or what it did best and cheapest in the global economy (Cappelli 1999: 99–100). Firms organized production through more tentative relationships of subcontracting and outsourcing that were subject not to corporate administrative rules but instead the machinations of global markets (Cappelli 1999: 104; Slaughter 1999: 8). Employers began to seek flexibility, not stability, in employment and the number of ‘contingent employees’ who work part-time, or are leased or subcontracted, reached new heights in developed economies (Belous 1995). Employees engaged in the same productive enterprise became more distant from the economic power of the firm, and each other, both in their legal relationships and their geography. Moreover, the information technology decreased the importance of the physical plant and raised new issues of employee access and communication (Technology Service 2000). New questions arose about who were employers and employees in an appropriate bargaining unit and how these (p. 1054) employees could be encouraged to communicate with each other in order to represent their interests in the workplace (Dau-Schmidt 2007: 915–918). The new information technology also undermined the bargaining power of employees in developed countries, decreasing their success in addressing basic issues of wages hours and working conditions through collective bargaining. Thus the new information technology has increased the need for workers to rely on protective legislation to address their conflicts with employers.

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Although there are plenty of legal problems to resolve from the adoption of the new information technology over the last 40 years, the transformations to the employment relationship wrought by the new information technology are not yet done. Indeed, as the pace of advances in the new information technology quickens, perhaps the biggest changes are yet to come. Both the hardware and software components of the new information technology have been improving exponentially in their speed and efficiency, increasing the scope and complexity of tasks they can be used to accomplish (Brynjolfsson and McAfee 2011: 18–19). It is not clear how many of the members of the workforce can keep up with this rate of change in adapting their skills and training (Ford 2009: 53; Kurzweil 2000). Moreover, advances in artificial intelligence suggest that we may be building computers that are ‘smarter’ than the average human as soon as 2029 (Ford 2009: 2). Once computers are ‘smarter’ than humans, who knows what sort of changes in production technology these machines might develop? Although many economists are optimistic about these developments, arguing that historically workers and the economy as a whole have benefited from improvements in technology (Autor 2014), ‘technologists’ are not so sanguine, arguing that they portend enormous changes in the allocation of the rewards from production and perhaps a fundamental change in the relationship between labour and capital (Ford 2009: 4–6). At the very least, continuing improvements in information technology will lead to the reformation of industries and dislocations of workers that will raise issues not only for collective bargaining, but also for our public policies with regards to education, pensions and social welfare.

In this chapter, I will outline the impact of the new information technology on the employment relationship and the implications of these changes for the regulation of the employment relationship. I will first discuss the system of industrial production that was the background for protective regulation and laws of collective bargaining advanced in developed countries prior to the ascension of the new information technology in the late 1970s. Then I will discuss the new information technology and how it has developed and changed the employment relationship. In this discussion, I distinguish between the changes that have already occurred, their implications for the regulation of the employment relationship, the changes that are projected to happen in the near future, and their implications for the regulation of the employment relationship and other public policies.

(p. 1055) 2. Industrial Production and the Rise of Collective Bargaining

2.1 The Organization of Industrial Production

Although England and other European countries began to industrialize earlier, America’s period of industrial production began towards the end of the nineteenth century. In both Europe and North America, the process of industrialization matured in the early twentieth century and its impacts on the employment relationship were much the same. The prior system of artisanal production had been marked by small local or regional ‘manufacto-

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ries owned by master craftsmen who supervised all facets of production (Stone 2004: 27–41). Even in larger facilities, capitalists undertook production in partnership with master craftsmen who employed servants and whose knowledge base encompassed the entire technology of production (Stone 2004: 27–41). Advances in communication and transportation technology in the nineteenth and early twentieth centuries increased the optimal scale of production, so that now many producers sold on a regional or even a national basis (Dau-Schmidt and others 2014: 20). Furthermore, in the early twentieth century the ‘scientific management’ techniques of Frederick Winslow Taylor were used to break each job down into its component parts to determine not only the best means to undertake production, but also appropriate compensation (Stone 2004: 27–41). When Henry Ford added a moving assembly line to the principles of ‘Taylorism’ at his Highland Park plant in 1913, modern industrial production was born. These advances in management techniques and the organization of production allowed mass production and the ‘deskilling’ of jobs. Management controlled the speed of the assembly line and production, while low-skilled workers performed the component parts of production without understanding the entire technology of production (Stone 2004: 27–41). In modern industrial production the technology of production was incorporated into the assembly line, obviating the need for master craftsmen.

Large-scale industrial production swept the developed world during the ensuing decades. By the 1920s, the world’s captains of industry believed that the ‘best’ management practices were to build a large vertically integrated firm, supported by a stable workforce (Cappelli 1999: 61). Firms ‘vertically integrated’, performing all stages of production in-house, to ensure coordination of production and to achieve economies of scale (Cappelli 1999 59–60). Firms desired a stable workforce to ensure their supply of this valuable resource and maintain production (Dau-Schmidt 2001: 9). To preserve workforce stability, firms developed administrative rules for the retention, training, and promotion of workers within the firm. Economists refer to these systems of administrative rules as the ‘internal labour (p. 1056) market’, because, although these decisions are made in reference to external market forces, they define the terms of compensation and promotion within the firm in a way that is not directly determined by the ‘external’ market (Doeringer and Piore 1985). The vertical integration of firms facilitated the retention of employees over the course of their careers because integrated firms had layers of positions or ‘job ladders’ within the firm for employee advancement (Herzenberg, Alic, and Wial 1998: 11–12; Cappelli 1999: 61). Thus, the employer became an important source of training, security, and benefits throughout the employee’s life.

2.2 The Rise of Collective Bargaining under Industrial Production

To be sure, employees found it in their interests to organize and pursue protective legislation during the industrial period, setting minimum standards for wages, hours, and conditions of employment, but during this period many workers also found that collective bargaining worked well to help them secure favourable terms of employment beyond the statutory minimums. In the United States, the National Labor Relations Act (NLRA) system of choosing an exclusive representative through an election in an appropriate unit

and resolving disputes through collective bargaining worked relatively well from the 1930s to the post-war period. Because of the large-scale vertical integration of production by a single firm, the NLRA definitions of 'employer' and 'employee', based on agency and tort under the Taft-Hartley amendments, generally defined the party that had control over the terms and conditions of employment of concern to the labouring party (29 USC § 152(2),(3); Harper 1998: 333-355). There were many fewer instances of subcontracting, outsourcing, and leasing of employees to complicate the relationships of the parties to collective bargaining. Moreover, because jobs were well defined and long term, bargaining units of employees under the NLRA were relatively well defined and stable (29 USC § 152(b)). These employees had a long-term interest in their jobs and a particular employer and thus had incentive to invest in organizing their workplace to reap future benefits (Dau-Schmidt 2001: 20). Employers were relatively insulated from international competition and were more concerned with maintaining production than maintaining low wages (Dau-Schmidt 2001: 9). As a result, employers were relatively forthcoming in providing wage and benefit victories for organized employees.

Moreover, the traditional system of 'bread-and-butter' collective bargaining worked well in resolving issues in the industrial workplace. Due to the large-scale vertical integration of firms, the firm that signed the employees' pay cheques was also the firm that decided how much to produce, what methods to use, and how to market production. This unified powerful employer coincided with the definition (p. 1057) of 'employer' under the NLRA and employees could address their concerns to the employer through collective bargaining (Dau-Schmidt 2007: 911). Traditional collective bargaining also gave employees a useful voice in the administrative rules of the internal labour market (Weil 1999). Workers' demands for benefits, seniority, and job security were compatible with management's objective of the long-term retention of skilled workers. Employee co-determination and enforcement of the administrative rules of the internal labour market played an important role in the best management practices of the industrial period (Cooke 1994; Rubinstein 2000). Finally, union representation and its accompanying system of grievance and arbitration provided a fair and efficient means of enforcing the agreed-upon administrative rules of the workplace (Wheeler, Klaas, and Mahony 2004: 32-44).

3. Production and Employment Using the New Information Technology

3.1 The New Information Technology

Large-scale vertically integrated industrial production dominated developed countries until the late 1970s. At this time, computers, and their accompanying software and networks, began to emerge as the new general purpose technology which, like steam and electricity before them, remade how work and production is done. A computer is a device consisting of many 'on/off switches' that can save and retrieve information or carry out arithmetic or logical operations according to a predesigned program (Koepsell 2000: 3

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and it b). Modern computers use integrated circuits for their on/off switches and these circuits are growing geometrically in their speed and shrinking geometrically in their size and cost (Brynjolfsson and McAfee 2011: 17–18). Following ‘Moore’s law’, the number of transistors in a minimum-cost integrated circuit has doubled every 12–18 months since about 1965 and there is no end in sight to the process. Similarly, following ‘Grötschel’s observation’, the efficiency of software algorithms has also grown at exponential rates (Brynjolfsson and McAfee 2011: 18). Since, the predesigned program that regulates the computations of the computer can be changed, the computer can be used to solve multiple problems.

Computers are better at performing some tasks than others. Computers excel at performing ‘routine tasks’ such as organizing, storing, retrieving, and manipulating information, or executing precisely defined physical movements in a production process (Autor, Levy, and Murnane 2003: 1279–1333). These tasks are most (p. 1058) often associated with middle-skilled/-paid jobs like clerical work, accounting, bookkeeping, and repetitive production jobs. However, there are other tasks that pose more serious challenges for computers and programmers (Autor, Levy, and Murnane 2003: 1279–1333). First, computers have trouble performing ‘manual tasks’ that require situational adaptability, visual recognition, language recognition, or in-person interactions. These tasks are most often found in low-skilled/-paid jobs like cleaning and janitorial work, food preparation and service, in-person health assistance, and protective services (Autor 2014: 7–8). Second, computers have trouble performing ‘abstract tasks’ that require adaptive problem solving, intuition, creativity, or persuasion. These tasks are most often found in high-skilled/-paid professional and creative jobs like management, law, medicine, science, engineering, advertising, and design (Autor 2014: 7–8). Although computers are making inroads into almost all occupations, it seems that currently they tend to replace middle-skilled/-paid workers, while they tend to augment the productivity of high-skilled/-paid workers (Brynjolfsson and McAfee 2011: 50). Although the professions should not be entirely sanguine about the adoption of the new information technology, as computers are currently used to conduct complex legal document searches and diagnose disease (Markoff 2011).

Like the other transformative technologies that have come before it, the new information technology has stirred up a fair amount of ‘automation anxiety’ about the impact it will have on the nature of people’s jobs and their employment. Just as the luddites and John Henry battled steam machines for their jobs, so too some have worried that computers might replace people in good paying jobs, or perhaps in employment altogether (Ford 2009: 47–48). There were similar concerns about the impact of technology on employment during the twentieth century. In his Depression-era essay, John Maynard Keynes foresaw the possibility of ‘technological unemployment’ within a century’s time because technology might make it possible that ‘we may be able to perform all the operations of agriculture, mining and manufacture with a quarter of the human effort to which we have been accustomed’ (1963: 358–373). Keynes saw this as a short-run problem opining that society would adjust to this development perhaps with a 15-hour work week (1963: 358–373). In 1964, President Johnson appointed a ‘Blue-Ribbon National Commission on Technology, Automation, and Economic Progress’ and charged them to assess the likely im-

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impact of technological change on new job requirements and worker displacement (*Herald Post* 1966: 2). The commission ultimately concluded that automation did not then threaten employment, but as insurance against this eventuality it recommended 'a guaranteed minimum income for each family; using the government as the employer of last resort for the hard core jobless; two years of free education in either community or vocational colleges; a fully administered federal employment service, and individual Federal Reserve Bank sponsorship in area economic development' (*Herald Post* 1966: 2). The commission's conclusions still left some important thinkers with concerns. In an open letter to President Johnson in (p. 1059) 1966, Nobel laureates Linus Pauling (chemistry) and Gunnar Myrdal (economics), as well as economic historian Robert Heilbroner, worried that '[t]he traditional link between jobs and incomes is being broken' and that soon '[t]he economy of abundance [will be able to] sustain all citizens in comfort and economic security whether or not they engage in ... work' (Akst 2013).

Economists have traditionally dismissed concerns about long-term technological unemployment. They note that new technology capital is both a substitute and a complement for labour in production, displacing some workers but raising the productivity of those that remain. Historically, the displaced workers generally find new work to do, sometimes work created by the new technology (Autor 2014: 7–8). Thus, although technological improvements may result in short-run worker displacement, historically these displaced workers are eventually retrained or resituated and the wages of the workers who employ the new technology, and total production, are ultimately increased (Autor 2014: 7–8). There is no economic law that technological change will lead to Pareto improvements that benefit everyone; there will be winners and losers with technological change, but overall the impact of technological improvements on the economy are to increase productivity and wages (Brynjolfsson and McAfee 2011: 38–39; Autor 2014: 8–9). However, there is renewed concern with the new information technology, even among some economists, because the new information technology changes so quickly and artificial intelligence may result in a fundamental change in the relationship between capital and labour (Sachs and Kotlikoff 2012). At the very least, it seems that the new information technology will lead to some serious displacement of workers across industries, a long-term reduction in middle-skilled jobs and perhaps a long-term reduction in the bargaining power of labour.

3.2 The Organization of Production under the New Information Technology and the Rise of the Global Economy

In the 1980s, the new information technology allowed for the efficient horizontal organization of firms and accelerated the rise of the global economy. Employers no longer had to be large and vertically integrated to ensure efficient production; they just had to be sufficiently wired to reliable subcontractors somewhere in the world. The 'best business practices' became those of horizontal organization, outsourcing, and subcontracting as firms concentrated on their 'core competencies'—or that portion of production or retailing that they did best (Cappelli 1999 99–100). Information technology also allowed employers to coordinate production among various plants, suppliers, and subcontractors around the world while (p. 1060) container technology made shipping even cheaper (Cap-

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pen 1999 99–100). In this economic environment, employers sought flexibility, not stability, in employment and the number of ‘contingent employees’ who work part-time, or are leased or subcontracted, reached new heights in developed economies (Belous 1995: 867). The new horizontal organization of firms broke down the administrative rules and job ladders of the internal labour market, and firms became more market driven. New technology allowed ‘bench-marking’, or checking the efficiency of a division of a firm against external suppliers, thus bringing the market inside the firm in a way employees in developed countries had not previously experienced (Cappelli 1999: 106). The new information technology also facilitated the rise of the ‘big box’ retailers to a position of unprecedented worldwide economic power. The simple bar code allowed Walmart to master inventory control, coordinate sources of product supply worldwide, and act as the retail arm for producers around the globe (Dau-Schmidt 2007: 14).

Many workers in developed countries have not fared well in the global economy of the information age. For example, although American workers of the post-war era enjoyed wage increases in proportion to the increases in their productivity, since the late 1970s the wages of American workers have remained flat despite significant increases in worker productivity (Dau-Schmidt 2011: 793). As a result of this divergence between wages and productivity or the ‘wage gap’, ‘labour’s share’ of the gross domestic product (GDP) has been declining in recent years and the distribution of income and wealth in America has become much more unequal. Since 1980, the share of non-farm domestic product going to non-supervisory employees in the form of wages and benefits has declined from 35 per cent of non-farm domestic product to just 27 per cent (Dau-Schmidt 2011: 795). This decline in labour’s share of total product has occurred in most countries around the world and in particular in developed countries (Karabarbounis and Neiman 2013). Of course as labour’s share of GDP has declined, the shares that are paid to capital and management have increased.

Economists have identified several ways in which the new information technology promotes higher relative payments to capital and lower relative payments to labour. First the new information technology has made investment goods cheaper and more productive and so encouraged producers to buy more of them substituting capital for labour in the production process (Karabarbounis and Neiman 2013). Karabarbounis and Neiman estimate that this effect accounts for about half of the observed decline in labour’s share (2014). Second, by globalizing the economy, the new information technology has thrown workers in developed countries into competition with low-wage workers across the globe, lowering the wages and benefits that these workers can demand and raising the payment that capital can now demand (Dau-Schmidt 2007: 913–914). Even simple international trade models predict that when high-wage, high-capital countries trade with low-wage, low-capital countries, the result will be decreased wages in the high-wage country and (p. 1061) increased payments for capital which is now in greater demand (Feenstra 2004; Tsaganea 2014). With the entry of Eastern Europe, Russia, China, and India into the global economy, this downward pressure on wages and upward pressure on payments to capital from international trade became even more pronounced because their entry almost doubled the relevant global labour force from 3.3 billion to 6 billion while providing little

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increase in relevant capital (Freeman 2007: 128–140). Finally, Thomas Piketty has provided empirical evidence that the post-war period from 1945 to 1980 was exceptional with respect to the share of GDP that was paid to labour because much of the world's capital had been destroyed in two world wars and labour was relatively scarce (2014: 356). By Piketty's account, we are now returning to a more 'normal' period in the economic history of capitalism in which the returns to capital exceed the economic growth rate and wealth becomes increasingly concentrated in the hands of a few (2014: 356).

Economists have also argued that the new information technology promotes higher relative payments to innovators and managers, and lower relative payments to labour, because it allows the replication of innovations on a massive scale converting many markets from ordinary markets into ones in which compensation for a few 'superstars' dominates (Brynjolfsson and McAfee 2011: 42–44). Just as the new information technology allows music to be recorded and distributed on a national or international basis, so too the technology allows processes and management strategies to be replicated across international firms or industries magnifying the value of these performances and allowing a few top performers or innovators to reap previously unimaginable rewards (Brynjolfsson and McAfee 2011: 1–11). Although it is probably true that the new information technology has helped to raise CEO pay in developed countries for large companies that reap the benefits of replication, American CEOs enjoy pay well above competitive levels in the global economy due to agency problems in the organization of American firms and the short-term manipulation of stock prices for the benefit of management compensation (Dau-Schmidt 2011).

The new information technology has also led to greater income inequality among workers in developed countries because it tends to eliminate middle-skilled/-paid jobs while creating low-skilled/-paid jobs and high-skilled/-paid jobs (Autor 2014: 10). Recall that, although computers can perform many repetitive 'routine tasks', thus reducing the number of middle-skilled workers needed to perform those tasks, computers have trouble facilitating low-skilled 'manual tasks' that require situational adaptability, visual, and language recognition, or in-person interactions, and high-skilled 'abstract tasks', that require problem-solving, intuition, creativity, or persuasion (Autor, Levy, and Murnane 2003: 1279; Autor, Katz, and Kearney 2006; Autor 2014: 11). A large body of international empirical evidence confirms that adoption of the new information technology produces 'job polarization', in that the jobs that disappear are disproportionately middle-skilled/-paid jobs while the types of jobs that continue to grow are low-skilled/-paid and high-skilled/-paid jobs

(p. 1062) (Autor, Katz, and Kearney 2006; Brynjolfsson and McAfee 2011: 50; Autor 2014: 10). High-skilled jobs have the added advantage that highly skilled workers tend to work as complements to the new information technology so that their productivity and wages can increase with its adoption (Autor 2014: 10). Middle-skilled jobs were hit particularly hard during the Great Recession of 2007 with many formerly middle-skilled workers falling into the low-skilled labour market to further depress wages there (Autor 2014: 18). The middle-skilled workers who suffered this fate were disproportionately men who did not enjoy the same opportunities for educational advancement as their female colleagues (Autor 2014: 14). The low-skilled jobs that remain and grow in developed countries have

the advantage that most of them are service jobs that cannot be outsourced to other countries (Autor 2014: 11). Unfortunately, they still suffer downward pressure on wages and benefits and more and more workers who previously would have been middle-skilled workers fall into the low-skilled labour market.

3.3 Reimagining Collective Bargaining in the Information Age

The new methods of production in the information age strain many of the traditional concepts of collective bargaining. For example, in the United States, under the NLRA, the old definitions of who is an employee, who is an employer, and what constitutes an appropriate bargaining unit have all become increasingly irrelevant for the purposes of determining the parties that can usefully negotiate together to determine the terms and conditions of employment. Workers may labour as temporary workers, subcontractors, subcontracted workers, or employees of a subcontracting employer when the real economic power in the relationship resides with a 'third party' producer or retailer (Harper 1998). The decentralized decision-making in the new economic environment poses a particular problem for the definition of employees and employers under the NLRA due to the Supreme Court's broad interpretation of the supervisory and managerial employee exceptions (Yeshiva 1980;¹Oakwood 2006).² The definition of an appropriate bargaining unit has lost meaning not only because it is based on outdated definitions of who is an employer and who is an employee, but also because it assumes a relationship among employees in one or more physical locations that may not be true in the 'workplace' of the new information technology (Malin and Perritt: 13–21). What is the appropriate bargaining unit for employees who never gather in one physical space and may never meet or even see each other? Finally, our interpretation of the NLRA has to deal with the use of the new information technology itself. Should workers have access to the work email of their fellow employees for the purposes of organizing and collective action and, if so, under what terms? (Malin and Perritt: 37) Can employers regulate (p. 1063) employees' use of social media to air complaints about their jobs? To what extent will government regulators use the new information technology to conduct and speed elections and administrative proceedings? (Malin and Perritt: 60)

In the United States, the Board has begun to address some of these issues and interpret the NLRA as being consistent with its purpose of fostering collective bargaining. As early as 2000, the Board began to take account of the new multi-employer production methods of the information age. In the *Sturgis* decision, it recognized a bargaining unit 'composed of employees who are jointly employed by a user employer and a supplier employer, and employees who are solely employed by the user employer' (*MB Sturgis* 2000). This precedent was short-lived, however, as a later Board overturned *Sturgis* in the 2004 *H.S. Care* case where the Board held that 'units of solely and jointly employed employees are multi-employer units and are statutorily permissible only with the parties' consent' (*H.S. Care* 2004). However, recently, the Board has shown interest in reinvigorating the joint employer doctrine with its invitation for amicus briefs in the *Browning-Ferris Industries* case (*Browning-Ferris* 2013) and its recent efforts to hold the McDonald's Corporation and its franchises liable as joint employers (Crain's 2014; Spandorf 2014). Recognition that firms

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now commonly conduct production with multiple employers in a single enterprise, making joint or interconnected decisions concerning the terms and conditions of employment is necessary for the traditional model of collective bargaining to be successful in the new economic environment. Without such recognition, Board precedent will confine the NLRA's affirmative duty to collectively bargain to subsets of employees and employers within the enterprise who have no effective control over the terms and conditions of employment.

The Board has also recently considered whether employee communications concerning their job through electronic social media are protected under the NLRA. In 2011, the Board's General Counsel began circulating a series of reports discussing the application of the NLRA to employee comments on social media (NLRB 2015b). The reports discussed particular cases and made it clear that, in the General Counsel's opinion, the NLRA offered similar protection for employee communication regardless of whether that communication was made in person or through social media (NLRB 2015b). Accordingly, the reports suggested that employers should not make general policies discouraging employee comments on social media that are protected concerted activity or punish employees for electronic posts that constitute concerted activity (NLRB 2015b). In 2012, the Board confirmed the thrust of the General Counsel's reports and held that employee comments on Facebook that constituted 'concerted activity'³ enjoyed the same protection under the NLRA as similar in-person employee communications—*Hispanics United of Buffalo, Inc.* (2012). As with all protection of concerted activity under the NLRA, these protections apply whether or not the employees are organized. Generally speaking, there is protected concerted activity when two or more employees act together to improve their terms and conditions of employment through mutual discussions or (p. 1064) by addressing concerns to the employer (Meyers 1984). However, NLRA protection does not extend to 'mere griping' unrelated to concerted activity (Karl 2012).

Finally, the Board has made progress in guaranteeing employees' right to use modern information technology in the exercise of Section 7 rights and the conduct of representation elections. Just last year in *Purple Communications, Inc.*, the Board held that employees who have already been granted access to their employer's email system for work purposes have a presumptive right to use that system to engage in Section 7-protected communications and that the employer may rebut this presumption only by demonstrating special circumstances that make a ban on non-business use of the system necessary to maintain production or discipline among its employees (Purple 2013). Although the opinion applied only to email, the Board hinted at the possible extension of the holding to other types of electronic communication (Purple 2013; Sloan and Park 2014). The Board has also adopted new rules for representation elections that employ the new information technology. Not only can the parties now file and transmit documents electronically in these proceedings, but the employer is now required to give the union the email addresses and phone numbers of the employees who are eligible for the unit election as part of the 'Excelsior List' so that the union can use modern methods of communication to communicate with prospective voters (NLRB 2015a).

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Regardless of the form or interpretation of the law, it is not clear that the traditional system of collective bargaining will be as successful in the new information age as it was in the industrial age either in terms of fostering employee organization or producing higher wages and benefits. In the new economy, employees have less long-term interest in the job and thus less incentive to organize a particular employer. Why should employees incur the risks and costs of organizing a particular employer when they may well be working for a different employer next year? (Dau-Schmidt 2007: 916). Employers are more concerned with ensuring low prices and flexibility in production than with maintaining production or a stable workforce. As a result, employers are more inclined to resist employee organization and take advantage of the many strategies for delay and intimidation available under the current law (Dau-Schmidt 2007: 916). The global economy of the information age places workers in developed countries in competition with low-wage workers across the globe putting constant downward pressure on wages and benefits, making it hard for unions to deliver through collective bargaining (Dau-Schmidt 2007: 917). Finally, in the new economic environment, employers strive to maintain flexibility in production and employment and to resist the promises of job security, seniority, and benefits that employers once used to bind employees to their jobs. With the decline of the internal labour market and the rise of a market-driven workforce, there are fewer managerial rules for unions to help determine and administer, and thus less responsibilities for unions to perform through traditional collective bargaining (Dau-Schmidt 2007: 917).

(p. 1065) 3.4 Things to Come? The Brave New World of Employment Using the New Information Technology

The new information technology has already brought enormous change to the employment relationship, but many are predicting even larger changes as the pace of technological advance accelerates. Recall that computer hardware and software have been improving at an exponential rate (Brynjolfsson and McAfee 2011: 18–19). As great as the changes and impact of this technology have been in the last 40 years, the changes of the next 40 years will be even greater. What might this mean for the employment relationship and the regulation of this relationship?

Most economists tend to be moderate in their predictions regarding the future impact of the new information technology on employment. They argue that we should resist believing in the ‘lump labour fallacy’ that the demand for labour in the economy is fixed and will decrease as jobs are automated (Autor 2014: 2). Although some workers will lose their jobs to computers, in the long-run they will find other jobs producing other goods and services where their work is needed, perhaps in a new job created by the new information technology (Autor 2014: 38). They point out that, like other labour-saving technologies, the new information technology is both a substitute and a complement for labour. Some workers will keep their jobs, or find new jobs, and find their productivity and wages enhanced because of the technology (Autor 2014: 16). In support of this argument they point to historical examples of new highly useful, but disruptive, technology such as the steam engine, electricity, and the assembly line (Ford 2009: 135). These economists acknowledge that the dislocations will be hard for individual workers and require

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investment in retraining, but they argue these dislocations are inevitable. The economists also acknowledge that there is no guarantee that all workers will benefit from the new information technology (Brynjolfsson and McAfee 2011: 38–39; Autor 2014: 8–10). There will be winners, such as the high-skilled workers whose productivity is increased by the new information technology, and losers, such as the middle-skilled workers who lose their jobs and fall down into the low-skilled/-paid job market. They also acknowledge that the new information technology has so far made the distribution of income and wealth less equal in our society by increasing rewards to capital and innovators and some high-skilled workers and lowering rewards for middle-/low-skilled workers (Autor 2014: 23).⁴ Some acknowledge that increased inequality may sap our economy's vitality by undermining middle-class consumers—the true job creators of developed economies (Stiglitz 2011). In response to those who say the new information technology is different and will eventually replace a good portion of the workforce, the traditional economist's response is that there are always some tasks—creativity, flexibility, common sense—at which humans will have an advantage over computers (Autor 2014: 11). People's tacit knowledge in solving a problem (p. 1066) or performing a task is always greater than their explicit knowledge and this tacit knowledge cannot be reduced to a computer program (Autor 2014: 1). As a result, they argue that we will never be replaced en masse by the machine.

However, the 'technologists' have been much more alarmist in their predictions, arguing that the new information technology is evolving more quickly than past technologies, and is different in character, heralding a fundamental change in the relationship between labour and capital. They argue that the rate of technological change of the new information technology is much faster than previous technologies and this will make it much harder for people to keep up with technological changes in their work (Kurzweil 2000; Ford 2009: 100; Brynjolfsson and McAfee 2011: 9–11). The new information technology threatens massive dislocation of workers in some industries. For example, the new driverless car threatens to dislocate many of the two million truck and taxi drivers in the shipping and transportation industries within the next 20 years (Brynjolfsson and McAfee 2011: 14; Mui 2013: pt 3). Frey and Osbourne have estimated that 47 per cent of the American workforce will be subject to automation within the next 20 years including jobs in transportation, logistics, production labour, construction, administrative support, various sales, and service clerk positions (Frey and Osborne 2013; Dashevsky 2014). Some technologists worry that the increasing inequality of income wrought by the new information technology will undermine the vitality of our economy because many workers will not be able to buy the goods that are produced (Ford 2009: 17–20; Brynjolfsson and McAfee 2011: 48–49).⁵ Others worry that the increasing inequality of wealth will keep the growing number of low-skilled/-wage workers from investing in the education necessary to advance to high-skilled/-paid jobs and benefit from the new information technology (Sachs and Kotlikoff 2012). Technologists also argue that the nature of the new information technology is different from that of previous technologies in that properly programmed computers can use their enormous storage, retrieval, and computational skills to effectuate 'artificial intelligence' allowing them to perform, or learn to perform, many of the 'abstract tasks' that have previously been performed by humans (Ford 2009: 97–100). The

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ability of computers to replace humans in so many tasks may bring about a new relationship between capital and labour in which labour is superfluous to many production processes. Some technologists foresee a time when only a small sector of the population needs to work, requiring us to rethink our work-based economic and social structures (Ford 2009: 100–103).

Even if the starkest predictions of the technologists are tempered by the more optimistic reasoning of the economists, it seems certain that the new information technology will cause enormous changes in the economy and the employment relationship in the years to come. The technology has already reformulated the way we undertake production, displaced scores of employees and made scores of others more productive. Whether or not computers will actually be made that can replace human intelligence, it seems certain that at the margins it will become harder and (p. 1067) harder for humans to adapt to this technology increasing displacement and retraining costs and shortening useful work lives. At the margins, it seems likely that this technology will make some people in our society much more productive, but also increase the proportion of our society who have trouble eking out enough pay to maintain themselves, and perhaps raise and educate children, over the course of their useful work life.

In this brave new world, organized labour and policymakers will have to strive mightily to keep the traditional system of collective bargaining relevant in addressing the problems and concerns of workers. New information technology will pose new challenges to the definition of the basic terms of labour and employment law; for example, whether the task-based workers of the ‘sharing economy’, such as Uber drivers, are employees covered by protective legislation or independent contractors or casual employees excepted from protection. The middle-skilled/-paid workers who have been the bedrock of the labour movement in most industrialized countries are in decline and, at the very least, unions, and policymakers will have to work to accommodate legal doctrine and processes to organization and collective bargaining by more low-skilled or high-skilled workers to keep collective bargaining relevant in the new economy. There has recently been an increase in collective activity among low-skilled workers in the American economy as they come to see their position in the low-skilled market as long-term rather than temporary, although this collective activity has taken the form of strategic national protests like ‘Our Walmart’ or the McDonald’s worker campaign, rather than traditional collective bargaining. The collective action of these workers is clearly protected by the NLRA, even though they are not yet formally represented by a union. There is evidence that these protests are having an effect as national firms, including Walmart, Target, and McDonald’s, have recently announced significant raises for their lowest-paid employees. There has even been some interest in organization among high-skilled workers as they transition from independent professionals to employees in large corporations.

There will be no shortage of needs among the workers in the new economy. They will need: subsidized education and retraining that allows them to work as complements to the new information technology, health insurance to cover the health costs that are too large for an individual to bear, income insurance to see them through periods of disloca-

tion and retraining, perhaps a subsidized pension to maintain them after their useful work lives are over, and perhaps even a guaranteed minimum income. If these cannot be obtained through individual or collective bargaining, there will almost certainly be action on one or more of these issues in future legislatures. Of course, organized labour is useful not only for collective bargaining but also for representing workers' interests in the legislature. Perhaps preserving the voice of workers in social and political discourses will be the biggest challenge for organized labour and policymakers in the future.

(p. 1068) 4. Conclusion

The new information technology has wrought enormous change in the employment relationship—with much bigger changes yet to come. With the rise of this technology, developed countries have transitioned from industrial economies dominated by large vertically integrated firms and long-term employment to economies in which firms are more often organized horizontally with trading partners and suppliers around the world and in which the employment relationship has become much more transitory. This transition of the method of production has caused employers to become much more market driven, seeking flexibility in employment and the minimization of firm administrative rules and benefits. The transition has also undermined employee and union bargaining power. The new information technology promises further change as the pace of automation quickens and technologists develop computer 'artificial intelligence'. This automation promises greater productivity for some workers but also threatens massive dislocations of labour, particularly middle-skilled labour, and perhaps even a fundamental change in the relationship between capital and labour. Even if the direst predictions of technologists do not occur, it seems likely that further adoption of the information technology will increase income inequality and cause substantial dislocation of labour, shortening useful work lives and requiring increased investment in retraining.

Policymakers must endeavour to draft and interpret protective legislation and the laws governing collective bargaining in light of these changed circumstances in order to adequately protect workers in the global economy of the information age. Policymakers will have to broaden the key concepts of the labour and employment law, in particular the definitions of who is an 'employee', who is their 'employer', and what is an 'appropriate bargaining unit', in light of the changed organization of production. They must also decide how to incorporate the new information technology into their doctrines of union access and employee concerted activity. In the United States, the National Labor Relations Board has already begun some of this work with its reconsideration of the joint employer doctrine in *Browning-Ferris Industries Inc.* and its grant of a presumptive right of employee access to company email for the purposes of concerted action in *Purple Communications, Inc.* If the adoption of the new information technology continues to undermine the bargaining power of employees and unions in the workplace, employees will have to rely more on legislation to address their needs. Those needs will be many, including public education and retraining programmes, job creation programmes, healthcare, and retirement programmes, and perhaps a guaranteed minimum income. The new information

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technology holds great promise to further the 'creative destruction' that Joseph Schumpeter identified as essential to capitalism. It will require careful planning to help workers benefit from the 'creative' aspects of this technology and minimize its 'destructive' effects. (p. 1069)

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Notes:

(1.) According to *Yeshiva*, managerial employees are those who are either closely aligned with management or who formulate or effectuate managerial policies for the company, *National Labor Relations Board v Yeshiva University* [1980] USSC, 444 US 672 (USSC); see also *Pacific Lutheran University* [2014] NLRB, 361 NLRB No 157 (NLRB) narrowly reading *Yeshiva*.

(2.) This case defined a 'supervisor' as 'anyone who holds authority to exercise independent judgment in performing at least one of twelve specified supervisory functions on a regular basis and such exercise constitutes at least 10-15% of their total work time' *Oakwood Healthcare, Inc* [2006] NLRB, 348 NLRB 686 (NLRB).

(3.) For a discussion of speech that constitute concerted activity, see *Meyers Industries, Inc.* [1984] NLRB, 268 NLRB 493 (NLRB).

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(4.) Among the economists there is at least one pessimist. Tyler Cohen predicts that these technology driven changes in the distribution of income will result in the division of the population into two groups: a small wealthy aristocracy of highly educated workers who are capable of working collaboratively with automated systems; and a much larger group of workers who earn little or nothing, surviving on low-priced goods created by the first group, living in shantytowns (Cowen 2013).

(5.) While touring a robotic assembly line with UAW President Walter Reuther, Henry Ford II is alleged to have asked 'Walter, how will you get these robots to pay UAW dues?' to which Reuther responded 'Henry, how are you going to get them to buy cars?' (Brynjolfsson and McAfee 2011: 49).

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Crime, Security, and Information Communication Technologies: The Changing Cybersecurity Threat Landscape and its Implications for Regulation and Policing



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Abstract and Keywords

Networked digital technologies have transformed crime to a point that ‘cybercrime’ is here to stay. In the future, society will be forced to respond to a broad variety of networked crimes that will increase both the complexity of crime investigation and prevention, whilst also deepening the regulative challenges. As cybercrime has become an inescapable feature of the Internet landscape, constructive management and system development to mitigate cybercrime threats and harms are imperatives. This chapter explores the changing cybersecurity threat landscape and its implications for regulation and policing. It considers how networked and digital technologies have affected society and crime; it identifies how the cybersecurity threat and crime landscape have changed and considers how digital technologies affect our ability to regulate them. It also suggests how we might understand cybercrime before outlining both the technological developments that will drive future cybercrime and also the consequences of failing to respond to those changes.

Keywords: cybercrime, Internet crimes, policing cybercrimes, information communications technologies, hacking, data theft

1. Introduction

CONTEMPORARY media headlines about cybercrime boldly suggest that we are still coming to terms with the Internet a quarter of a century or so on from its introduction.¹ Yet, we have actually come far since those early years, at least in terms of understanding the Internet’s ill effects and how to respond to them. During the Internet’s early years many apocalyptic predictions were made about cybercrime (p. 1076) without any real evidence of it actually happening on the scales predicted (Wall 2008). We knew, for example, all about cybercrime long before we had really experienced any and our understanding of

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the issues were largely shaped by, what were effectively, the equivalent of ‘weather reports from umbrella salesmen’ (Wall 2008: 53). In other words, without any contemporary counterfactual information, the emerging cybersecurity industry and others used fear as a marketing tool to increase sales of their products, which raises important epistemological questions about how we understand the reality, or realities, of cybercrime. We will return to this question later.

In terms of predicted threats, the jury is still out on Y2K and contemporary security concerns (Bilton 2009) and whether or not the many billions of dollars, pounds, euros or roubles spent on preventative measures was a wise investment, or just an over-reaction to an unknown risk. What is certain is that some of those early predictions about the invasiveness and impact of cybercrime are now being realized and have become part of our everyday reality. As the Internet continues to permeate almost every aspect of our everyday life, so the opportunities for cybercrime grow, often mimicking developments in online e-commerce. But the impacts of online activity often appear contradictory and sometimes unexpected; for example, the scale of the impact of social network media was not anticipated a decade ago and nor were its good or bad consequences. Social Network Media evils, such as sexting, bullying, and the resultant suicides, deceptions and so on, are well reported, but headlines trumpeting the Internet’s contribution to the positive well-being of millions of people or its ‘civilising’ effect are largely absent from the news.² Knowing about cybercrime is one thing, but responding constructively to that knowledge is another.

As the growth of criminal opportunities relating to digital and networked technologies continues, then so do the regulatory challenges for law, industry, police, and the courts. One of those challenges lies in managing public expectations of security to keep them in line with the levels of protection that police and government can realistically deliver. The ability of police and government to manage those expectations is important because the police, as upholders of law and gatekeepers to the justice system not only have to respond to reported victimizations, but how they do so is also increasingly important. This is because the politics of policing cybercrime is almost as important as the policing process itself. Furthermore, not only are policing agencies having to respond to public demands to act, but very often the laws they use are either outdated, mis-applied, or not yet formed—see, for example, the three case studies mentioned later in this chapter. Case studies which highlight that Police agencies cannot respond to cybercrimes alone and it is arguable that they should not do so where the solution or resolution cuts across criminal justice and other agencies. Yet a potential paradox emerges whereby on the one hand it could be counter-productive to involve the police as the sole agency involved in dealing with some of the more minor types of cybercrimes because they lack (p. 1077) financial and human resources to deal with the increased volume of crime. Yet, not involving the police would leave judges out of the equation with a detrimental effect on interpretations of the common law developments relating to cybercrime. This is because police decisions over what to investigate are increasingly important factors in the subsequent decisions over whether to prosecute or not and filter what goes before the court. For these reasons, together with the need for transparency and oversight, police agencies must develop col-

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laborative models with other key stakeholders, such as the financial industries and telecommunications service providers. Such models are not only counterintuitive to traditional police organizational cultures (see Reiner 2010), but they will have to go way beyond being merely collaborative. Any new partnerships will have to be co-productional in order to create a USP (unique selling point) in terms of new intelligent security products and norms.

This reflective essay draws upon 20 years of experience (from Wall 1997 onwards) in researching and commentating upon the developing area of crime and technology. It also encompasses recent research conducted for the RCUK Global Uncertainties programme³ to consider how networked and digital communication technologies have changed, and are continuing to change,⁴ the world in terms of crime and expectations of security. The chapter looks, firstly, at the impact of networked and digital technologies upon society and crime. The second section specifically examines how the cybersecurity threat and crime landscape have changed. The third section considers how digital technologies are affecting the ability to regulate them and the corresponding challenges for law and its enforcement. The next section explores what cybercrime is and how we understand it. Section five describes the technological developments that will likely impact upon the regulation of cybercrime over the next five to ten years, and section six reflects upon the consequences if we fail to respond to these changes. The final section concludes with some ideas about what needs to be done, and how.

2. How have Network and Digital Technologies Transformed Criminal Behaviour Online?

In three significant ways, digital and networked, technologies have brought about a fundamental transformation of social behaviour across the networks they create. They have caused it to become *global*, *informational*, and *distributed* (see further Castells 2000). The same technologies have also transformed criminal behaviour in much the same ways, although to achieve different ends (Wall 2007). (p. 1078) Firstly, network technologies not only globalize the communication of information, ideas, and desires, but they also impact locally by causing a 'glocalizing' effect—the global impact upon local policing services. For example, a new type of scam committed by offenders in one country upon victims in another will create the need to expand the capacity of their local police to deal with that crime—as was the case with pyramid scams committed by offenders in the UK upon victims in South America.⁵ Secondly, network technologies create the potential for new types of asymmetric relationships where one offender can victimize many individuals across the planet at the same time. Thirdly, network technologies and associated social network media are creating new forms of networked and non-physical social relationships that act as the source of new criminal opportunities (Wall 2007; 2013). Such opportunities lead to emerging crimes such as stalking, grooming, bullying, fraud, sexting, and sextortion,⁶ etc.—forms of offending that challenge law and its procedures. The upshot is that crime can now be simultaneously panoptic and synoptic in that a few offenders can not only victim-

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ize the many, but the many can also victimize the few; especially in cases involving social network media crime. Cybercrime can be committed at a distance, much more quickly, and in much greater volume than offline crime and this 'cyber-lift' marks out the fundamental differences between the two.

New forms of criminal opportunity are being created that are also changing the way that crime is taking place. Criminal labour—because committing crime is a form of labour—is rapidly becoming deskilled and reskilled simultaneously by the networked and digital technologies (see arguments in Wall 2007: 42); in much the same way that everyday work has become rationalized via process a process of automating labour. In terms of criminal labour, one person can now control a complete crime process, such as a robbery which once required many people with a range of criminal skills. Furthermore, the entry level skills of cybercrime have fallen because crime technologies have become so automated that malware can now operate by itself, or be rented, or be bought off the shelf via crime-ware-as-a-service (Sood and Enbody 2013; Wall 2015a). The 'technology' used has effectively 'disappeared' in that its operation is now intuitive and offenders no longer require the specialist programming skills they once did. Another significant development has been the drop in the cost of technologies, which has dramatically reduced the start-up costs of crime, thus increasing the level of incentive, especially with the advent of cloud technologies (see later).

Put in more simplistic terms, networked and digital technologies create an environment in which there is no need for criminals to commit a large crime at great risk to themselves anymore, because one person can now commit many small crimes with lesser risk to themselves. The modern day equivalent of the bank robber can, for example, contemplate committing 50m £1 low-risk thefts themselves from the comfort and safety of their own home, rather than commit a single £50m robbery with its complex collection of criminal skill sets and high levels of personal (p. 1079) risk (Wall 2007: 3, 70). The impact of these transformations upon crime is that the average person can, in theory, now commit many crimes simultaneously in ways not previously imagined possible, and on a global scale. If not a bank robbery, then they can commit a major hack, a DDOS (Distributed Denial of Service)⁷ attack (De Villiers 2006), a hate speech campaign, or suite of frauds; see for example, the case of Lomas who scammed 10,000 victims out of £21m (BBC 2015a) or the 15-year-old TalkTalk hacker who (with others) allegedly hacked the TalkTalk database and stole personal information on 1.2 million customers (Wall 2015b; BBC 2015c). The fact that one or two people can now control whole criminal processes has profound implications for our understanding of the organization of cybercrime. In a rather cynical way, the Internet has effectively democratized crimes such as fraud that were once seen as the crimes of the powerful and the privileged. There is, however, an underlying and almost ideological (mis)assumption that a new Internet mafia is forming (Wall 2015a). As mentioned earlier, all crime is organized in one way or another, but all crime is not 'organized crime', so we need to briefly understand how cybercrime differs from other crimes, but firstly we need to look at the Cyberthreat landscape.

3. How has Network and Digital Technology Changed the Cyberthreat Landscape?

Two and a half decades since the birth of the Internet, it is clear that the cybersecurity threat landscape has changed considerably as networked technologies have progressively transformed the way that online crime is organized. These threats have been further escalated in recent years as cybercrime has become more professional (see, for example, the case of Stuxnet⁸) and stealthier via Rootkit⁹ malware, such as Zeus¹⁰ and the BEE-BONE Botnet¹¹ (Robot networks) (Simmons 2015). In this post-script kiddie¹² world, the offenders no longer want to be known or even admired as they once did. Cybercrimes have also become more automated, for example, Ransomware¹³ and Fake AV,¹⁴ and larger, as recent distributed denial of service (DDOS) attacks illustrate. They have also become more complex with the maturing of social network media and the crime potential of Cloud technologies which increase computing power, storage space, and reduce overall costs.¹⁵ Furthermore, these trends are compounded by emerging networked technologies that are currently being planned or in progress (see later). Before looking at how we can understand the many accounts of cybercrime, it is important to also look briefly at the (p. 1080) ways that the same technologies that create criminal opportunity can also assist police public service and criminal justice delivery.

3.1 Regulating and Policing: How are Technologies Helping?

The same technologies that are transforming crime are also transforming policing, which is the gateway to the criminal justice system – a factor often forgotten. Not only can these technologies help police investigate and catch criminals, but they can also help victims report their victimization and help police to respond to victims, especially if no further police action is to be taken. Or they enable victims to be referred to another agency, for example, the UK Action Fraud National reporting site which takes reports of economic and certain types of cybercrime.

In addition to the above, Social network media can not only help police and other agencies engage with the public to communicate outwards, but they can also help capture essential specialist community knowledge even encouraging community sleuthing in support of police. The same technologies also help increase police accountability to the public, the police profession itself, and also to law (Chan 2001: 139). Furthermore, new technologies are also assisting police forces to administer their organization more effectively and help individual officer's process cases more efficiently, in greater volume and also at a distance—ironically, in much the same way that criminals commit crime. In so doing, new digital and network technologies increase individual worker accountability to police management whilst also helping to enforce the rules of the organization. The indications for the policing future is that networked technologies are causing individual UK police forces to think nationally by creating national policing norms, whilst remaining local. Yet, with a twist because there is also early evidence that policing models are developing that

are increasingly less dependent on the local police station system itself, than local online services. But, the rest of this chapter focuses upon cybercrime.

4. What is Cybercrime: How Can We Best Understand It?

The definition of cybercrime is highly contentious because everybody agrees that it exists, but not everybody agrees what it is, even after so many years (p. 1081) (Wall 2007; 2014). The following outline of cybercrime helps us understand how it is organized, but we must first separate the cybersecurity debates over risk and threats from the cybercrime debates over *actual* harms (to individuals, businesses, and nation states). These issues are often confused, yet not all threats and risks manifest themselves as harms and not all harms are crimes, but some do, so how do we make sense of them?

The 'transformation test' (Wall 2007) is one way of separating cybercrimes from non-cybercrimes. This is where the impact of networked technologies (earlier referred to as the 'Cyber-lift') is removed from the crime to see what would be left. This can be done either scientifically or metaphorically. But this process helps reflect upon how the crime was committed and the levels to which networked and digital technology have assisted the criminal behaviour. We can use this 'transformation test' to understand how crimes have been transformed in terms of their *mediation by technologies*. At one end of the spectrum is 'cyber-assisted' crime that uses the Internet in its organization and implementation, but which would still take place if the Internet was removed (e.g. murderers Googling for information about how to kill someone or dispose of the body). At the other end of the spectrum is 'cyber-dependent' crime, which exists *because* of the Internet, such as DDoS attacks or spamming.¹⁶ If the Internet (networked technology) is taken away, then the crime simply disappears. In between the cyber-assisted and cyber-dependent crime is a range of hybrid 'cyber-enabled' crime. This range of cyber-enabled crimes includes most types of frauds (but not exclusively) and are existing crimes in law, previously committed locally but are given a global reach by the Internet, see for example, Ponzi frauds and pyramid selling scheme scams. If the Internet is taken away, these crimes still happen, but at a much more localized level and they lose the global, informational, and distributed lift that is characteristic of 'cyber' (see further Wall 2005).

Once the level of mediation by technology has been established then the *modus operandi* needs to be considered. We therefore need to distinguish between 'crimes *against* the machine', such as hacking and DDOS attacks, etc., which are very different from 'crimes *using* the machine', such as fraud, etc. Both also differ from 'crimes *in* the machine', such as extreme pornography, hate speech, and social networking-originated offences, and others. Yet, the distinction between them is rarely made in practice, even though the three types of *modus operandi* each relate to different bodies of law in most modern jurisdictions. Finally, the treatment of cybercrime also needs to be differentiated by victim group. Despite similarities in 'attack type', individual victimisations are different from organizational victimisations (including businesses), who in turn are different from nation state vic-

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ties (national infrastructure) (see Wall 2005; 2014). Each involve different offender motivations and victimization tactics.

Each of these dimensions of cybercrime in terms of influence of technology, *modus operandi* and victim group have different implications for understanding the (p. 1082) nature of the victimization experience, but also differences in the types offenders and the way the cybercrimes are organized. The process of separating out the different organizing concepts of cybercrime also helps differentiate between the different debates, different impacts of technology and different types of crime. It helps our understanding of them and also reconciles different accounts of cybercrime and cybersecurity in the literature that are often presented in conflicting ways. By mapping out, say, impacts of technology on crime against *modus operandi*, by, say, different victim group, the different resources required to respond to cybercrime can be identified. The resulting matrix also helps identify the intelligence and evidential challenges and also the responsible agencies. Moreover, it can also help identify when police do or do not get involved, or pass a particular type of case on to another agency, and the following section on cybercrime statistics illustrates why this may be important.

5. Which Cybercrimes are Actually Affecting Police and the Criminal Justice System?

There has been much speculation over the years about the extent of cybercrime victimization and a considerable disparity exists between the millions of cyberthreats circulating at any one time compared to the low level of prosecution, say, for computer misuse (see for example Wall 2007: 42). Cyberthreat analyses are numerous and Semantec's 2015 Internet Security Threat Report is one useful example of many such regular reports and it has a long track record of reporting change in the threat landscape. The report identified in 2014, for example, that 500,000 web attacks are blocked daily and that 6549 new vulnerabilities were identified. Malware and ransomware attacks increased in volume 2014, with a noticeable four thousand-fold increase in crypto-ransomware attacks. McAfee estimated that the global cost and impact of cyber attacks was about \$400 billion a year (Latiff 2014). Kaspersky and others provide similar threat analyses. The problem with these threat reports is that estimates of losses in terms of numbers and costs contrast dramatically with the number of prosecutions, especially for computer misuse. In the UK, for example, approximately four hundred or so prosecutions have been made under the Computer Misuse Act 1990 in the past twenty-five years since its introduction (Wall and Cockshut 2015).

(p. 1083) 5.1 The Divide between Cybercrime Estimates and the Prosecutions

Simply put, the estimates and alleged reports of cybercrimes are often breath-taking in their claims and excite dramatic media headlines. However, these reports can be equally confusing, because they regularly conflate risks with threats, harms, and crimes, and very

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often in the way that media sources report their findings rather than the way the data is presented. The difference between each source is very important epistemologically when seeking to understand cybercrime. Whereas risks are the things that in theory *could* happen, such as the meteorite that might destroy life on earth, ‘threats’ are those risks that are in circulation at any one time, such as meteorites flying around the cosmos but not necessarily hitting anything (yet!). These risks and threats both contrast with harms and crimes, which (following the meteor analogy) actually hit something, but do not necessarily cause significant damage. In the case of crimes, however—and the meteor analogy stops here, they may either do damage that needs resolving, or in the case of inchoate crimes,¹⁷ exhibit behaviour that needs to be prevented from reoccurring. It is therefore very important to distinguish between reports relating to risk and threats; reports of harms made to the police; harms the police decide to investigate; and offenders who the Crown Prosecution Service prosecute.

The estimates that most excite the media are usually representative of threats and risks, rather than the actual harms committed against victims (unless there is a strong human interest victim story) because of their dramatic volume or novel news value. At the courts end of the criminal justice process, prosecutions are very unreliable indicators of overall crime levels as they simply represent the end of the long legal process. Also, as the above analysis of cybercrime has illustrated, there are also many different types of cybercrime other than computer misuse. Moreover, there are also many different groups of victims—individual victims, as stated earlier, are very different from business victims, and within each group are sub-groups who have different reporting practices and understandings of the harms against them. There are also different public or private sector regulators who may vary as to whether they see the resolution of the crime as public or private affair. Despite the media tendency to over-sensationalize, some cybercrime are likely to be under-reported, for example in the case of business victims, or victims of cybercrime with a sexual motivation (as they tend to be offline also). It is also the case that many computer misuse crimes are eventually prosecuted under other laws. As a rule, computer-related fraud, for example, tends to be prosecuted as fraud alone under the Fraud Act 2006 (the main offence), and any Computer Misuse Act 1990 aspect will tend to be lost from the debate or dialogue.

To reiterate, in order to understand the cybercrime issue, it is important to separate risks and threats from the actual harms. Harms are an important tipping point (p. 1084) in the justice process as they indicate when a crime begins to be experienced by the victim as a crime, rather than simply be as a technical victimization. One such example might be the receipt of a scam email where the recipient has not responded to it. It is technically an attempted fraud (an invitation to be defrauded), but unlikely in most circumstances to be either experienced or prosecuted as a fraud. So, crime has a technical state, a breach of certain legal conditions, but for it to progress through the criminal justice system it has in most circumstances to substantially harm a victim in order for it to be reported, as well as to satisfy various legal and procedural criteria in order for it to be investigated and prosecuted. These criteria include the Home Office Counting Rules,¹⁸ the Code of Practice for Criminal Procedure and Police Investigations,¹⁹ or the Code for Crown Prosecu-

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As state earlier, crimes very often described as cybercrime are technically crimes, in so far as they are a breach of the law, but for various reasons they often do not fall within the legal criteria of a crime that can be investigated and pursued through the courts.

Sometimes cybercrimes are simply *de minimis non curat lex*; too small to pursue or prosecute in the public interest, or they fall outside routine police activities, or the criteria for recording and investigating crime (Wall 2007: ch8). This is especially the case if the crime now comprises of 50 million £1 thefts instead of a £50 million bank robbery. Whilst this is a hypothetical example, the previously discussed case of Lomas (BBC 2015a) graphically illustrates a new and real dynamic to policing cybercrime, especially then need to join up the intelligence from each offence in order to identify the offender. This intelligence not only includes information about who is committing mass amounts of small victimisations, but also the various inchoate offences related to them, such as the Spamming that delivers the threat via fraudulent email—which tends to be currently ignored in most cases. In this new set of policing dynamics, intelligence and evidence become very closely intermingled.

Finally, there is the definitional question as to when a morally outlawed deviant behaviour actually becomes a crime in law, because many of the harms that concern the public are not actually computer misuse, but related to bad Internet behaviour, or breaches of what was once called ‘netiquette’. A phenomenon arises that is not unlike the ‘dog-shit syndrome’ found in research into perceptions of street safety, where people fixate upon incivilities such as dog excrement on the pavement, rather than on more serious criminal threats affecting their life and limb. This emphasis on Internet bad behaviour can be illustrated by comparing prosecutions under s. 127 of *The Communications Act 2003* with those under the *Computer Misuse Act 1990* since 1990. Between 2004 and 2015 there were 21,320²¹ s.127 prosecutions: a considerable contrast to the very small number of computer misuse prosecutions (four hundred over twenty-five years). The finding suggests that police are responding to increased demands to resolve Social Network Media behaviours and online communications issues, rather than offences under the Computer Misuse Act 1990. The following three case studies each explore the types of crimes regularly being found in the police workload today.

(p. 1085) 5.1.1 Facebook and Flirting

The first case study is reminiscent of the Twitter Joke Trial (*DPP v Chambers*)²² and relates to s127 of the Communications Act 2003 and Internet threats. About five years ago a teenaged girl posted on Facebook a holiday picture of herself coming out of the sea wearing a bikini with the text, ‘What do you think boys?’ ‘Fxxxing gorgeous’, came the reply from her 15-year-old boyfriend’s best mate, and a flirty, but witty, banter followed. Jealous, her boyfriend told his best mate to ‘back off’ and a bad-tempered exchange ensued. The boyfriend angrily said (to his, now former best mate) that if he said it again he would hunt him down and kill him—actually paraphrasing Liam Neeson’s speech in the 2008 Pierre Morel-directed film, *Taken*. The former best mate’s parents saw the exchange and, concerned for his safety, mentioned it to his teacher, who did not know what to do.

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She referred it to the head of year, and the situation worked its way up to the school's management hierarchy to the headmaster, who also did not know what to do. He asked the local police liaison officer, who asked the Crown Prosecution Service for advice. They considered the words 'I will kill you' to be of a menacing character and a clear contravention of s. 127(1a) of the Communications Act 2003. The police arrested the boyfriend, now deemed a potential killer, with force and seized his computers. In the following investigation the case then started to unravel and fall apart and became very public; the boyfriend was clearly not a killer and when he refused to accept a caution the case was dropped.

5.1.2 Snapchat and 'Sexting'

The second case study was reported by the BBC (2015b) and involved a 14-year-old boy sending a naked photograph of himself via the smartphone application Snapchat to a girl at his school. Snapchat deletes pictures after ten seconds, but the recipient managed to save the picture within that period and sent it on to her school friends. The picture was brought to the attention of the school liaison officer and although no charges were brought it was officially recorded as a crime and the details of both the sender and recipient placed on a police intelligence database. They could be stored for up to ten years and disclosed in a criminal records check. If the original sender of the image had been over eighteen years of age, the boy would have been the victim of 'revenge porn' and the girl who distributed the image prosecuted. Interviewed by the press, the boy's mother said that her son has been 'humiliated' for being 'at best naive' and at worst, just being 'a teenager'. What the case identified was that many young people now take part in so-called 'sexting' as a form of flirting (BBC 2015b). It is a form of behaviour that has become part of 'a new normal' and which requires much more understanding by the older generation and the authorities.

5.1.3 The TalkTalk Hack

The third case study is the 2015 TalkTalk data hack²³ and theft which sparked off a media frenzy and raised questions as to whether the culprit could receive a fair trial (p. 1086) and also whether the proportionality of justice normally found in the courts could ever be applied. In the aftermath of the TalkTalk 'attack' there seemed to be endless, yet information-less hand-wringing apologies from the company's CEO who repeatedly painted a picture of the company as an innocent victim. In the media stampede that followed various pundits liberally speculated over potential terrorist involvement, vast financial losses and an impending cybercrime tsunami. Then apocalyptic warnings followed from the business community and the commissioning of Government enquiries. Additionally, there were many media reports of customers losing money through secondary victimization to opportunist fraud. Quite independent of the data hackers, fraudsters made random phone calls purporting to be from TalkTalk and asking 'victim' subscribers to change their login details over the phone whilst confirming their payments for a refund or discount—therefore giving away their personal financial information. These events confirmed many folk myths about cybercrime and escalated the culture of fear around cybercrime (see Wall 2015b). And then there was an anti-climax following the sudden arrest of a 15-year-old boy from

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Northern Ireland who presumably masterminded this heinous international crime from his bedroom and two 16-year-olds and a 20-year-old in connection with the case. Subsequently bailed, the 15 year old and accomplices were alleged to have hacked into the Internet service provider by using a DDoS attack as a smokescreen to hide an SQL injection in order to steal data containing information about four million or so TalkTalk customers (the actual number varies according to different reports). Not only do DDoS attacks fall under s36(3) of the Police and Justice Act 2006, but the way the data was stolen also contravenes s1(1) and s1(3) of the Computer Misuse Act 1990; so in this case, the law was very clear as to the crime. The hackers are then alleged to have contacted TalkTalk to ransom the data for about £80,000,²⁴ presumably threatening to release or sell the data if the ransom demand was not paid. The Metropolitan Police Cybercrime Unit (FALCON) tracked them down and arrested them before the data could be released or sold on. FALCON also confirmed that although some personal information could have been stolen, credit and debit card numbers had not been taken.

In fact, much of the initial speculation about the hack turned out to be unfounded and the whole affair began to look rather amateurish. But not before the backlash. More enquiries were announced and embarrassing questions asked about where TalkTalk's security people were at the time and exactly what was learned from TalkTalk's two previous attacks? Were they being fair to their customers? But the elephant in the room was the question over how could a 15-year-old and his 16- and 20-year-old associates could commit such serious crimes and cause so much damage from their bedrooms, simply 'because they could' and not because of a deeper criminal motive. In explaining his actions to Magistrates, one of the hackers said: 'I didn't think of the consequences at the time. I was just showing off to my mates' (BBC 2016). So, the answer to this question about how they could cause such damage lies in the earlier analysis of the how the Internet changes criminal behaviour by (p. 1087) providing new opportunities for crime at a distance, at speed, and in great volume (Wall 2015b). The answer to 'why' in this case may be much simpler.

5.1.4 Deciphering the Threat of Cybercrime

Each of the three cases mentioned above raises some very important questions about the role of police and authority today in dealing with disputes and issues arising from the internet and social network media. None are particularly unusual, but each present Police agencies with a new set of circumstances that fall outside their normal routine activities. In the threats and sexting cases, there are questions about whether police should have become involved so directly. There are also important questions about the responsibilities of the other parties involved. Did the parents over react? Were the teachers over-cautious or under-informed, or both? Did the prosecution lawyers consider the full context of the cases in their assessment of criminal responsibility? Did the police over-react because of pressure from parents or teachers? In the TalkTalk case, however, almost the opposite questions could be asked: were the parents under-cautious? Should they, or the teachers, have picked up warning signs, or involved police earlier? And the question common to all three cases is whether or not the authorities involved fully understood the nature of, what

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is, apparently 'normal' teenage behaviour around the use of networked and mobile devices, a point raised earlier. All things seem to point here to the increasing importance of mainstreaming cybercrime in policing and, for example, developing roles like the police school liaison officer as key players in the resolution of cybercrime, rather than just developing specialist cybercrime units.

5.2 Policing the Reassurance Gap

Various victim surveys show a disparity between high levels of fear of cybercrime compared with lower levels of actual victimization (National Statistics 2012; Levi and Williams 2012; Wall 2013: 16–17). As alluded earlier, a 'culture of fear' about cybercrime has emerged from a combination of confused media reportage which mixes up potential cybersecurity risks and threats and actual cybercrime harms, against a background of dystopic conceptualizations of cybercrime that were written in social science fiction before cybercrime had ever existed (see Wall 2008). This inflation of fear has arguably led to demands for levels of security that the police agencies and government cannot realistically deliver alone (Wall 2008). The knock-on effect is that police and government have embarked upon a process of reassurance policing to bridge the gap between the demands for, and supply of, security and safety. But the results have been mixed, because some of the tactics employed amount to important and novel developments in policing (e.g. disruptive policing models), whereas others seem to be little more than PR exercises to (p. 1088) appease the public. What seems to be happening is that in the current politicization of cybercrime with the lack of legal focus and practical guidance, police agencies often tend to respond to the micro-politics of the situation, especially to the 'voices of concern', rather than to the justice needs of individual victims. Because of the general uncertainty in relating the involvement of police agencies to actual policing of cybercrime, forces and their officers find it hard to distinguish between those crimes which cause real harm to victims and those which people *perceive* as harmful. The upshot here, it is argued, is that the loudest voices tend to prevail and policing agencies feel pressure to police the reassurance gap, rather than police cybercrimes in order to achieve justice. This phenomenon is supported by an analysis of local police data which shows emphasis towards policing internet bad behavior (under s.127 Communications Act 2003) rather than Computer Misuse, but can be seen more broadly, for example, locally and nationally in the various responses to the three case studies outlined in the previous section.

The culture of fear about cybercrime and the reassurance gap arising from the mismatch between expectations of security and its delivery means that police and related agencies will have to work towards managing public and business expectations of the levels and types of security that police and government can deliver. The public's first point of contact, the police call centre, for example, is the most logical starting point for this. Current practice in many police force call-centres with regard to reports of frauds and cybercrime seems to be to re-direct callers to report them to Action Fraud (the UK national economic and cybercrime reporting centre). It is arguable that if call-centre staff across the UK spent one or two minutes more with each caller to give advice and reassurance and explain to victims that their information is very important even though less serious cases

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may not result in a police investigation, then the public might be more inclined to report a cybercrime. In so doing, important strategic intelligence is also collected, including vital information about the many attempted frauds and related inchoate offences, which can be used by the National Fraud Intelligence Bureau to develop the UK Fraud Strategy and also to identify the tactical information that is needed to investigate online crimes (see Wall 2013: 18 and references below).²⁵

5.3 Which Cybercrimes are Impacting upon Local Police Forces?²⁶

The disparity between the politics and reality of cybercrime illustrated above is supported by an analysis of primary police data (from two UK police forces).²⁷ What is strikingly absent from local incident and ‘crimed’ datasets are the tier-one threats that cybercrime allegedly poses to the nation, as well as the cyber-dependent (p. 1089) malicious malware and cyber-enabled frauds so often reported in the media. But this lacunae is not surprising, because reports relating to these incidents are steered away from local police forces by call-centre responders, for example, directly to Action Fraud—the central repository for reports of economic and cybercrime. The data is therefore found in different databases, such as the Action Fraud dataset held by the City of London Police and intelligence feeds from GCHQ. But what is being found in the local police data, however, is an impact of the Internet that has rarely been the focus of public discussion. Local police forces receive many reports of low-level social network media aggravated crime (cyber-assisted crime) in which networked technologies play an important part and which increases demands upon police time. There are two main forms of this type of offending: social network media aggravated threats and assaults, and social network media aggravated frauds.

Social network media aggravated assaults occur where person A has insulted person B on a social network media site and person B, their partner or friend, retaliates by insulting or even physically assaulting person A. A variant of this behaviour is ‘trolling’ or Internet bad behaviour, where an individual takes pleasure in repeatedly upsetting others online. The victims in both types of offending are very often former friends or family members, though not always, and the actions cause considerable upset and disruption to victims’ lives. Often, the offending online behaviour breaches an offline restraining order and typically occurs when an ex-partner harasses the victim online, incorrectly thinking the behaviour is not covered by the order. In each of these variants of threats and assaults, the online behaviour has offline implications and creates localized and resource-intensive demands on local police forces to meet with the parties involved.

Social network media aggravated frauds occur when peer to peer (P2P) online relationships lead to fraud both online and usually offline at some point. Many are variations of advance-fee fraud²⁸ of which the 419 scams have been the classic model. The offender typically entices a victim into taking part in an activity in order to extract fees in advance of services which do not take place. Before the Internet existed, these types of scams took place offline by using the postal system and letters, but they quickly moved online with the advent of the Internet to offer victims’ large sums of money if they help the fraudster

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move funds from one country to another. This 'alleged' transfer of funds is usually to be achieved by the victim agreeing to provide either an advanced fee to 'release funds', or allowing the perpetrator access to the victim's bank account, or sometimes both. Although victims are risk averse and rarely seem to fall for advanced fee frauds, when they do they are at considerable personal risk, especially if the online behaviour goes offline.

Advanced fee fraud has recently evolved into the Lottery Scam, which requires advance fees to release the 'winnings' and also the dating scam, which is claiming many victims. Fraudsters meet and groom victims through online dating sites and as the relationship progresses they extract monies, often in anticipation of the (p. 1090) meeting date and the fulfilment of emotional or sexual desires (see further Whitty and Buchanan 2012). The third type of advanced fee fraud is the auction fraud, where fraudsters lure victims by enticing them into buying goods that either don't exist or are not as advertised. These, and other relevant, offences are initially dealt with by Action Fraud, Trading Standards, or the commercial sector, and are then referred back to local police forces where a clear evidence trail exists. Some of the more straight-forward scams, mainly where both victim and offender are in the police force locality, will be handled directly by local police (see further Levi and others 2015).

These two basic types of cyber-assisted (or cyber-aggravated) crime are not particularly dramatic developments in the profile of crimes to which the police respond, but they do indicate a marked and gradual change in police response behaviour, which raises the question as to how police and police forces need to develop in terms of volume and resource demands. Currently local police forces and the National Crime Agency at a national level handle cyber-assisted crime, depending upon the severity of the harassment and volume of the offending.

6. Technological Development: Five-Ten Year Impact on the Police

One or more of three current technological developments will possibly challenge law enforcement and keep police managers and policy makers awake at night during the next ten years²⁹. Mesh technologies will join our digital 'devices' to develop lateral communication networks; self-deleting communications, such as Tiger texts or Snapchat will eradicate evidence of communications; and crypto-currencies such as Bitcoin, Robocoin, Dodgecoin, Litecoin, and especially Zerocoin, which claims to be anonymous (Greenberg 2015), will create alternative value-exchange systems that could challenge the authority of banking systems. Amplified in time by the 'Internet of things' (see Ward 2014), these three technologies will collectively challenge policing and attempts at imposing governance, especially cross-jurisdiction governance. Moreover, there are also new forms of new criminal service delivery which mimic online business services and enable non-specialist criminals to commit crimes. Crimeware-as-a-service enables criminals to organize cybercrime attacks without requiring expert knowledge of computers or systems, as was once the case (Wall 2015a). The general concern about these developments is that the

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public fear of crime that they give (p. 1091) rise to will reduce incentives for legitimate businesses to invest in networked activities, whilst further encouraging the infiltration of online markets by offline organized criminals. This development could further widen the reassurance gap between the levels of security that are being demanded by the public and the levels of security that governments and police bodies can realistically deliver. The widening of the reassurance gap is further exacerbated by the additional fear of an Internet take-over by organized crime groups present in media reporting, which raises questions about how the police will respond to these potential changes (Wall 2015a).

6.1 Failing to Respond to These Changes: the Consequences

What will happen if the police are unable to, or fail to, respond to cyber-criminals and cybercrime? Firstly, there would be no 'certainty of apprehension' and therefore no deterrence effect, which could encourage more online offending. This highlights the need to think about how to deal with cybercrime offender groups, which are distinctly different from other offender groups. Since there is little evidence to show that traditional organized crime groups have migrated their activities online, in fact online offender groups seem to have a different social and educational profile to traditional organised crime groups. As a consequence, it is probably unwise to directly imprison young online offenders who have succumbed to the seductions of cybercrime and drifted into serious (cyber) crime without ever leaving their bedroom. Typically, these offenders will have heavily played computer games before graduating to using game cheats and then learning how to disable their opponent's computers in order to win, before developing further cybercrime skills from various criminal forums, often to see if they could do it? Not only are they psychologically unprepared for criminal justice processes and punishments, but whilst in prison they could easily fall under the protection of organized criminals, who will likely as not, then own them and call in cybercrime favours later! They do, however, require some alternative punishment to utilise their skills to the common good. Yet, without sufficient deterrence, the reassurance gap mentioned earlier will increase between public demands for security (the culture of fear) and what police and government can or cannot deliver. The perceptions of greater insecurity will, in turn, likely further discourage strategic investment in the Internet to improve services and citizen participation. The worst case scenario is that the perceived failure of police agencies will give rise to vigilante groups both online and offline, which could result in a growth in virtual or networked societies away from the Westphalian (p. 1092) state model, and towards affinity-based networked societies, like that occurring in the Middle East with IS.

7. Conclusion: What Can Be Done about Cyber-crime, and How?

One certain fact about cybercrime is that it cannot be eradicated and there is no kill switch (literally or metaphorically) to turn these technologies off. More laws are also not the answer because existing computer misuse law, seemingly in all jurisdictions, is ar-

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guably under-utilized. Furthermore, pure technological counter-measures are not purely the answer because they so often restrict other freedoms. Instead, we can only seek to manage cybercrime constructively and mitigate the risks and harms that it poses as soon as practically possible. So police, government and the private sector, as the 'capable guardians' (see Hollis and others 2013), will each need to respond intelligently to increasingly dynamic and varied forms of networked crime. To achieve this goal, a more nuanced and connected approach is required to address the challenges, and at a number of difference levels, but how?

The traditional response has been to develop collaborative models that bring together policing agencies, the computer security industry and other private sector bodies. The overview of cybercrime presented here, however, would suggest that such bodies also need to work closely with a broad range of other types of parties, such as, teachers, parents and the Crown Prosecution Service (CPS) to name but a few. One of the main weaknesses of collaborations, however, is that they tend to promote, at best, a form of tolerance, so there is the need for a more dynamic type of collaborative relationship that follows a co-productive or co-creative model. One that is co-owned by each of the stakeholder groups and aligned with a more intelligent capacity-building programme to help police leaders, officers, support staff, and other stakeholders understand, respond, and manage the behaviours that lead to developments in crime both off- and online crime. Furthermore, police agencies will need to work with their partner agencies and key stakeholders in their own countries as well as overseas towards developing new systems and standards for understanding changes in crime as they happen, and then immediately sharing the information about these changes. Developments in 'big data' analytic capacities indicate possibilities for informing strategy and policy in near real-time, although they introduce new risks and ethical concerns, especially to privacy. All this suggests that a major conversation is necessary between the private and public sectors, especially as we are at the dawn of the 'Internet of things', which will connect most (p. 1093) of our domestic and professional objects to the Internet and drastically expand the information flows about and between us.

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Notes:

(1.) This chapter was originally presented as a paper to the *Cyber crime: Research, practice and roadmaps panel* of the 2015 CEPOL Annual European Police Research and Science Conference, 5-8 October, Edifício Polícia Judiciária, Lisbon, Portugal. It mainly draws upon the UK experience, but the general issues are global. I thank Karen Yeung and reviewers for their valuable comments.

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(2.) These statements are based upon observations made by myself from the UK National Wellbeing Survey which shows an increase in well-being (especially among young women) during a period of austerity, an increase that could be attributed to the impact of social network media. See <<https://www.gov.uk/government/publications/wellbeing-policy-and-analysis>>. Also based upon observations of young social network users who appear to morally censure each other when one of them 'oversteps the mark'.

(3.) EPSRC Global Uncertainties Programme (EPSRC CeRes Project EP/K03345X/1).

(4.) This paper is also informed by the early findings of another (new) project under the EPSRC Global Uncertainties Programme which is looking at the impact of Cloud Technologies upon Cybercrime (EPSRC CRITiCal EP/M020576/1).

(5.) **Pyramid selling scams** (or Ponzi schemes) have migrated online and are elaborate confidence tricks that promise a good return on investment. The return on investment is, however, paid from money derived from new investors rather than profits and the schemes mathematically eventually run out of investors.

(6.) **Sextortion** is when intimate knowledge or pictures of a victim's sexual activity is used to threaten their reputation in order to extort revenge, money, or favours.

(7.) **Distributed denial of service** (DDOS) attacks prevent legitimate users from gaining access to their web space (networks and computer systems) by bombarding access gateways with a barrage of data.

(8.) The **Stuxnet** worm is a form of malware that was used in 2010 to sabotage industrial control systems (SCADA) in an Iranian Nuclear Powerplant. The worm was introduced via a USB stick and sought out a particular configuration of hardware and control system before deploying. It is often regarded as an example of information warfare.

(9.) **Rootkit malware** is lodged in the 'root' of the operating system and enables hackers to obtain remote access to the computer. It is essential in the execution of, amongst other cybercrimes, botnets.

(10.) **Zeus** is a form of malware distributed by spammed email to infect the computers of small businesses and individuals in order to steal bank login information and make the computers part of a botnet.

(11.) **Botnets** comprise lists of the Internet protocol (IP) addresses of 'zombie' computers that have been infected by remote administration tools (malcode) and which can subsequently be controlled remotely.

(12.) **Script kiddies** are inexperienced and unskilled hackers who seek peer respect for their audacity by infiltrating or disrupting computer systems by using cracking scripts that they have designed.

(13.) **Ransomware** is malicious software that hijacks a computer system until it is neutralized by a code provided by a blackmailer once a ransom has been paid.

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(14.) **Fake AV** (Anti-Virus) malware informs users, using signs that emulate the operating system, that illegal files are found on their computers and that they need to download a free 'patch' to prevent them reappearing. Users are then told that they need to purchase a professional version of the 'patch' in order to make the repair permanent.

(15.) I am avoiding using the term 'The Cloud' here because it is conceptually problematic and hard to differentiate from what existed before, but the phrase cloud technologies encapsulates the change in terms of increased computing power, storage, and reduced costs.

(16.) **Spamming** is the distribution of unsolicited bulk emails. They choke up bandwidth and present risks to the recipient, should they respond.

(17.) An Inchoate offence is typically an action that is taken in preparation to commit a crime and it may not in itself be harmful.

(18.) Counting rules for recorded crime <<https://www.gov.uk/government/publications/counting-rules-for-recorded-crime>>

(19.) Code of Practice to the Criminal Procedure and Investigations Act 1996 <<https://www.app.college.police.uk/app-content/investigations/introduction/#principles-of-investigation>>

(20.) Code for Crown Prosecutors <http://www.cps.gov.uk/publications/code_for_crown_prosecutors/codetest.html>

(21.) Data obtained from requests made under the Freedom of Information Act 2000 (my thanks to Dr Ladan Cockshut and Dr Laura Connelly).

(22.) In the Twitter Joke Trial, Chambers sent a tweet saying that he would destroy Doncaster airport while in a fit of pique and was subsequently prosecuted under s 127 of the Communications Act 2003. The conviction was quashed after a third appeal, as it was deemed to be 'a message which does not create fear or apprehension in those to whom it is communicated, or who may reasonably be expected to see it, falls outside this provision' (of the CA 2003 Act) See *DPP v Paul Chambers* [2012] EWHC 2157 <<https://www.judiciary.gov.uk/wp-content/uploads/JCO/Documents/Judgments/chambers-v-dpp.pdf>>

(23.) **Data theft** (hack) is the theft of bulk data by hackers who have, to date, tended to perform a DDoS attack as a decoy to confuse the computer security before breaching the system (via an SQL injection) to steal the data.

(24.) Which is a small sum compared to the value of the data to the company.

(25.) At the time of writing, many UK police forces are reviewing their call-centre advice to the public with regard to cybercrimes. There is also talk of a review of the Action Fraud system being undertaken.

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(26.) These observations are of trends drawn from an analysis a combination of aggregated individual police force data for an EPSRC project (EP/K03345X/1) obtained under data processing agreements which, because the research is still underway, only allow for discussion in principle, and also an analysis of Action Fraud Data by the author (see Levi and others 2015).

(27.) Because of the data processing agreements governing the use of this data the findings of the analysis are only discussed broadly and in principle at this stage.

(28.) **Advanced fee frauds** (419 Scams) are fraudulent tactics that deceive victims into paying fees in advance to facilitate a transaction which purportedly benefits them and never materializes.

(29.) These issues were first raise in (Norman Baker's) Home Office Ministerial Working Group on Horizon Planning 2020-2025 in 2013.

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Debating Autonomous Weapon Systems, their Ethics, and their Regulation under International Law

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Abstract and Keywords

An international public debate over the law and ethics of autonomous weapon systems (AWS) has been underway since 2012, with those urging legal regulation of AWS under existing principles and requirements of the international law of armed conflict in argument with opponents who favour, instead, a preemptive international treaty ban on all such weapons. This chapter provides an introduction to this international debate, offering the main arguments on each side. These include disputes over defining an AWS, the morality and law of automated targeting and target selection by machine, and the interaction of humans and machines in the context of lethal weapons of war. Although the chapter concludes that a categorical ban on AWS is unjustified morally and legally—favouring the law of armed conflict’s existing case-by-case legal evaluation—it offers an exposition of arguments on each side of the AWS issue.

Keywords: Autonomous weapon systems, AWS, robotic weapons, Killer Robot, law of armed conflict, international humanitarian law, IHL, targeting, meaningful human control

1. Introduction

IN November 2012, a high-profile public debate over the law and ethics of autonomous weapon systems (AWS) was kicked off by the release of two quite different documents by two quite different organizations.

The first of these is a policy memorandum on AWS issued by the US Department of Defense (DOD), under signature of then-Deputy Secretary of Defense (today Secretary of Defense) Ashton B Carter: the *DOD Directive: Autonomy in Weapon Systems* (DOD Directive 2012). The Directive’s fundamental purposes are, first, to establish DOD policy regarding the ‘development and use of autonomous and semi-autonomous functions in weapon systems’ and, second, to establish DOD  ‘guidelines designed to minimize

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the probability and consequences of failures in autonomous and semi-autonomous weapon systems that could lead to unintended engagements' (DOD Directive 2012: 1).

The Directive defines terms of art, and in particular the meaning of 'autonomous' and 'semi-autonomous' with respect to weapons and targeting in the international law of armed conflict (LOAC)—the body of international law, also known as international humanitarian law, regulating the conduct of warfare (DOD Directive 2012: 13–15). As a policy directive, it provides special requirements for AWS that might now or in the future be in development. But its substance draws upon long-standing DOD understandings of policy, law, and regulation of weapons development—understandings premised, in the Directive's language, on the requirement that AWS be designed to 'allow commanders and operators to exercise appropriate levels of human judgment over the use of force' (DOD Directive 2012: 2).

The gradual increase in the automation of weapon systems by the US military (taking the long historical view) stretches back at least to World War II and the early development of crude, mechanical feedback devices to improve the aim of anti-aircraft guns. Efforts to increase weapon automation are nothing new for the United States or the military establishments of other leading states. The Directive represents (for DOD, at least) an incremental step in policy guidance with respect to the processes for incorporating automation technologies of many kinds into weapon systems, including concerns about legality in particular battlefield uses, and training to ensure proper and effective use by its human operators. But the Directive's fundamental assumption (indeed DOD's fundamental assumption about *all* US military technologies) is that, in general, automation technologies will, and should, continue to be built into many new and existing weapon systems. While the Directive emphasizes practical and evolving policies to minimize risks and contingencies that any particular system might pose in any particular setting, it takes for granted that *of course* advancing automation, even to the point of 'autonomy' in some circumstances, is a legitimate aim in weapons design.

That assumption, however, is precisely what comes under challenge by a second high-profile document. It is a report and public call to action (also issued in November 2012) by the well-known international human rights organization, Human Rights Watch (HRW), *Losing Humanity: The Case against Killer Robots*. Its release was coordinated with, and the basis for, the launch of an international NGO campaign under the name Stop Killer Robots (2013). This new campaign draws on the now familiar model of the 1990s campaign to ban antipersonnel landmines. The Stop Killer Robots coalition, with HRW at its core and *Losing Humanity* as its manifesto, called in the most sweeping terms for a complete, pre-emptive ban on the development, production, transfer or sale, or use of any 'fully autonomous' AWS. It called for an international treaty to enact this sweeping, pre-emptive ban.

(p. 1099) *Losing Humanity* is thus not primarily about debating DOD over the optimal prudent policies and legal interpretations to ensure that today's emerging weapon systems would be lawful in one battlefield setting or another. Rather (as this chapter discusses in

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sections 3 and 4), *Losing Humanity* asserts flatly that on its initial assessment, AWS—now or in the future, and no matter how advanced artificial intelligence (AI) might one day become—will not be able to comply with the requirements of LOAC. It is a remarkable claim, as critics of the report (including the present authors) have noted, because it contains sweeping assumptions about what technology will be capable of far into the future.

Today's international advocacy campaign, seeking a total, pre-emptive ban treaty, paints a dire picture of future warfare if current trends toward automation and artificial intelligence in weapon systems are not nipped in the bud today. Advocates make bold claims, implicitly or explicitly, about the future capabilities and limits of technology. And, deploying tropes from popular culture and science fiction (the catch-phrase 'Killer Robots,' to start with), this public advocacy urges that the way to prevent a future in which Killer Robots slip beyond human control is to enact today a complete ban on AWS.

Largely as a result of the *Losing Humanity* report and the coalition to Stop Killer Robots campaign, AWS and debates over its normative regulation, whether by a ban or something else, have been taken up by some states and United Nations officials at various UN forums. Beginning in 2013, several expert meetings on AWS have been convened under the aegis of the UN Convention on Certain Conventional Weapons (CCW 1980). Debate over the appropriate application of international law to AWS is far from static, however, and it is likely that positions and views by one actor or another in the international community that loom large today will have shifted even by the time this chapter reaches print.

The two foundational documents from 2012, viewed together, represent two main positions in today's debate over AWS: regulate AWS in ways already required in LOAC, on the one hand, or enact a complete ban on them, on the other. While other, more nuanced positions are emerging in the CCW meetings, these two represent major, fundamental legal alternatives. Yet the debate between these two has a certain 'ships passing in the night' quality to it; the DOD Directive is about practical, current technological R&D, while HRW's call for a total pre-emptive ban is grounded in considerable part on predictions about the long run. The 'risks' that each position sees in AWS are thus very different from each other, and likewise are the forms of norms and regulation that each side believes addresses those risks. Although some intellectual leaders of the debate have gone some distance over the last three years in bridging these conceptual gaps, at some fundamental level gaps are likely always to remain. It bears noting, however—in a Handbook about not just weapons and war, but about emerging technologies and their regulation more broadly—that many aspects of the AWS debate arise in other debates, over other technologies of automation, autonomy, and artificial intelligence.

(p. 1100) The aim of this chapter is to provide a basic overview of the current normative debates over AWS, as well as the processes through which these debates are taking place at national and international levels.

2. What is an AWS and Why Are They Militarily Useful?

The DOD Directive defines an AWS as a ‘weapon system that, once activated, can select and engage targets without further intervention by a human operator’. The Directive goes on to define a ‘semi-autonomous weapon system’ as one that ‘once activated, is intended to only engage individual targets or specific target groups that have been selected by a human operator’ (DOD Directive 2012: 13–14). *Losing Humanity* defines a ‘fully autonomous weapon’ as either (a) a weapon system in which human operators are ‘out-of-the-loop,’ meaning that the machine is ‘capable of selecting targets and delivering force without any human input or interaction’; or (b) a weapon system in which human operators are ‘on-the-loop,’ meaning that, in principle, a human operator is able to override the machine’s target selection and engagement, but in practical fact, the human operators are ‘out-of-the-loop’ because mechanisms of supervision are so limited (*Losing Humanity* 2012: 2). These definitions of AWS differ in certain important ways, but they share a common view of what makes a weapon system ‘autonomous’: it is a matter of whether a human operator realistically is able to override an activated machine in the core targeting functions of target selection and engagement.

In a highly abstract sense, any weapon that does not require a human operator could be regarded as an AWS. Antipersonnel landmines would be a simple example of a weapon that is triggered without a human operator in-the-loop or on-the-loop, but instead is triggered by pressure or movement. Conceptually, at least, such mines might fit the definition of autonomy. This is so, however, only if ‘select’ is construed to mean merely ‘triggered,’ rather than ‘selection among’ targets. ‘Selection among’ emphasizes that there is a machine-generated targeting decision made; some form of computational cognition, meaning some form of AI or logical reasoning, is inherently part of AWS in the contemporary debate. The debates over what constitutes an AWS leaves aside weapons, such as landmines, that are conceptually ‘autonomous’ merely because they are so technologically unsophisticated that they cannot be aimed, and we leave those aside as well. AWS in today’s debates refer to technologically sophisticated systems in which capabilities for ‘selection among’ is a specific (p. 1101) design aim for the weapon, and in which the machine possesses some decisional capability to ‘select’ and ‘engage.’

A feature of the above definitions of AWS, however, is that they are essentially categorical: a weapon is or is not autonomous. If so, this would certainly make regulation of AWS easier. But the practical reality is that the line between ‘highly automated’ and ‘autonomous’ is not clear-cut. Rather, ‘automation’ describes a continuum, and there are various ways to define places along it. Terms like ‘semi-autonomous,’ ‘human-in-the-loop’ and ‘human-on-the-loop’ are used to convey different levels and configurations of machine-human interaction and degrees of independent machine decision-making. Autonomy is not just about machine capabilities, but instead about the capabilities and limitations of both machines and human operators, interacting together. Rather than debate categorical definitions, a better starting point is that new autonomous systems will develop incrementally

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as more functions (not just of the weapon but also of the platform, e.g. the vehicle or aircraft) are automated. Incremental increases in automation will alter the human-machine interaction, and 'functional' autonomy (whether believed to be good or bad) will have to be assessed on a detailed examination of each system, case-by-case, assessing machine functions, human operator functions, and how they interact.

This continuum offers many possible gradations of automation, autonomy, and human operator control. For example, 'intermediate' automation of weapon systems might pre-program the machine to look for certain enemy weapon signatures and to alert a human operator of the threat, who then decides whether or not to pull the trigger. At a further level of automation, the system might be set so that a human operator does not have to give an affirmative command, but instead merely decides whether to override and veto a machine-initiated attack. Perhaps next in the gradation of automation, the system would be designed with the capability to select a target and engage autonomously—but also programmed to wait and call for human authorization if it identifies the presence of civilians or alternatively, more sophisticated yet (perhaps into the level of science fiction, perhaps not) programmed to assess possible collateral damage and not engage if it is estimated to be above a certain level.

In some cases, a human operator might control only a single or very few sets of sensor and weapon units. In others, he or she might control or oversee an integrated network of many sensor and weapon units, which might operate largely autonomously, though with the supervisor able to intervene with respect to any of the weapon units. In still other cases, the move to automate the weapon system (or even give it autonomy) might be driven by automation of all the *other non-weapon* systems of the platform with which the weapon has to be coordinated (including the ability to operate at the same speed at which the rest of the platform operates). Eventually, these systems may reach the point of full autonomy for which, once activated, the human role is vanishingly small (*functionally* out-of-the-loop, even if technically on-the-loop), and it may depend heavily on the operators' training (p. 1102) and orders from higher commanders. The tipping point from a highly automated system to an 'autonomous' one is thus very thin, a continuum rather than distinct categories, a function of both machine and human parameters together and, in practice, an unstable dividing line as technology moves forward.

It is important to be clear as to what kinds of highly automated or even autonomous weapons exist today. Weapon systems that would be able to assess civilian status or estimate harm as part of their own independent targeting decisions do not exist today and research toward such capabilities currently remains in the realm of theory (see Arkin 2009). That said, several modern highly automated—and some would call them autonomous—weapon systems already exist. These are generally for use in battlefield environments such as naval encounters at sea where risks to civilians are small, and are generally limited to defensive contexts against other machines in which human operators activate and monitor the system and can override its operation. The US Patriot and Aegis anti-missile systems and Israel's Iron Dome anti-missile system are both leading examples, but they will not remain the only ones (See Schmitt and Thurnher 2013 explaining existing types of

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sophisticated highly automated or autonomous weapon systems). New autonomous weapon systems are gradually becoming incorporated into warfare as technology advances and capabilities increase, one small, automated step at a time.

Increasing automation in weapons technology results from advances in sensor and analytical capabilities and their integration into—and especially in response to the increasing tempo of—military operations. Some of this technology is highly particular to military battlefield requirements, but much of it is simply a military application of a new technology that finds wide uses in general society. For example, as private automobiles gradually incorporate new automation technologies—perhaps even a genuinely self-driving car—it would be inconceivable that military technologies would not incorporate them as well. This is no less true in the case of the targeting functions of weapons as for other weapon system functions, such as navigation or flying. Put another way, the ability to apply robotic systems to military functions depends upon advances and innovations in all the areas necessary to robotics—sensors, computational cognition and decision-making analytics, and physical movement and action mechanisms that make the machine robotic rather than a mere computer.

Increasing automation has other drivers, specific to the military, such as the desire among political leaders to protect not just one's own personnel on the battlefield but also civilian persons and property. Nonetheless, although automation will be a general feature across battlefield environments and weapon systems, genuine, full *autonomy* in weapons will likely remain rare for the foreseeable future, save in situations where special need justifies the expense and burden of weapons development. What are some of these special battlefield needs? A central and unsurprising one is the increasing tempo of military operations in which, other things being equal, the faster system wins the engagement (Marra and McNeil 2012). Automation permits (p. 1103) military systems of all kinds, not just weapons, to act more quickly than people might be able to do, in order to assess, calculate, and respond to a threat.

Moreover, speed, whether achieved through increased automation or genuine autonomy, might sometimes serve to make the deployment of force in battle more precise. By shortening the time, for example, between the positive identification of a target and its attack, there is less likelihood that the situation might have changed, that the target may have moved, or that civilians might have come into proximity. In the Libya hostilities in 2011, NATO-manned attack aircraft were reportedly too slow and had too little loiter time to permit accurate targeting of highly mobile vehicles on the ground in an urban battlefield with many civilians. In response, an appeal was made to the United States to initially supply surveillance drones, and then armed drones that could speed up the targeting process.¹ Some version of this will drive demand for automation, especially in competition with a sophisticated enemy's technology.

3. AWS Under the Existing Law of Armed Conflict

A peculiarity of the existing debates over AWS since 2012 is that some participants and certainly many ordinary observers appear to believe that AWS are not currently governed by existing international law, or at least not by a sufficiently robust body of international law. This misimpression lends greater weight and urgency to the call for some new law to address them, whether in the form of a ban treaty or a new protocol to the CCW. This is not the case, however; AWS of any kind—indeed, *all* weapons—are subject to LOAC. A requirement of LOAC is that states conduct legal reviews of weapons to determine if they are lawful weapons based on certain longstanding baseline requirements; if there are any legal restrictions on the battlefield environments for which they are lawful; or if there any legal limitations on how they can be used (see Thurnher 2013 for a non-technical exposition of these requirements). This matters because, despite the attention garnered by both the NGO campaign for a ban and demands for a new CCW protocol on AWS, there is already a robust legal process for the legal review of weapons.

Additionally, all the law of targeting and other fundamental rules of LOAC already apply to AWS, any form of automated weapon or any other form of weapon. Indeed, there are very few types of weapons, such as chemical weapons, that are governed by their own special set of international treaty rules. That sort of specialized regulation is the exception, not the rule. The vast majority of weapon systems—and the use of (p. 1104) those systems—are regulated by a well-established body of law that applies broadly, including to any new weapons that are invented.

There is a belief among some LOAC experts, perhaps particularly among LOAC lawyers in DOD and some other ministries of defence, that the whole debate over AWS has somehow got off on the wrong foot since 2012, with an assumption that this is legally ungoverned or only lightly governed space and therefore something must put in place. These LOAC lawyers might prefer to begin by asking what is wrong with the status quo of LOAC and its requirements, as they apply to AWS, now and in the future? And in what way has the existing process of legal weapons review been shown to be so inadequate that it needs to be replaced or supplemented by additional legal requirements—particularly given that for the most part, these remain *future* weapons with many unknown issues of design and performance? While it is certainly true, and recognized by LOAC lawyers, that legal weapon review of highly automated systems will require earlier review and legal guidance at the design stage, and quite possibly new forms of testing and verification of systems at a very granular level of a weapon system's engineering and software, in what way has the current system of legal review and regulation failed?

According to HRW, a weapon system that meets the definition of 'full autonomy' is inherently or inevitably illegal under LOAC. *Losing Humanity* states

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initial evaluation of fully autonomous weapons shows ... such robots would appear to be incapable of abiding by key principles of international humanitarian law. They would be unable to follow the rules of distinction, proportionality, and military necessity ... Full autonomy would strip civilians of protections from the effects of war that are guaranteed under the law (2012: 1-2).

Many LOAC experts—ourselves included—disagree that this is so as a matter of existing legal principle; the question, rather, is to examine any particular system and assess whether, and to what extent, it is, in fact, able to satisfy the requirements of LOAC in a given battlefield environment.² LOAC experts such as ourselves see arguments for a preemptive ban (or even greatly strengthened restrictions in a CCW protocol), moreover, as making of new law, not merely interpreting existing law, and doing so on the basis of certain factual predictions about the future of technology and how far it might advance in sophistication over the long-run. To understand this difference in perspectives, it is necessary to understand the basics of the existing LOAC framework (see Anderson, Reisner, and Waxman 2014, for a detailed discussion of these legal requirements as applied to AWS).

The legality of weapon systems turns on three fundamental rules. First, the weapon system cannot be indiscriminate by nature. This is not to ask whether there might be circumstances in which the weapon could not be aimed in a way that would comply with the legal requirement of ‘distinction’ between lawful military targets and civilians. That would be true of nearly any weapon, because any weapon could be deliberately misused. Rather, the rule runs to the nature of the (p. 1105) *weapon in the uses for which it was designed* or, as some authorities have put it, its ‘normal’ uses; i.e., the uses for which it was intended. This sets a very high bar for showing a weapon to be illegal as such; very few weapons are illegal per se, because they are indiscriminate by nature. The much more common problem arises when legal weapons are used in an indiscriminate manner—a serious violation of the law of armed conflict, certainly, but one that concerns the actual use of a weapon.

Second, a lawful weapon system cannot be ‘of a nature’ to cause ‘unnecessary suffering or superfluous injury’. This provision aims to protect combatants from needless or inhumane suffering, such as shells filled with glass shards that would not be detectable by an x-ray of the wound. It is a rule that applies solely to combatants, not civilians (who are protected by other law of armed conflict provisions). Like the ‘indiscriminate by nature’ rule, it sets a high bar; this is unsurprising, given the many broad forms of violence that can lawfully be inflicted upon combatants in armed conflict.

Third, a weapon system can be deemed illegal per se if the harmful effects of the weapon are not capable of being ‘controlled’. The rule against weapons with uncontrollable harmful effects is paradigmatically biological weapons, in which a virus or other biological agent cannot be controlled or contained; once released, it goes where it goes. Once again, even though many LOAC rules prevent the use of weapons in circumstances that might have uncontrolled effects, the bar to make the weapon itself illegal per se is high.

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There is debate on this point, but many LOAC experts—including the authors of this chapter—believe that these rules do not render a weapon system illegal *per se* solely on account of it being autonomous (Schmitt and Thurnher 2013: 279, discussing that ‘autonomous weapon systems are not unlawful *per se*’). Even if a weapon system is not *per se* illegal, however, it might still be prohibited in some—even most—battlefield environments, or in particular uses on a particular battlefield. But in other circumstances, the weapon might also be legal. With respect to new weapon technologies generally, the question is not whether the ‘new technologies are good or bad in themselves, but instead what are the circumstances for their use’ (ICRC 2011: 40).

Targeting law governs the circumstances of the use of lawful weapons and includes three fundamental rules: discrimination (or distinction), proportionality, and precautions in attack (see Boothby 2012 for a standard reference work with respect to targeting law). Distinction requires that a combatant, using reasonable judgment in the circumstances, distinguish between combatants and civilians, as well as between military and civilian objects. Although use of autonomous weapon systems is not illegal *per se*, a requirement for their lawful use—the ability to distinguish lawful from unlawful targets—might vary enormously from one weapon system’s technology to another. Some algorithms, sensors, or analytic capabilities might perform well, others poorly.

(p. 1106) Such capabilities are measured with respect to particular uses in particular battlefield environments; the ‘context and environment in which the weapon system operates play a significant role in this analysis’ (Thurnher 2013). Air-to-air combat between military aircraft over the open ocean, for example, might one day take place between autonomous systems, as a result of the technological pressures for greater speed, ability to endure torque and inertial pressures, and so on. Distinction is highly unlikely to be an issue in that particular operational environment, however, because the combat environment would be lacking in civilians. Yet, there would be many operational environments in which meeting the requirements of distinction by a fully autonomous system would be very difficult—urban battlefield environments in which civilians and combatants are commingled, for example. This is not to say that autonomous systems are thereby totally illegal. Quite the opposite, in fact, as in some settings their use would be legal and in others illegal, depending on how technologies advance.

Proportionality requires that the reasonably anticipated military advantage of an operation be weighed against the reasonably anticipated civilian harms. As with the principle of distinction, there are operational settings—air-to-air combat over open water, tank warfare in remote uninhabited deserts, ship anti-missile defence, undersea anti-submarine operations, for example—in which civilians are not likely to be present and which, in practical terms, do not require very much complex weighing of military advantage against civilian harms. Conversely, in settings such as urban warfare, proportionality is likely to pose very difficult conditions for machine programming, and it is widely recognized that whether and how such systems might one day be developed is simply an open question.

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Precautions in attack require that an attacking party take feasible precautions in the circumstances to spare the civilian population. Precautions and feasibility, it bears stressing, however, are terms of art in the law of armed conflict that confer reasonable discretion on commanders undertaking attacks. The commander's obligation is grounded in reasonableness and good faith, and in 'planning, deciding upon or executing attacks, the decision taken by the person responsible has to be judged on the basis of all information available to him at the relevant time, and not on the basis of hindsight.'

In applying these rules to AWS, it is essential to understand that before an AWS—like any weapon system, including highly-automated or autonomous ones—is used in a military operation, human commanders and operators employing it generally will continue to be expected to exercise caution and judgement about such things as the likely presence of civilians and the possibility that they may be inadvertently injured or killed; expected military advantage; particular environmental conditions or features; the weapon's capabilities, limitations, and safety features; as well as many other factors. The many complex legal issues involved in such scenarios make it hard to draw general conclusions in the abstract. In many cases, however, although a weapon system may be autonomous, much of the requisite legal analysis (p. 1107) would still be conducted by human decision makers who must choose whether or not to use it in a specific situation. Whether LOAC legal requirements are satisfied in a given situation will therefore depend not simply on the machine's own programming and technical capabilities, but also on human judgements.

In the end, at least in the view of some LOAC experts, there is no reason *in principle* why a highly automated or autonomous system could not satisfy the requirements of targeting law (Schmitt and Thurnher 2013: 279). How likely it is that it will do so *in fact* is an open question—indeed, as leading AI robotics researcher Ronald Arkin says, it should be treated as a hypothesis to be proved or disproved by attempts to build machines able to do so (Arkin 2014³). In practical terms, however, weapon systems capable of full or semi-autonomy, and yet lacking the capacity to follow all the LOAC rules, could still find an important future role, insofar as they are set with a highly restrictive set of parameters on both target selection and engagement. For example, an AWS could be set with parameters far more restrictive than those required by law; instead of proportionality, it could be set not to fire if it detects *any* civilian presence. Being an AWS does not mean, in other words, that it cannot be used unless it is capable of following the LOAC rules entirely on its own. As participants in the AWS are gradually coming to recognize, the real topic of debate is not AWS set loose on battlefield somewhere, but instead the regulation of machine-human interactions.

4. Substantive Arguments for a Pre-emptive Ban on AWS

Although the existing legal framework that governs AWS and any other weapon system AWS is primarily LOAC and its weapons review process (and some other bodies of law, such as human rights law, might apply in some specific contexts), advocates of a complete

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ban generally advance several arguments in favour of a complete, pre-emptive ban. Three of the most prominent are taken up in this section: (a) AWS should be banned on the pure moral principle that machines should not make decisions to kill; this morally belongs to people, not robotic machines; (b) machine programming and AI will never reach a point of being capable of satisfying the requirements of LOAC, law, and ethics, and because they will not be able to do so even in the future, they should be pre-emptively banned today; and (c) AWS should be banned because machine decision-making undermines, or even removes, the possibility of holding anyone accountable in the way and to the (p. 1108) extent that, for example, an individual human soldier might be held accountable for unlawful or even criminal actions.

AWS should be banned on the moral principle that only human beings ought to make decisions deliberately to kill or not kill in war. This argument, which has been developed in its fullest and most sophisticated form by ethicist Wendell Wallach, is drawn from a view of human moral agency (see Wallach 2015). That is, a machine, no matter how sophisticated in its programming, cannot replace the presence of a true moral agent—a human being possessed of a conscience and the faculty of moral judgment. Only a human being possessing those qualities should make, or is fully morally capable of making, decisions and carrying them out in war as to when, where, and who to target with lethal force. A machine making and executing lethal targeting decisions on its own programming would be, Wallach says, inherently wrong (Wallach 2013).

This is a difficult argument to address because, as a deontological argument, it stops with a moral principle that one either accepts or does not accept. One does not have to be a full-blown consequentialist to believe that practical consequences matter in this as in other domains of human life. If it were shown to be true that machines of the future simply did a vastly better job of targeting, with large improvements in minimizing civilian harms or overall destruction on the battlefield, for example, surely there are other fundamental principles at work here.

One might acknowledge, in other words, that there is something of genuine moral concern about the intentional decision to take a life and kill in war that diminishes the dignity of that life, if simply determined by machine and then carried out by machine. But at some point, many of us would say that the moral value of dignity, even in being targeted, has to give way if the machine, when it kills or unleashes violent force, clearly uses less violence, kills fewer people, causes less collateral damage, and so on.

In the foreseeable future, we will be turning over more and more functions with life or death implications to machines—such as driverless cars or automated robot surgery technologies—not simply because they are more convenient but because they prove to be safer—and our basic notions about machine and human decision-making will evolve. A world that comes, if it does, to accept self-driving autonomous cars may also be one in which people expect those technologies to be applied to weapons and the battlefield as a matter of course, precisely because it regards them as better (and indeed might find the *failure* to use them morally objectionable).

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The second argument is that AWS should be banned because machine learning and AI will never reach the point of being capable of satisfying the requirements of LOAC, law, and ethics. The underlying premise here is that machines will not be capable, now or in the future, of the requisite intuition, cognition, and judgement to comply with legal and ethical requirements—especially amid the fog of war. This is a core conviction held by many who favour a complete ban on autonomous lethal weapons. They generally deny that, even over time and, indeed, no matter how (p. 1109) much time or technological progress takes place, machine systems will ever manage to reach the point of satisfying legal and ethical codes and principles applicable in war. That is because, they believe, no machine system will ever be able to make appropriate judgements in the infinitely complex situations of warfare, or because no machine will ever have the capability, through its programming, to exhibit key elements of human emotion and affect that make human beings irreplaceable in making lethal decisions on the battlefield—compassion, empathy, and sympathy for other human beings (Losing Humanity 2012: 4).

These assessments are mostly empirical. Although many who embrace them might also finally rest upon moral premises denying in principle that a machine has the moral agency or moral psychology to make lethal decisions, they are framed here as distinct factual claims about the future evolution of technology. The argument rests on assumptions about how machine technology will actually evolve over decades or longer or, more frankly, how it will *not* evolve, as well as beliefs about the special nature of human beings and their emotional and affective abilities on the battlefield that no machine could ever exhibit, even over the course of technological evolution. It is as if to say that no autonomous lethal weapon system could ever pass an ‘ethical Turing Test’ under which, hypothetically, were a human and a machine hidden behind a veil, an objective observer could not tell which was which on the basis of their behaviours.

It is of course quite possible that fully autonomous weapons will never achieve the ability to meet the required standards, even far into the future. Yet, the radical scepticism that underlies the argument that they never will is unjustified. Research into the possibilities of autonomous machine decision-making, not just in weapons but across many human activities, is only a couple of decades old. No solid basis exists for such sweeping conclusions about the future of technology.

Moreover, we should not rule out in advance possibilities of positive technological outcomes—including the development of technologies of war that might reduce risks to civilians by making targeting more precise and firing decisions more controlled (especially compared to human-soldier failings that are so often exacerbated by fear, panic, vengeance, or other emotions—not to mention the limits of human senses and cognition).⁴ It may well be, for instance, that weapons systems with greater and greater levels of automation can—in some battlefield contexts, and perhaps more and more over time—reduce misidentification of military targets, better detect or calculate possible collateral damage, or allow for using smaller quanta of force compared to human decision-making. True, relying on the promise of computer analytics and artificial intelligence risks pushing us down a slippery slope, propelled by the future promise of technology to overcome

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human failings rather than directly addressing the weaknesses of human moral psychology that lead to human moral and legal failings on the battlefield.

But the protection of civilians in war and reduction of the harms of war are ‘not finally about the promotion of human virtue and the suppression of human vice’ (p. 1110) as ends in themselves; human moral psychology is simply a means to those ends, and so is technology. If technology can further those goals more reliably and lessen dependence upon human beings with their virtues but also their moral frailties—by increasing precision; taking humans off the battlefield and reducing the pressures of human soldiers’ interests in self-preservation; removing from battle the human soldier’s emotions of fear, anger, and desire for revenge; and substituting a more easily disposable machine—this is to the good. Articulation of the tests of lawfulness that any autonomous lethal weapon system must ultimately meet helps channel technological development toward those protective ends of the law of armed conflict.

The last argument is that AWS should be banned because machine decision-making undermines, or even removes, the possibility of holding anyone accountable in the way and to the extent that an individual human soldier might be held accountable for unlawful or criminal actions in war. This is an objection particularly salient to those who put significant faith in accountability in war through mechanisms of individual criminal liability, such as international tribunals or other judicial mechanisms. One cannot hold a computer criminally liable or punish it. But to say that the machine’s programmers can be held criminally liable for the machine’s errors is not satisfactory, either, because although in some cases negligence in design might properly be thought to be so gross and severe as to warrant criminal penalties, the basic concept of civil product liability and design defect does not correspond to the what the actions would be if done by a human soldier on the battlefield—war crimes. Therefore, the difficulty is, as many have pointed out, that somehow human responsibility and accountability for the actions taken by the machine evaporate and disappear. The soldier in the field cannot be expected to understand in any serious way the programming of the machine; the designers and programmers operate on a completely different legal standard; the operational planners could not know exactly how the machine would perform in the fog of war; and finally, there might be no human actors left standing to hold accountable.

Putting aside whether there is a role of individual accountability in the use of AWS, however, it is important to understand that criminal liability is just one of many mechanisms for promoting and enforcing compliance with the laws of war (see Anderson and Waxman 2013 for an expanded discussion). Effective adherence to the law of armed conflict traditionally has come about through mechanisms of state (or armed party) responsibility. Responsibility on the front end, by a party to a conflict, is reflected in how a party plans its operations, through its rules of engagement and the ‘operational law of war.’ Although administrative and judicial mechanisms aimed at individuals play some important enforcement role, LOAC has its greatest effect and offers the greatest protections in war when it applies to a side as a whole and when it is enforced by sanctions and pressures

that impose costs on parties to a conflict that breach their legal responsibilities under LOAC.

Hence, treating criminal liability as the presumptive mechanism of accountability risks blocking the development of machine systems that might, if successful, (p. 1111) overall reduce actual harms on the battlefield. It would be unfortunate indeed to sacrifice real-world gains consisting of reduced battlefield harm through machine systems (assuming there are any such gains) simply in order to satisfy an a priori principle that there always be a human to hold accountable.

5. The Processes of International Discussions Over AWS

The Stop Killer Robots campaign, distinguished by its willingness to frame its call for a ban in ways that explicitly draws on pop culture and sci-fi (no one could miss the references to *The Terminator* and *Skynet*, least of all the journalists who found the sci-fi framing of Killer Robots irresistible) were able to line up a variety of sympathetic countries to press for discussion of ‘Killer Robots’ in UN and other international community meetings and forums. Countries had a variety of reasons for wanting to open up a discussion besides a sincere belief that this technology needed international regulation beyond existing LOAC—wanting to slow down the US lead in autonomous military technologies, for example. But the issue was finally referred over to its logical forum—the mechanisms for review, drafting, and negotiation provided by the CCW. Periodic review meetings are built into the treaty, and this would be the normal place where such a discussion would go.

The CCW process began with the convening of several ‘expert meetings’, in which recognized experts in the field were invited in their individual capacities to open discussion of the issues. One of these was convened in spring 2014 and a second in spring 2015. Parallel to this intergovernmental treaty process, interested international NGOs (particularly member organizations of the Stop Killer Robots campaign) sponsored their own meetings, in a process of government/NGO parallel meetings that has become familiar since the 1990s and the international campaign to ban landmines.

It is not clear that an actual protocol on AWS will emerge from the CCW discussions, open for signature and ratification by states. We do not want to predict those kinds of substantive outcomes. However, it is very likely that pushing formalized international law—a treaty, a protocol—too quickly out of the box will fail, even with respect to a broadly shared interest among responsible states to ensure that clearly illegal autonomous weapons do not enter the battlefield. As we previously wrote with Daniel Reisner, a better approach to the regulation of AWS than quick promulgation of a new treaty is to:

(p. 1112)

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reach consensus on some core minimum standards, but at the same time to retain some flexibility for international standards and requirements to evolve as technology evolves. Such an instrument is not likely to have compliance traction with States over time unless it largely codifies standards, practices, protocols and interpretations that States have converged upon over a period of actual development of systems

(Anderson, Reisner, and Waxman 2014: 407).

The goals of legitimate normative regulation of AWS might well require an eventual treaty regime, and most likely in the form of a new protocol to the CCW convention. But the best way to achieve international rules with real adherence is to allow an extended period of gestation at the national level, within and informally among states' military establishments. Formal mechanisms for negotiating treaties create their own international political and diplomatic pressures. As we also previously wrote with Daniel Reisner, the process of convergence among responsible states is likely to be most successful if 'it takes place gradually through informal discussions among States, informed by sufficiently transparent and open sharing of relevant information, rather than through formal treaty negotiations that if initiated too early tend to lock States into rigid political positions' (Anderson, Reisner, and Waxman 2014: 407).

In other words, the best path forward is for a group of responsible states at or near the cutting edge of the relevant technologies—such as the United States, its NATO and Asian allies—to promote informal discussion about the evolving nature of the technologies at issue in autonomy, to focus on gradual and granular consideration of the legal, design, engineering, and strategic issues involved in autonomous weapons, and to foment, through the shared communications and discussions of leading states a set of common understandings, common standards, and proposals for best practices for such questions. It is slow and it is unapologetically state-centric, rather than being focused on international institutions or international NGOs and advocacy groups, but such an approach would adapt better to the evolution of the technologies involved in automation, autonomy, AI, and robotics.

A gestational period of best practices and informal state exchanges of legal interpretations over specific technologies and their uses has other advantages with respect to using process to advance more durable international norms for AWS. Discussions that are informal and directly among states, yet not part of an international 'negotiation,' and initially making no claim to creating new law, allow states to more freely expound, explore, evolve, and converge with others in their legal views. Moreover, rapid codification of treaty language, in advance of having actual designs and technology to address, inevitably favours categorical pronouncements, sweeping generalities and abstractions. What is needed, however, is not generalities, but concrete and specific norms emerging from concrete technologies and designs; LOAC already supplies the necessary general and abstract principles.

Among the many complex, concrete, and deeply technical issues that a gradual coalescence of best practices and informal norms might address, for example, is (p. 1113) how legal standards ‘translate into terms of reliability engineering that are “testable, quantifiable, measurable, and reasonable”’ (Anderson, Reisner, and Waxman 2014: 409, quoting Backstrom and Henderson 2012: 507). Such concrete and often technical matters (both in law and engineering) are the real issues for elaborating norms to govern AWS, not sweeping statements of first principles with which LOAC is already properly equipped. That said, however, the ability gradually to evolve widely shared international norms—norms that are concrete and often technical in nature—for AWS will necessarily depend on leading players, such as the US and its allies, being willing to see they have strategic interests in greater levels of transparency than they might otherwise prefer. Shared norms require at least some shared information.

6. Conclusions and the ‘Meaningful Human Control’ Standard

This discussion of AWS concludes by leaving the political, diplomatic, and negotiating issues of international treaty processes and returning to issues of regulatory substance. Discussions in the CCW meetings as well as in academic and policy forums have recently taken up the idea of a legal requirement of ‘meaningful human control’ (MHC) with respect to highly automated or autonomous weapon systems (see Horowitz and Scharre 2015). The idea is undeniably attractive—who would not want to require that machine weapon systems have appropriate and proper levels of human control? It is a concept found, for example, in the DOD Directive, where it is offered as one of the purposes for the special requirements imposed on AWS (DOD Directive 2012: 2).

There are, however, several reasons to be cautious about embracing MHC. The first is that the basis on which many parties seem to have embraced MHC as a way out of conceptual and political difficulties is because it offers strategic ambiguity. This principle can be read many different ways, and it begs questions of what is meant by ‘meaningful’ and what is meant by ‘control’. Sometimes strategic ambiguity is a good idea in international politics, as a way of defusing tensions. But much of the time, strategic ambiguity ends in disappointment. It is not generally a good idea to embrace treaty phrasing about which the parties hold radically opposed or at least inconsistent ideas as to what it means. At some point, the contradictions can no longer be elided. This threatens to be the case with MHC—the US can make itself comfortable with the MHC standard because it says that, of course, its AWS have the proper amount of MHC; the Stop Killer Robots campaign and its (p. 1114) sympathetic governments will understand exactly the same language to mean that no truly autonomous system can ever have MHC; and a not-insignificant number of militarily advanced countries will urge everyone to embrace it (especially their rival, the United States) while secretly developing AWS with capabilities that will be known only when deployed.

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Secondly, although some of its proponents view the MHC standard as flowing from LOAC, in some important respects it is quite at odds with the fundamental structure of LOAC, and its core principles of necessity, distinction, proportionality, and humanity. Each of these four principles is directed to, and evaluated by, its effects in armed conflict. Necessity authorizes violent hostilities, but also limits their effects. Distinction authorizes attacks on some persons, but also limits the effects of attacks, by limiting those who can be directly targeted. Proportionality authorizes attacks that might foreseeably lead to civilian harm or deaths, but it also limits the scope of permissible collateral harm. Humanity, in its LOAC meaning, seeks to relieve the burdens of those trapped in armed conflict, but it does so by reference to the effects that one action or another has on those people.

MHC is different. Insofar as its requirements are not already part of the others, it means obligations that are not finally measured by their effects, but instead by an insistence on a certain mode of weapons and hostilities. It is not a law of nature, however, that weapons that put a human being 'meaningfully' in control of it, in some fashion, necessarily do the best job at minimizing battlefield harms. It is not beyond possibility that at some point, in some circumstances, a machine might do it better, on its own.

It is not clear at this writing how or even whether the international debate over a new treaty will proceed; neither is it clear what arguments or concepts might come to dominate in that debate. Perhaps it will be MHC—or perhaps something else. As an alternative to MHC, however, we would suggest that debate over standards or rules for automated or autonomous systems should remain neutral as between human or machine, and should affirmatively reject any a priori preference for human over machine.

The principle of humanity is fundamental, but it refers, not to some idea that humans must operate weapons, but instead to the promotion of means or methods of warfare that best protect humanity within the lawful bounds of war, irrespective of whether the means to that end is human or machine or some combination of the two. Whether to favour an ethical insistence on an element of human control or to instead to favour strict neutrality as between 'who' or 'what', to be settled solely on the basis of effects and who or what performs better in minimizing battlefield harms: this is an essential debate today over the normative regulation of autonomous weapon systems, and surely not irrelevant to many other debates arising today over the law and ethics of automation and robotic technologies.⁵

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Notes:

- (1.) See, e.g. Julian E. Barnes, 'US Launches Drone Strikes in Libya' (*Wall Street Journal*, 22 April 2011) A6 ('Drones have been used for reconnaissance missions from the start of the conflict, but in recent days, NATO commanders had asked the US to provide armed Predator strikes.')
- (2.) For a general and legally thorough introduction to the legal requirements and processes of weapons review in international law, from a US perspective, see Hays Parks, 'Conventional Weapons and Weapons Reviews' (2005) 8 Yearbook of International Humanitarian Law 55.
- (3.) For example, remarks by Ronald C Arkin in a public panel discussion on AWS, on (regarding the ability of machine systems gradually to advance in capabilities to make algorithmic determinations that would conform to LOAC requirements, not as a certainty or impossibility, but instead as a 'testable hypothesis'), University of Pennsylvania School of Law, Conference on Autonomous Weapon Systems, 14 November 2014.
- (4.) As the ICRC put it in its 2011 'Contemporary Challenges of Armed Conflict' report, p. 40: 'After all, emotion, the loss of colleagues and personal self-interest is not an issue for a robot and the record of respect for [the law of armed conflict] by human soldiers is far from perfect, to say the least.' See also, 'Out of the Loop,' p. 249 ('Although emotions can restrain humans, it is equally true that they can unleash the basest instincts. From Rwanda and the Balkans to Darfur and Afghanistan, history is replete with tragic examples of unchecked emotions leading to horrendous suffering').
- (5.) Readers interested in additional resources on AWS and their legal and ethical considerations are referred to the Center for a New American Security, 20YY Warfare Initiative, Ethical Autonomy Project, which since 2014 has maintained a running bibliography on AWS issues from the standpoints of technology, strategy, law, and ethics; website at <http://cnas.org>.

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Genetic Engineering and Biological Risks: Policy Formation and Regulatory Response

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Abstract and Keywords

This chapter serves three objectives. First, it provides a narrative account of key developments in core bioengineering technologies. Second, it critically interrogates the emergence and evolution of regulatory regimes aimed at responding to perceived risks associated with these technological capabilities, highlighting how these have primarily relied on establishing ‘soft’ forms of control rather than hard edged legal frameworks backed by coercive sanctions, largely in the form of self-regulation by the scientific research community (with some notification provisions to keep the relevant government informed). Third, it provides an analysis of this regulatory evolution, focusing on the narrow construction of risk, and flagging up the possibility of alternative framings, which might have generated more inclusive and deliberative approaches to standard-setting and oversight.

Keywords: recombinant DNA, genetically modified organisms, biosafety, biosecurity, select agents, potentially pandemic pathogens, CRISPR, synthetic biology, dual use research of concern

1. Introduction

BIOENGINEERING has experienced enormous growth over the last decades, fuelled by a stream of groundbreaking discoveries originating with the structure of DNA and the genetic code, and the introduction of the concept of biology as information (Fox Keller 2000; Kay 2000). Gene-splicing technologies have played a particularly significant role, not only enabling the artificial modification and transfer of genetic material between organisms, but permitting the deliberate exchange of genetic material between species. Advances in reading (‘sequencing’) and writing (‘synthesis’) DNA are making this process ever more precise and predictable, and growing numbers of engineers are moving into the field with the aim of standardizing DNA parts that can then be assembled to create entirely new biological devices and systems.

Significant societal, ethical, environmental, and security concerns have been raised in response to the scientific advances throughout the journey towards (p. 1119) biology becoming engineerable material. This chapter considers a series of concrete sites of regulatory development to explore policy responses to these concerns, and the origins and evolution of oversight mechanisms for gene technologies and genetic engineering: (1) the development of the ‘recombinant DNA’ technique in the 1970s and the safety concerns that became the regulatory focus around that technology, and which resulted in a set of guidelines that were replicated throughout Europe and the English-speaking world; (2) the introduction of ‘genetically modified organisms’ and concerns about public health and the environment in the late 1980s, early 1990s which resulted in exceptional legislation in the European Union but not in the United States; (3) the rise of security concerns in the United States from the mid 1990s and the introduction there of ‘select agents’, physical security measures and personnel reliability programmes, and, later, ‘experiments of concern’ and the notion of dangerous biological knowledge; and, finally, (4) synthetic biology and the recent controversy around potentially pandemic pathogens, where the policy and regulatory response is still very much in formation.

The chapter argues that while some legal frameworks backed by coercive sanctions have been introduced, the majority of concerns around bioengineering technologies have principally been managed through self-regulation, focusing on scientists and control via the scientific community, rather than external oversight through law. Most attempts to create regulatory control have occurred at the national level, with states largely following the lead of the United States where the majority of the scientific breakthroughs in bioengineering have taken place.

2. Early Concerns

The birth of modern biotechnology, and gene technologies more specifically, is generally dated to the early 1970s. It was at this time that scientists at Stanford University and UCLA developed the revolutionary ‘recombinant DNA’ technique that enables genes to be transferred between organisms that would not normally reproduce. The initial experiments used ‘plasmids’—round self-replicating bits of DNA that co-exist and replicate in bacteria alongside the bacteria’s own DNA—as ‘vectors’ to transfer and splice the genetic material.

The rapid advances in gene splicing that followed were paralleled by an increasing concern for the potential social, ethical, and environmental implications of the new technology. Discussions of the possible hazards of splicing genes from different organisms entered the policy arena at the annual session of the US Gordon Conference on Nucleic Acids held in New Hampshire in June 1973 (Wright 1994). (p. 1120) It was there that the Stanford and UCLA scientists first presented the results of their early recombinant DNA experiments. The ensuing questions raised about the wisdom of continuing the work prompted the conference co-chairs to send a letter to the National Academy of Sciences (NAS) communicating the concerns. Published in *Science*, the letter expressed safety concerns for

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laboratory workers as well as the public. It proposed that the NAS should establish a committee to assess the biohazards posed by recombinant DNA research and to 'recommend specific actions or guidelines that seem appropriate' (Singer and Söll 1973).

In response, the NAS formed a committee in February 1974 chaired by Paul Berg, a prominent biochemist from Stanford (Wright 1994). The committee was comprised of eleven members, all of whom were active in recombinant DNA research. In its discussions of the potential implications of the new technology, the committee focused narrowly on the question of the immediate hazards posed by the genetic modification of viral and other types of DNA. The historian of science Susan Wright notes: 'Some issues that almost certainly would have been confronted had the Berg committee been broader in composition seem either to have not been raised or to have dropped quickly out of consideration' (1994: 137). Within six months the committee produced its report—the 'Berg letter'—simultaneously published in the *Proceedings of the National Academy of Sciences*,¹ *Science*,² and *Nature*.³ The letter called on the director of the National Institutes of Health (NIH) to immediately establish an advisory committee to oversee and develop guidelines for recombinant DNA research. The letter also called for an international conference of scientists involved in the field 'to review scientific progress in this area and to further discuss appropriate ways to deal with the potential biohazards' (Berg 1974a,b,c). The Berg committee played a fundamental role in defining the problematic issues of the new technology and in proposing mechanisms through which they would be addressed:

What was generally lost in the dissemination of the Berg committee's letter was any consideration of the significance of the committee's procedural and policy recommendations, especially its proposal that future control of the field should become the responsibility of the NIH and should take the form of guidelines for research. These actions strongly reinforced the elimination of the social dimensions of the issues associated with genetic engineering and restriction of policymaking to technical dimensions.

(Wright 1994:139-140)

The international conference of scientists called for in the Berg letter was held in February 1975 at Asilomar, California (Wright 1994). Wright argues that what seemed like a 'community of scientists idealistically moving to restrict their own research and to anticipate its hazards' was in reality a meeting 'designed to enable research to move forward and that this goal was anticipated by organizers from the beginning' (1994: 145). The scope of the meeting was restricted to questions of hazards and safety, explicitly excluding broader social and ethical issues; attention was confined to benefits, broadly designed, and to costs, narrowly focused on (p. 1121) laboratory hazards. Although disagreement was prominent among the scientists, they were persuaded to agree:

Two factors seem to have been particularly influential in enabling participants to reach virtually a unanimous conclusion. First there was the promise of a technical solution to the hazard problem—or at least a part of it: the use as host organism of strains of *E.coli* K12 with little ability to live or to multiply outside the laboratory.

... Second there was the very real possibility that legislation in the United States and perhaps elsewhere might act to control the new field if the conference produced nothing more than a controversy.

(Wright 1994: 152–153)

The invitation-only meeting, Wright argues, proved to be a pivotal event in the history of policy formation for recombinant DNA technology:

It produced a broad consensus among scientists in the United States and elsewhere about the nature of the genetic engineering problem and the contours of future policy that served to generate a highly influential public discourse concerning the problem and its solution.

(Wright 1994: 144)

Four months after the meeting, in June 1975, the final version of the Asilomar statement was published in *Science*.⁴ It recommended peer review and voluntary guidelines as the oversight mechanisms to control recombinant DNA research. Wright observes:

The power of the exclusion of the social from the definition of the genetic engineering problem and the virtual unanimity with which this definition was embraced meant that this perception of genetic engineering would quickly become dogma. Rarely in the future would policymakers deviate far from that basic position. On both sides of the Atlantic, those who contributed to the policy process would work largely within the boundaries of this discourse.

(1994: 159)

3. Developing a Regulatory Framework

The NIH director accepted the Berg committee's proposal of establishing an advisory committee and by the time of the Asilomar conference the NIH Recombinant DNA Molecule Program Advisory Committee, later shortened to the Recombinant DNA Advisory Committee (RAC), was in place. In line with the accepted discourse, the committee was defined as 'a technical committee, established to look at a specific problem' (Department of Health, Education and Welfare 1974; Wright 1994: 164). In all, four meetings of the full RAC were held in 1975 before the release of the NIH (p. 1122) guidelines on 23 June 1976. These guidelines built on the Asilomar conclusions that hazards could be ranked on a scale, and that these hazards could be matched with a series of both physical and biological containment precautions.

The development of the US regulatory framework of voluntary guidelines applying solely to laboratories sponsored by the NIH was to have considerable impact on the development of other national and international frameworks to control gene technologies. This was particularly the case in Europe where many countries also set up scientific commit-

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tees in the mid to late 1970s to consider recombinant DNA oversight. In the UK, for instance, a central advisory body, the Genetic Manipulation Advisory Group (GMAG), was established, and a code of practice and general guidelines were drawn up (GMAG 1976). Additionally, statutory regulations were implemented under the Health and Safety at Work etc Act 1974.⁵ As experience with the technology grew, controls on the hazards of recombinant DNA technology were relaxed and the functions of GMAG were transferred to the Health and Safety Executive (the British statutory authority responsible for enforcing the 1974 Act).⁶ The most restrictive regime developed, in Norway, followed a similar pattern and regulated recombinant DNA research through compulsory guidelines managed through a central advisory body called the Control Committee.⁷

The early 1990s saw major changes in European regulatory measures controlling genetic modification and genetically modified organisms (GMOs). Following the introduction of the European Commission directives on contained use and deliberate release of GMOs,⁸ the UK was obliged to implement the directives and restructure its regulatory framework. The Genetically Modified Organisms (Contained Use) Regulations were formed under the Health and Safety at Work etc Act 1974 to control recombinant DNA technology in laboratories and the Genetically Modified Organisms (Deliberate Release) Regulations were formed under the Environmental Protection Act 1990 to control recombinant DNA technology outside laboratories.⁹ In Norway, the late 1980s politicization of recombinant DNA technology resulted in the introduction of entirely new legislation—the Gene Technology Act—in 1993 to ensure that the technology was ‘used for the common good and in line with the values on which Norwegian society is based’. Although not a member of the European Union, Norway still implemented the directives on contained use and deliberate release of GMOs (through the Gene Technology Act).¹⁰ The directives did not, however, significantly alter the Norwegian requirements, as they were less onerous than the Norwegian regulations and permitted the implementation of additional requirements if individual member states considered them necessary.

It is the similarity of the governance mechanisms, in spite of very different political traditions, that is so striking about the formation of the British and Norwegian regulatory frameworks. In both countries, the committees set up to initially consider the need for control and regulation of the new technology were solely comprised of scientists. They ended up problematizing genetic modification in the same way—they conceived of the risks with recombinant DNA similarly—and they reached (p. 1123) comparable conclusions about the kinds of oversight that was necessary. Similar guidelines—in the UK, strongly resembling the NIH guidelines (see GMAG 1976), and in Norway, wholly based on the NIH guidelines¹¹—were applied to control the genetic modification of microorganisms, and experiments were approved by analogous advisory bodies—also comprised solely of scientific experts—to ensure they observed appropriate safety precautions.

In the early 1990s, both regulatory frameworks changed their problematization of genetic modification to consider not only the protection of human health, but also the protection of the environment. The two sets of regulations in the UK, concerning the contained use and deliberate release of GMOs,¹² correlated to a large extent with the two main parts of

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the Norwegian Gene Technology Act of 1993. Even the terminology used—such as ‘contained use’, ‘deliberate release’, and ‘genetically modified organisms’—was the same. Both countries supported their legislation with advisory bodies: the Advisory Committee on Genetic Modification in the UK and the Norwegian Biotechnology Advisory Board in Norway. The specific requirements in the regulations were also to a large degree similar.¹³ Laboratories were, for example, classified on the basis of four levels, GMOs were classified into two groups, operations were classified into two types (where ten litres was the cut-off point between the two types in both countries). Notification requirements were also in general very similar, as were the requirements to undertake risk assessments, develop emergency plans, and alert the regulatory authorities of any accidents.

The similar oversight mechanisms and regulatory requirements established in the UK and Norway underscore that although the justification of the regulatory frameworks rested on a concern to prevent risks of accidental harm, the *form* of regulation was focused on soft forms of control via self-regulation by the scientific community. It is clear that the regulatory frameworks highlighted here were significantly influenced and shaped by powerful actors. Scientists and industry, in particular, played key roles in fashioning the national regulatory frameworks controlling recombinant DNA technology. The policy paradigm created by scientists reduced the implications of genetically modifying microorganisms to immediate laboratory hazards, and suggested voluntary controls and expert-based oversight committees as appropriate governance structures. This paradigm was propagated through journal publications (e.g., the Gordon Conference on Nucleic Acids letter in *Science* and the Berg letter in the *Proceedings of the National Academy of Sciences*, *Science and Nature*), scientific meetings (e.g. at Asilomar), professional associations (e.g. the European Science Foundation), and, perhaps most importantly, through membership on advisory committees (such as the Ashby and Williams Working Parties in the UK and the DNA and Control Committees in Norway). Industry’s demand for international competitiveness pushed the UK, in particular, but also Norway, to revise its national regulatory requirements and oversight mechanisms in line with developments in other countries in the late 1970s and early 1980s.

(p. 1124) The designation in the US of the RAC and the NIH guidelines as appropriate for both the control and development of recombinant DNA technology, prompted both the United Kingdom and Norway to imitate the regulatory regime. The similar experts and committee compositions, definitions of the problems, oversight mechanisms and regulatory requirements highlight how the political settlements reached elsewhere can act as templates for national decisions, conferring legitimacy on national solutions (in this instance to controlling recombinant DNA technology).

There is, of course, flexibility retained by national policymakers to respond to the models prescribed by powerful actors, and the local context and groups involved in social negotiation and the political settlement reached go some way to explain why local differences in the European regulations arose. In the case study presented here, for example, the Ministry of Environment observed that ‘Norway is alone in establishing a regulatory frame-

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work that, in addition to incorporating considerations of health and the environment, also requires an emphasis on ethical and social concerns.¹⁴ This meant approval was obligatory for: (a) the genetic modification of vertebrates resulting in hereditary genetic alterations; (b) the transfer of human genetic material to animals, plants or microorganisms, which are not carried out in connection with research or experiments for the purpose of identifying the structure, characteristics, and functions of DNA; and (c) the production and use of GMOs for placing on the market or other commercial use. Another factor contributing to the relatively restrictive Norwegian framework compared with the British was its broad definition of deliberate release, covering not only field trials and placing a product containing or consisting of GMOs on the market, but extending to the use of GMOs in greenhouses, aquaculture facilities and animal accommodation. Indeed, it was noted, with some pride by a Conservative representative in the parliamentary debates leading up to the Gene Technology Act, that the Norwegian regulatory framework ‘will probably [be] one of the world’s most stringent regulative frameworks’.¹⁵

The differences in the British and Norwegian regulatory frameworks were also a result of particular local factors (Corneliussen 2003). The relatively stringent elements of the Norwegian Gene Technology Act arose mainly because of the particular state of Norwegian politics—especially the strong environmental agenda—and because of the absence of an industrial biotech lobby in Norway. The Norwegian biotech industry was still in its infancy when the Gene Technology Act was established. Indeed, the industry only formed its own organization—the Norwegian BioIndustry Association—in April 2001 (Norwegian Bioindustry Association 2008). Relative to Norway, the UK has, since the Second World War, a persistent structural unemployment problem, particularly in the North, arising from the decline of mining and heavy engineering, which has led to a continuing concern to introduce ‘sunrise’ industries. Most of these have failed, but this has not deterred the government agencies involved—the politicians *cannot* give up on the attempt to bring new jobs, partly because of voter pressures and partly because of strong (p. 1125) trade unions. The result is less an ‘industry lobby’ in the narrow sense than an ‘industry coalition’ where politicians and labour leaders are open to alliances with industry on industry’s terms (which often leaves them vulnerable to exploitation). This is evident from the policy debates that took place during the establishment of the British regulatory framework. For example, the biotech industry’s concern over the weakening of controls in other countries in the late 1970s, early 1980s and its threats of transferring research programmes abroad, moved GMAG to recategorize genetic modification work to lower containment levels and to weaken notification procedures of experiments (the revision of industry programmes was thereby virtually eliminated) (GMAG 1982). Equally, the industry’s interest in withholding information from the public registers of genetic modification notifications, set up in response to the 1990 EC directives, pressured the government to permit the exclusion of substantial amounts of information. The industry’s claim of competitive disadvantage following the introduction of the 1992 regulations also drove the government to press for amendments to the EC directives in Brussels (Science and Technology Committee 1992).

4. Security Concerns and the Evolving Regulatory Environment

The primary concerns with genetic technologies in the twentieth century were related to lab safety, public health, and the environment. This began to change in the mid 1990s as bioterrorism concerns came to the fore in the United States (Guillemin 2005; Wright 2006). While it had been illegal to possess biological agents for use as a weapon for some time in the US,¹⁶ it was following the mid 1990s incident in which the microbiologist and white supremacist Larry Wayne Harris ordered strains of *Yersinia pestis* from a supplier and, later in the same year, a federal building was bombed in Oklahoma City, that certain biological agents were deemed to have the potential to pose a severe security threat.¹⁷ These ‘select agents’ were first named as such by the Antiterrorism and Effective Death Penalty Act of 1996, and comprise the ‘worst of the worst’ microbes such as bacillus anthracis, *Yersinia pestis*, Ebola virus, clostridium botulinum, Avian influenza virus, and the Bovine spongiform encephalopathy (BSE) agent. The legislation established a list of select agents, as well as procedures for the transfer of those select agents.¹⁸

It was at the start of the twenty-first century, however, following the ‘anthrax letters’ that were discovered within weeks of 9/11, that the political significance of bioterrorism and its flipside, biosecurity, changed by an order of magnitude. (p. 1126) ‘Amerithrax’—as the anthrax attacks were labelled by the Federal Bureau of Investigation (FBI)—powerfully demonstrated how biology could be used to terrorize and kill, and it emphasized the lack of means by which to detect and mitigate, much less prevent, this kind of attack (Expert Behavioral Analysis Panel 2011). The rise of political concern with biosecurity was echoed in the focus of the regulatory framework. Shortly after 9/11 and Amerithrax, Congress passed the USA PATRIOT Act (2001)¹⁹ and the Bioterrorism Acts (2002)²⁰ which significantly expanded the regulation of select agents. The new legislation required that physical security measures be fitted in laboratories to safeguard select agents; and it required that plans to prevent unauthorized access be implemented, record-keeping accounts be established, laboratories and facilities submit to inspection, and relevant authorities be notified in the event of theft, loss, or release (Bioterrorism Acts 2002).

Significant attention was paid in the new legislation to personnel security, and they contained a new set of oversight provisions that went into force without public notice and comment. Specifically, the legislation required that individuals who have a legitimate need to work with select agents are registered, and that they are trained in working with select agents (Bioterrorism Acts 2002). It further required that they undergo a security risk assessment, to identify any ‘restricted persons’ (including nationals of countries that the Secretary of State determines support international terrorism) or individuals reasonably suspected of being involved with terrorist organizations (Bioterrorism Acts 2002). The risk assessments are conducted by the FBI using criminal, immigration, national security, and other electronic databases, and typically take about a month to complete, according to the head of the FBI unit responsible for the assessments (Roberts 2009). A decade after 9/11 and Amerithrax, approximately 35,000 assessments had been

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processed, and about 250 individuals had been restricted, the majority of these (around 70 per cent) because they had been convicted of a crime (Bane and Strovers 2008; Majidi 2011). Individuals granted access to work with select agents must undergo new security risk assessments every three to five years (Bioterrorism Acts 2002). In addition, the FBI continually monitors individuals with access to select agents to examine if they are arrested, finger-printed, or subjected to a criminal history check (Bioterrorism Acts 2002).

Several agencies—including the Departments of Defense, Energy, Agriculture, and Homeland Security as well as the National Institutes of Health and Centers for Disease Control and Prevention—have gone even further, voluntarily implementing personnel reliability programmes to ensure that individuals granted access to sensitive material, in this case select agents, are ‘trustworthy, responsible, stable, competent in the performance of their duties, and not a security risk’ (National Science Advisory Board for Biosecurity 2009; White House Working Group 2009). A regular feature of chemical and nuclear weapons programmes, personnel reliability (p. 1127) programmes may include background investigations; security clearances; medical records reviews and/or medical examinations; psychological screening; drug testing; screening for alcohol misuse, abuse or dependence; polygraph examinations; credit checks; comprehensive personnel record reviews; and mechanisms for continuous personnel monitoring (certifying official, supervisor, medical evaluator, and self- and peer-reporting).

The new legislation also provided the FBI and the Department of Justice with the authority to seize biological agents where there is probable cause to believe they would be used as a weapon, and to prosecute the perpetrators (Bioterrorism Acts 2002). Cases that the FBI highlights as ‘examples of successes’ include: (1) the conviction in 2003 of a computer programmer in Washington State who manufactured ricin as a biological weapon. He was sentenced to 14 years in prison. (2) The conviction in 2003 of a medical researcher in Texas who inappropriately handled and transferred plague samples. He was sentenced to 24 months in prison. (3) The conviction in 2008 of a man found to have a copy of the *Anarchist Cookbook*, earmarked to a page entitled ‘How to Prepare Ricin’, a bag full of ricin as well as weapons and hand-made silencers in a Las Vegas hotel room. He was sentenced to 42 months in prison, a \$7,500 fine, and three years of supervised release. (4) The conviction in 2009 of a man for sending hoax anthrax letters to financial institutions. He was sentenced to 46 months in prison, a \$5,000 fine, and \$87,734.40 in restitution (United States 2004; Majidi 2011).

Only a handful of nations outside the United States regulate select agents, and most of these were put into effect after 2001. In the United Kingdom, for instance, select agents are referred to as ‘schedule 5 pathogens’, after the appendix listing the pathogens of concern in the 2001 Anti-terrorism, Crime and Security Act regulations; in Australia, select agents are referred to as ‘security sensitive biological agents’ and are regulated by the National Health Security Act 2007; in Israel, they are referred to as ‘biological disease agents’ and are regulated by the Regulation of Research into Biological Disease Agents Act 2008.

5. From Bugs and People to Experiments and Dangerous Knowledge

Complementing the select agents regulations in the United States has been the introduction of a second set of security regulations focused on the potential misuse of knowledge and information in the biosciences (US Government 2012). While the (p. 1128) regulations only came into force in March 2012, they had been in development for at least a decade before that, triggered by a scientific experiment published in the *Journal of Virology* in early 2001.

The publication set off a series of high profile discussions about the intersection of life science research and security. Scientists at the Australian National University had been developing a new mechanism of pest control to limit the population densities of wild mice (Jackson and others 2001). They were aiming to produce an infectious immunocontraceptive—basically a vaccine that prevents pregnancy through an immune response. To make the vaccine, the researchers had inserted a gene encoding an antigen from fertilized mouse eggs into a mousepox virus. Immune mice were then infected with the antigen-expressing mousepox virus in the hope that this would stimulate antibodies against their eggs, causing them to be destroyed and rendering the mice infertile. It didn't work; the infected mice did not become infertile.

The researchers then attempted to boost antibody production by increasing the virulence of the mousepox virus. To do this, they inserted another gene into the mousepox virus, one that creates large amounts of interleukin 4 (IL-4), as previous studies had shown this to be an effective approach. And indeed it was. The addition of the IL-4 gene made the altered virus more virulent than the parent virus and successfully increased the production of antibodies against their eggs. But unexpectedly, it also completely suppressed the ability of the immune systems of the mice to combat the viral infection. Normally mousepox only causes mild symptoms in the type of mice used in the study, but with the IL-4 gene added it wiped out all the animals in nine days. Even more unexpected, mouse strains susceptible to mousepox virus, but which had recently been immunized against it, also died (Jackson and others 2001).

The publication of the paper and its unexpected findings immediately led to security concerns. While mousepox does not affect humans, there were concerns that if human IL-4 was inserted into smallpox—the human equivalent of mousepox—lethality would increase dramatically. The fact that immunized mice also died suggested that smallpox vaccination programmes could be of limited use. The *New Scientist* article that broke the story asked 'How do you stop terrorists taking legitimate research and adapting it for their own nefarious purposes?' (Nowak 2001).

The mousepox experiment was one of the prominent cases highlighted by NAS committees set up to examine the next generation of biological threats and ways of mitigating them in the years following 9/11 and Amerithrax. They released two reports, in 2004 and 2006, arguing that the US regulatory system's focus on select agents, most of which are

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well-recognized 'traditional' biowarfare agents developed by some countries during the 20th century, was in large part a response to the use of the 'classic' biowarfare agent of choice, anthrax, in the 2001 postal attacks, but that this was a dangerously narrow focus. Select agents

(p. 1129)

are just one aspect of the changing landscape of threats. Although some of them may be the most accessible or apparent threat agents to a potential attacker, particularly one lacking a high degree of technical expertise, this situation is likely to change as a result of the increasing globalization and international dispersion of the most cutting-edge aspects of life sciences research.

(Committee on Advances in Technology 2006)

The conception of biological threats must therefore be broadened, it was argued, beyond specific lists of pathogens, to one that also encompasses the particular research carried out (Committee on Advances in Technology 2006). However, useful distinctions between permitted and prohibited activities at the level of basic research are difficult to make because the same techniques used to gain insight into fundamental life processes for the benefit of human health and welfare may also be used to create a new generation of biowarfare agents. So rather than focusing on methods to identify and prohibit certain areas of research, it was advocated that channels of communication be developed between the life science community and government agencies to raise awareness of potential problems and to provide greater oversight of the research (Committee on Advances in Technology 2006).

Seven classes of experiments were identified that illustrated the types of research or discoveries that they felt should be reviewed before being carried out, and they coined them 'experiments of concern' (Committee on Research Standards and Practices 2004). Reviews of these kinds of experiments were to follow the model used to review recombinant DNA experiments, which in the first instance relies on local Institutional Biosafety Committees comprised of researchers and managers. Expanding on the recombinant DNA oversight model, reviews of research proposals were also to be carried out by funders and reviews of results carried out by publishers:

The heart of the system would be a set of guidelines to help identify research that could raise concerns ... they will provide criteria that can assist knowledgeable scientists, editorial boards of scientific journals, and funding agencies in weighing the potential for offensive applications against the expected benefits of an experiment in this arena.

(Committee on Research Standards and Practices 2004: 85)

The spreading of risk assessment across the research pipeline from funding to publication was in line with the thinking of publishers and funders. Around the same time, an influential group of journal editors and authors had developed in-house policy on the role of

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journal editors in identifying and responding to security issues raised by papers submitted for publication (Atlas and others 2003). They asserted that in circumstances where the potential risks outweigh the societal benefits the paper should be modified or not published (Atlas and others 2003). The major funders of bioscience research in the UK released a joint policy statement in 2005 on 'Managing Risks of Misuse Associated with Grant Funding Activities'; it outlined the introduction of a question on grant proposal forms asking applicants to consider the risks of misuse associated with their research (BBSRC, MRC, & Wellcome (p. 1130) Trust 2005). Similar steps have been taken at an EU level. Horizon 2020, which is the biggest EU Research and Innovation programme with nearly €80 billion funding available from 2014 to 2020, includes advice on misuse in its guidance note, 'How to complete your ethics self-assessment'. The guidance note contains a number of tick boxes, including the question: 'Does your research have the potential for malevolent/criminal/ terrorist abuse?'. If the answer is affirmative, applicants 'must make a risk-assessment and take appropriate measures to avoid abuse' (European Commission 2014). While the document provides some examples of the types of measures that could be adopted to avoid abuse (such as ensuring adequate security for the facility used, appointing an expert security adviser to the research project, and giving all personnel appropriate training), there is little advice on the criteria for conducting the risk assessment. Such criteria have also been absent from the publishers' debate, and, in practice, there have been few instances in which this has led to calls for a restriction on publication. At an NSABB hosted conference in 2008, a number of journal editors reported that few manuscripts of 'dual use concern' had been received between 2003 and 2008 and that none had been rejected on the basis on security concerns (Nightingale 2011).

The focus on the research itself, rather than on hardware, bugs, or people, was also picked up by the National Science Advisory Board for Biosecurity (NSABB), established in 2006, on the recommendation of the 2004 NAS report, to advise the US government on oversight of dual use life science research. In its advice, the NSABB adopted a modified version of the seven 'experiments of concern' to act as a guide by which knowledge, products or technologies could be evaluated for their potential as 'dual use research of concern'. Despite the recognition that 'there may be significant variation in the assessment of the dual use potential of any particular research project when it is considered by two or more different, equally expert reviewers' and that 'in many cases, there may be no clearly right or wrong answer', the NSABB recommended that the primary review of research projects be carried out by scientists themselves (NSABB 2007: 22). Given the difficulties inherent in explicitly defining the point at which the magnitude or immediacy of the threat of misuse makes dual use research 'of concern', the NSABB advised an emphasis at the institutional level on education and enhanced principal investigator awareness of dual use concerns (NSABB 2007: 22). If, during the primary review process, a project is considered to be dual use of concern, the NSABB advised a more elaborate system of review.

The regulations that were eventually implemented by the US government in March 2012 opted for somewhat different criteria for establishing dual use research of concern. Like the NAS and NSABB oversight models, the government regulations require a review of

research that aims to, or is reasonably anticipated to, produce one or more of seven categories of effects, such as enhancing the harmful consequences of an agent, altering the host range of an agent, or increasing the stability or transmissibility of an agent (US Government 2012). However, the government limits the (p. 1131) review to research carried out with one of 15 select agents deemed to pose the greatest risk of deliberate misuse with most significant potential for mass casualties or for devastating effects to the economy, critical infrastructure, or public confidence (US Government 2012). The review is also limited to public research, ie research funded or conducted by the government, and is to be carried out at the institutional level. Institutions are to notify funding departments and agencies, which in turn report to the Assistant to the President for Homeland Security and Counterterrorism. If any risks posed by the research cannot be adequately mitigated by modifying the design of the project, applying enhanced biosecurity or biosafety measures and the like, then voluntary redaction of publications or communications may be requested, the research may be classified, or the funding may be terminated (US Government 2012). A more detailed policy articulating and formalizing the roles and responsibilities of institutions and investigators was introduced in September 2014 with effect from September 2015 (White House 2014).

No other countries have to date developed guidance or practices like this addressing the potential for terrorist misuse of the knowledge based on bioscience research.

6. Potentially Pandemic Pathogens

Around the same time the US government first introduced its regulations on knowledge-based risks, another scientific experiment was attracting attention and was to provide a real-world test case for thinking about bioscience risks from the stage of research hypothesis development. It transpired that two leading influenza laboratories, under the leadership of Ron Fouchier and Yoshihiro Kawaoka, had conducted high-risk mutation experiments with H5N1 avian influenza, or 'bird flu'. H5N1 does not spread easily from human to human, but it kills more than 50% of people infected. Fouchier and Kawaoka were concerned that H5N1 could naturally become readily transmissible between mammals and still remain highly virulent, and the virologists were worried that governments were not taking the threat seriously enough. In the summer of 2011, both groups passed H5N1 among ferrets as an animal model and discovered that a mutated H5N1 virus that was air transmissible could indeed emerge. In other words, in their labs they had developed a novel, more contagious strain of the bird flu virus that could spread to humans and other mammals.

Kathleen Vogel (2013–2014) has described the unfolding story in some detail. In short, Fouchier submitted his paper to the prestigious journal *Science*; Kawaoka favoured *Nature*. In September Fouchier revealed his findings at a scientific meeting (p. 1132) in Malta: his mutated virus was airborne and as efficiently transmitted as the seasonal flu virus. In public, he commented that '[t]his is a very dangerous virus' (see Harmon 2011).²¹ The NIH grew concerned about the security implications if the results were published: could

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bioterrorists adopt similar gain-of-function (GOF) techniques to increase the pathogenicity and transmissibility of viruses? The NIH asked NSABB, the US government advisory body on dual use life science research oversight to review both papers. By the end of November, NSABB recommended that the papers' general conclusions highlighting the novel outcome be published, but that the manuscript not include a methods sections with details of how to carry out the experiment (US Department of Health and Human Services 2011). This was the first time NSABB had recommended restrictions on scientific publications in the life sciences.

The safety and security implications of the experiment got a great deal of media coverage. The *New York Times* ran an editorial with the unambiguous headline 'An Engineered Doomsday', arguing that the modified flu virus could kill tens or hundreds of millions of people if it escaped the lab or was stolen by terrorists. Proponents of GOF research, on the other hand, argued that such studies help us understand influenza transmission and can help public health researchers detect an impending flu pandemic and prepare vaccines (Vogel 2013–2014).

In January 2012, a prominent group of virologists wrote to NSABB to reconsider. NSABB published an explanation and defence in both *Nature* and *Science*. The primary reason for the unprecedented redaction was that 'publishing these experiments in detail would provide information to some person, organization, or government that would help them develop similar mammal-adapted influenza A/H5N1 viruses for harmful purposes'. By mid-February 2012, the World Health Organization (WHO) convened a technical consultation on the Fouchier and Kawaoka experiments (World Health Organization 2012a, 2012b). Both scientists attended and presented new data related to the manuscripts. The WHO meeting agreed a temporary moratorium was needed to address public concerns. Fouchier and Kawaoka were to revise their manuscripts with new details and submit them to NSABB for second security review.

Fouchier backtracked. He now stated that his group's mutated virus was not lethal when inhaled by ferrets and would not spread 'like wildfire' through the air; in fact, transmission would not be easy. He also said that most of the ferrets that had contracted the virus via aerosol transmission had hardly become sick, and none had died. He clarified, however, that the mutated virus did cause disease when injected in very high concentrations into the lower respiratory tract of ferrets.

In the end, NSABB recommended publication of Kawaoka's revised paper in full, but some board members continued to have concerns about Fouchier's paper. They felt it was 'immediately and directly enabling' for terrorism and a 'pretty complete cookbook' for causing harm. By May 2012 Kawaoka's paper was published in *Nature*. Fouchier's paper followed suit and was published in *Science* in June 2012.

(p. 1133) Following the voluntary moratorium, work resumed on GOF experiments in 2013, with scientists in multiple labs adding new properties to biological agents and creating modified variants of viruses that do not currently exist in nature. Within a short space of time, however, new papers on human-made H5N1 and other dangerous flu strains rekin-

dled concerns about potentially pandemic pathogens created in the lab—in part because a series of lab accidents and breaches at the NIH and Centers for Disease Control and Prevention (CDC) raised questions about safety at high-containment labs. On 17 October 2014, the US government stepped in, imposing a federal funding pause on the most dangerous GOF experiments and announcing an extended deliberative process (Public Health Emergency 2014).

7. Synthetic Biology and Mutational Technologies

Many have viewed the GOF controversy as a test case of what is to come when the still emerging field of ‘synthetic biology’ begins to mature. Aiming to create a rational framework for manipulating the DNA of living organisms through the application of engineering principles, synthetic biology’s key founding principle is ‘to design and engineer biologically based parts, novel devices, and systems, as well as redesigning existing, natural biological systems’—in other words, to engineer biology (Royal Academy of Engineering 2009).

Although many characterize it as a twenty-first-century science, the history of synthetic biology can be traced to 1979, when the first gene was synthesized by chemical means (Khorana 1979). The Indian-American chemist Har Gobind Khorana and 17 coworkers at the Massachusetts Institute of Technology took several years to produce a small gene made up of 207 DNA nucleotide base pairs. In the early 1980s, two technological developments facilitated the synthesis of DNA constructs: the invention of the automated DNA synthesizer and the polymerase chain reaction (PCR), which can copy any DNA sequence many million-fold. By the end of the 1980s, a DNA sequence of 2,100 base pairs had been synthesized chemically (Mandecki and others 1990).

In 2002 the first functional virus was synthesized from scratch: poliovirus, whose genome is a single-stranded RNA molecule about 7,500 nucleotide base pairs long (Cello, Paul, and Wimmer 2002). Over a period of several months, Eckard Wimmer and his coworkers at the State University of New York at Stony Brook assembled the poliovirus genome from customized oligonucleotides, which they had ordered from a commercial supplier. When placed in a cell-free extract, the viral genome then (p. 1134) directed the synthesis of infectious virus particles. The following year, Hamilton Smith and his colleagues at the J. Craig Venter Institute in Maryland published a description of the synthesis of a bacteriophage, a virus that infects bacteria, called ϕ X174. Although this virus contains only 5,386 DNA base pairs (fewer than poliovirus), the new technique greatly improved the speed of DNA synthesis. Compared with the more than a year that it took the Wimmer group to synthesize poliovirus, Smith and his colleagues made a precise, fully functional copy of the ϕ X174 bacteriophage in only two weeks (Smith H and others 2003).

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Since then, the pace of progress has been remarkable. In 2004, DNA sequences 14,600 and 32,000 nucleotides long were synthesized (Kodumai and others 2004; Tian and others 2004). In 2005, researchers at the US Centers for Disease Control and Prevention used sequence data derived from the frozen or paraffin-fixed cells of victims to reconstruct the genome of the 'Spanish' strain of influenza virus, which was responsible for the flu pandemic of 1918–1919 that killed tens of millions of people worldwide; the rationale for resurrecting this extinct virus was to gain insights into why it was so virulent. In late 2006, scientists resurrected a 'viral fossil', a human retrovirus that had been incorporated into the human genome around 5 million years ago (Enserink 2006). In 2008, a bat virus related to the causative agent of human SARS was recreated in the laboratory (Skilton 2008). That same year, the J. Craig Venter Institute synthesized an abridged version of the genome of the bacterium *Mycoplasma genitalium*, consisting of 583,000 DNA base pairs (Gibson and others 2008). In May 2010, scientists at the Venter Institute announced the synthesis of the entire genome of the bacterium *Mycoplasma mycoides*, consisting of more than 1 million DNA base pairs (Gibson and others 2010; Pennisi 2010). The total synthesis of a bacterial genome from chemical building blocks was a major milestone in the use of DNA synthesis techniques to create more complex and functional products. In 2014, a designer yeast chromosome was constructed—a major advance towards building a completely synthetic eukaryotic (i.e. non-bacterial or single-celled) genome (Annaluru and others 2014).

These advances have been complemented by progress in gene-editing technology, which is enabling deletions and additions in human DNA sequences with greater efficiency, precision, and control than ever before. CRISPR (clustered regularly interspaced short palindromic repeats) has become the major technology employed for these purposes and has been used to manipulate the genes of organisms as diverse as yeast, plants, mice, and, reported in April 2015, human embryos (Liang and others 2015). CRISPR relies on an enzyme called Cas9 that uses a guide RNA molecule to home in on its target DNA, then edits the DNA to disrupt genes or insert desired sequences. Most of the components can be bought off the shelf; often it is only the RNA fragment that needs to be ordered, with a total cost of as little as \$30 (Ledford 2015:21). Characterized as 'cheap, quick and easy to use', it (p. 1135) has been labelled the 'biggest game changer to hit biology since PCR', the gene-amplification method that revolutionized genetic engineering after its invention in 1985 (Ledford 2015: 20).

Genetic changes in one organism usually take a long time to spread through a population. This is because a mutation carried on one of a pair of chromosomes is inherited by only half the offspring of sexually reproducing populations. But a novel method called 'gene drive' allows a mutation made by CRISPR on one chromosome to copy itself to its partner in every generation, so that nearly all offspring will inherit the change (Ledford 2015). This means an edited gene can spread through a population exponentially faster than normal. Potential beneficial uses of gene drives include reprogramming mosquito genomes to eliminate malaria, reversing the development of pesticide and herbicide resistance, and locally eradicating invasive species (Ledford 2015). But commentators have also drawn

attention to some of the environmental and security challenges they raise, concluding that:

For emerging technologies that affect the global commons, concepts and applications should be published in advance of construction, testing, and release. This lead time enables public discussion of environmental and security concerns, research into areas of uncertainty, and development and testing of safety features. It allows adaptation of regulations and conventions in light of emerging information on benefits, risks, and policy gaps. Most important, lead time will allow for broadly inclusive and well-informed public discussion to determine if, when, and how gene drives should be used.

(Oye and others 2014)

It is precisely this sort of ‘lead time’ for ‘broadly inclusive and well-informed public discussion’ the US government has been trying to implement with its funding pause on GOF experiments and the extensive deliberative process (Public Health Emergency 2014). Yet, the process has not been without its teething problems. Foremost is the de facto lack of transparency and open discussion. Genuine engagement is essential in the GOF debate where the stakes for public health and safety are unusually high, and the benefits seem marginal at best, or non-existent at worst. As observed in relation to CRISPR, where there have been calls for a similar process: ‘A moratorium without provisions for ongoing public deliberation narrows our understanding of risks and bypasses democracy’ (Jasanoff, Hurlbut, and Saha 2015).

8. Conclusion

This chapter has provided a broad-brush sketch of how policies and regulatory frameworks for bioengineering have formed and developed. It has emphasized the role of powerful actors like the NAS and NIH as well as individual scientists in defining (p. 1136) the ‘problem’ with gene splicing when it first became a reality in early 1970s USA. It has also highlighted the way in which the oversight structures and requirements of the first, American regulatory framework of this technology were transferred and adapted internationally, conferring legitimacy on national solutions. The health and environment focus of the twentieth-century regulatory frameworks were extended to security at the start of the twenty-first, particularly in the United States, reflected in restrictions on certain microbes (‘select agents’) and particular scientists (‘restricted persons’). As the science has raced on, new concerns have emerged in the sociopolitical sphere, and regulations have been introduced that focus on the potential misuse of knowledge and information in the biosciences—expanding the regulatory focus from physical and biological containment precautions, through restrictions on microbes and individual scientists, to limits on the kinds of experiments conducted and what can be known. The United States continues to be the lead developer of bioengineering technologies and to act as the standard-setter in this area.

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Today, there is a growing convergence of concern about new gene technologies that raise significant societal, ethical, environmental and security risks (Lentzos, van der Bruggen, and Nixdorff 2015). The White House is to be commended for putting the funding pause in place and launching the deliberative process on GOF experiments which poses the greatest, most immediate threat to humanity. While adding new properties to microbes and allowing them to jump to new species or making them more transmissible are not new concepts, there is grave concern about a subset of experiments on influenza and SARS viruses which could metamorphose them into pandemic pathogens with catastrophic potential. The deliberative process has so far, however, been exceedingly US-centric and lacking in engagement with the international community. Microbes know no borders. The rest of the world has a huge stake in the regulation and oversight of GOF experiments—and they are likely to follow US initiatives. The regulations that emerged following the 1975 Asilomar conference on recombinant DNA are a prime example of this. GOF, as well as synthetic biology and other emerging gene technologies, need a globally representative group from all parts of society to develop a common understanding of where the red lines should be drawn. Provision must be made for robust, broad, and deep public engagement and harnessing the views of civil society.

Some of the key lessons from the original 1975 Asilomar meeting were that the areas of concern must not be restricted, the complexity of arguments must not be reduced, and the representation of different perspectives at the table must be enlarged. Different perceptions of the problem will lead to different conclusions about what an appropriate regulatory framework should look like. For instance, had there been wider representation at Asilomar, the recombinant DNA regulations might also have extended to apply to the military and commercial sectors, and not been limited to those in receipt of NIH funds. Legislation rather than controlling the purse strings could have been the vehicle of regulatory control. These lessons all underscore the importance of an open, inclusive debate that also extends into the decision-making process.

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Audience Constructions, Reputations, and Emerging Media Technologies: New Issues of Legal and Social Policy

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Abstract and Keywords

This chapter traces how changes in media and surveillance technologies have influenced the strategies producers have for constructing audiences. The largely unregulated practices of information gathering that inform the measurement and evaluation of audiences have consequences for how individuals are viewed by media producers and, consequently, for how they view themselves. Recent technological advances have increased the specificity with which advertisers target audiences—moving from the classification of audience groups based on shared characteristics to the personalization of commercial media content for individuals. To assist in the personalization of content, media producers and advertisers use interactive technologies to enlist individuals in the construction of their own consumer reputations. Industry discourse frames the resulting personalization as empowering for individuals who are given a hand in crafting their media universe; however, these strategies are more likely to create further disparity among those who media institutions do and do not view as valuable.

Keywords: audience construction, audience measurement, consumer reputations, advertising, surveillance, personalization, interactive media, consumer empowerment

1. Introduction

AUDIENCES are, by their very nature, constructions. These groupings of individuals, which are often discussed as if they are naturally occurring collectives, do not coalesce instinctively; rather, the audience is a product that is carefully compiled and managed by those wishing to communicate. In 1907, Walter Dill Scott, an early scholar of advertising psychology, described the role of the speaker in constructing an audience for his message:

(p. 1144)

The orator's influence is in direct proportion to the homogeneity of the audience. The orator who is able to weld his audience into a homogeneous crowd has already won his hardest fight. *The difficult task is not to convince and sway the crowd, but to create it.*

(1907: 179)

Scott's words reveal that, as early as the beginning of the twentieth century, communication professionals recognized that audiences do not exist as a priori groups. Instead, it is the job of the communicator to assemble an audience that is likely to be receptive to his message. When the goal of communication is to persuade, as is the case with advertising, the construction of a sympathetic audience takes on even greater importance. The practice of audience construction has a long history in the field of advertising. In the nineteenth century, newspapers relied on circulation numbers to prove to advertisers that they reached a wide audience. Magazines sought to compete with newspapers by forgoing mass circulation in favour of niche audiences with particular commercial interests or high levels of disposable income. The declining dominance of mass media channels throughout the twentieth century and the relatively recent rise of interactive media have further encouraged advertisers to think creatively about how they construct and engage their audiences.

The industrial shifts in audience construction over the last two centuries have been enabled by the evolving affordances of communication technologies. Advances in media production that make it easier to publish and disseminate content have supported the fragmentation of media channels and the corresponding splintering of audiences. This change has led media producers to develop specialized content designed to appeal to narrow social segments. Although media producers have occasionally lamented the fragmented media landscape as representing a threat to their business models, advertisers have embraced segmentation as a way to identify and speak directly with preferred populations. Over this same period, we have witnessed a rise in the sophistication of commercial surveillance technologies. These tools, which range from credit cards and loyalty cards to digital cookies and mobile GPS, have enabled the more complete monitoring of audience behaviours. Access to this data has provided advertisers with granular information about the interests and actions of consumers. As the available tools for seeing, measuring, and targeting populations have grown more sophisticated, so too have strategies for defining and evaluating consumers. Consistent with economic shifts that have moved away from the mass production of goods to the manufacture of highly customized products, advertisers no longer think exclusively in terms of mass marketing campaigns that reach an entire country or region. Rather, they focus on understanding and exploiting the differences between audience groups that are reflected in consumer goods and the corresponding advertising. Advertisers make use of the data available from a variety of sources to craft consumer reputations that inform the advertising individuals receive. Together, the fragmentation of communication channels and the proliferation of consumer surveillance

technologies have provided advertisers with the tools to analyse, reflect, predict, and shape audience preferences.

(p. 1145) Research and commentary about the ways consumer information informs advertisers' methods has largely focused on privacy and surveillance. We frame this discussion slightly differently by focusing on the role that consumer reputations play in shaping the media landscape individuals' experience. In this chapter, we explore the processes and implications related to advertisers' use of new media technologies to craft the reputations that inform their construction of audiences. We argue the ways advertisers craft their audiences is important because of the central role advertising plays in society. In addition to its economic function, promoting the sale of goods and services, advertising has a social role: to tell stories. The messages conveyed in advertisements are powerful narratives that reveal and reinforce social norms and expectations. Increasingly, the stories advertisers tell are not just about society at large; they are about specific individuals. The growing personalization of media content means that the advertisements we receive signal something about our social worth—at least in so far as marketers define it. Advertisers make many arguments in favour of commercial messages: they provide consumers with information; they reduce the cost of media content; in some cases, they may even entertain. Moreover, advertisers argue, personalized marketing efforts enrich the audience experience by allowing them to skip irrelevant commercial blandishments in favour of more pertinent ads. These benefits notwithstanding, contemporary advertising also works to discriminate, segregate, and marginalize. The following pages will show how audience surveillance technologies that enable advertisers to define the reputations of groups and individuals conflict with emerging industrial rhetoric that position advertising as an arena for consumer empowerment.

2. Advertisers' Construction of Audiences

The turn of the twentieth century brought with it a new form of market capitalism characterized by rapid industrialization and the mass production of large quantities of consumer goods (Leach 1993: 5). As a result of the industrial revolution, so many goods were flowing out of factories and into stores that industrialists feared overproduction might push prices low enough to drive manufacturers and retailers out of business. Advertising aimed to produce demand for consumer goods to guard against the costs of overproduction. Newspapers and magazines provided valuable vehicles for advertisers looking to get their copy in front of as many eyes as possible. Technological developments in printing and transportation in the early 1800s allowed for mass production and wide distribution, thereby turning these periodicals into channels for mass communication (Cooper 2003: 103). In the mid (p. 1146) 1800s, US newspaper editors began to turn away from business models that relied on annual subscriptions. Instead, they sold daily papers for pennies an issue—a practice that led to the characterization of this period as the 'penny press' era—and relied on advertising to generate revenue (Cooper 2003). By the end of the 1880s, most newspaper and magazine publishers had embraced the idea that general interest

periodicals with wide circulation were the best way to attract advertising dollars (Turow 1997: 22).

Newspapers and magazines reported their circulation numbers to prove to advertisers that their promotional dollars were well spent. These ratings determined the worth of each periodical and drove the prices publishers were able to charge for ads placed in their pages. Although circulation figures quickly became the currency of exchange between advertisers and publishers, there was disagreement on how these numbers should be measured and reported. Given the importance of circulation figures for setting the price of advertising space—known as the cost per thousand or *mil* (CPM)—advertisers suspected the newspapers of inflating their statistics. By the end of the nineteenth century, advertisers were demanding methods of verifying the accuracy of audience measurements provided by the newspapers (Cooper 2003: 103). Two early auditors of newspaper circulation figures—the American Advertising Association and the Bureau and Verified Circulations—merged in 1914 to become the Audit Bureau of Circulations (Cooper 2003). The organization provided circulation numbers for any newspaper, magazine, trade publication, or other publication in the US and would suspend publications suspected of submitting falsified circulation numbers (Cooper 2003: 104). Although there are other organizations that now provide this information, the Audit Bureau of Circulations, recently renamed the Alliance for Audited Media, remains a key industry source for information about the numbers of subscriptions and single purchases for periodicals.

The notion that mass advertising campaigns delivered through general interest publications was the optimal way to reach consumers dominated marketing campaigns in the late 1800s and early 1900s. These campaigns tended to focus on speaking to a broad middle-class audience that was assumed to share a uniform set of consumer preferences and tastes. Even in these mass media campaigns, however, advertisers developed messages that spoke to a preferred audience. Historian Gary Cross reveals that advertisers' mass messaging campaigns were designed to appeal primarily to the more affluent members of society (2002: 35). Advances in population research coming out of the social sciences in the mid-twentieth century allowed marketers to further rethink how they attracted particular audiences. In response to survey data that revealed social and demographic trends in the population, advertisers abandoned a rigid focus on 'the average' American in favour of new marketing theories that emphasized the *differences* between sociological categories (Cohen 2004: 299). Thinking about Americans' taste preferences shifted as confidence in mass advertising as the preferred strategy for reaching consumers eroded.

(p. 1147) Advertisers began to look for ways to reach particular audience groups that they identified as sharing a narrower set of characteristics. Although the practice had been around in some form since the 1920s, Lisabeth Cohen observes the first uses of the term market segmentation in the 1950s to refer to the practice of creating 'homogeneity of buyers within a segmented market, heterogeneity of buyers between segmented markets' (2004: 295). This strategy of dividing the population into distinct groups and sending them targeted messages reveals a shift in industrial thinking about the nature of audiences. Rather than assuming a single message would be sufficient to persuade all con-

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sumers, market segmentation reflected an emergent belief in diverse publics with different values and lifestyles that could be reproduced through the symbolic value of consumer products. As media tools that allowed for market segmentation matured, mass customization strategies—the practice of selling slightly different products to different parts of the market—were pursued as a profitable approach to production and marketing.

Publishers responded to advertisers' desires to reach narrower audiences by reshaping content to attract groups with more narrowly defined sets of interests. In order to survive the Great Depression, a number of magazines abandoned mass circulation strategies and repositioned themselves as niche publications. They hoped the move would allow them to attract advertisers interested in reaching particular social groups (Cross 2002: 79). These new specialty magazines focused on narrow topics that were designed to appeal to attractive audience segments. Rather than trying to compete with mass circulation periodicals, these magazines cultivated distinct images designed to bring together valuable consumer populations and the advertisers who wished to speak with them (Turow 1997: 29). Just as magazines shifted strategies in response to the threat of mass circulation newspapers, radio stations, under threat from television, turned to market segmentation by age, race, and music preference as a way to maintain their revenue streams. Radio consultants and management believed a formatted flow of music, news, and commercials hosted by radio personalities would signal to members of the target audience that the station wanted to attract them. By the 1950s, the DJ format had become a staple of American radio, and ad agencies crafted messages to speak to the stations' intended audiences (Turow 1997: 31).

The possibilities of targeted advertising were extended in the 1980s as media channels, particularly television, became increasingly fragmented. As regulatory limits on the distribution of cable channels in the US weakened in the 1970s, the television landscape experienced a flood of new stations that challenged the dominance of ABC, CBS, and NBC, collectively known as the big three broadcasters (Turow 1997). Much as radio stations had developed personality-based formats to attract particular groups of listeners, cable television networks began to focus on audience segments desirable to advertisers (Turow 1997: 52). While television broadcasters could lay claim to attract diverse audiences at different times of day, with shows aimed at children, women, and men, format-based channels spoke (p. 1148) directly to unique market segments. Strategies to carve up the American population were not, however, driven solely by changes in the media industry. Advertisers felt that, in the wake of the civil rights struggles and the growth of identity politics, the Americans population was increasingly divided on social issues (Turow 1997: 40–41). As a result, marketers included thinking about people's *lifestyles* in addition to traditional demographic characteristics to understand commercial desires. The resulting segmentation strategy allowed advertisers to respond to perceived social fractionalization by reflecting and creating social difference through their commercial messages.

As advertisers began to think differently about the most profitable ways to reach audiences, television networks had to similarly rethink how they constructed and measured audiences. Nielsen most prominently offered ratings for individual shows that helped determine how much networks could charge for advertisements. Originally, Nielsen report-

ed the number of homes that had tuned into a programme based on data collected from devices called 'audimeters' that were installed in a sample of homes around the country. With the introduction of diaries in which households would record which family members watched a given programme, Nielsen was able to supplement data collected through the audimeters with more specific information about the gender, age, and economic status of viewers (Barnouw 1978: 70). By the 1970s, notes media historian Erik Barnouw, consumer ratings had taken on a scientific authority and networks survived based on their ability to deliver the programming and audiences that met the demographic needs of their advertisers (1978: 70–71).

3. The Controversies in Audience Measurement

The mission of the Audit Bureau of Circulations—to provide 'facts without options' (Bennett 1965)—reflects this conception of audience measurement as a science. Over the decades, however, there have been a number of challenges to the validity of audience measurement. Critics have charged, for example, that the Audit Bureau of Circulations strategy for reporting paid circulation based on the number of copies sold for at least 50 per cent of the base price potentially obscures important differences in how periodicals are sold and consumed (Atkinson 1998). More broadly, others have raised concerns that audience measurement approaches dictate industry strategies toward audiences in ways that may ignore certain populations or define them in ways they find inimical. At different points, Nielsen has been (p. 1149) accused of inadequately measuring minority audiences, a pattern that threatens to depress the availability of programming targeted at these audiences (Napoli 2005). This concern was particularly acute in the 2004, when politicians, advocacy groups, and networks banded together to call into question methods they said undercounted the viewing habits of African American and Hispanic audiences (Barnes 2004). Nielsen has introduced a number of strategies to address concerns about inaccuracies in its ratings including increasing the compensation amounts given to minority households for their participation and offering classes on how to properly use the meters (Barnes 2004). Media economist Philip Napoli notes that, although there are ways to improve audience measurement systems, the difficulties faced by Nielsen in capturing the viewing habits of minority audiences reflect broader problems with audience measurement tools (Napoli 2005).

Audience measurement strategies have been closely tied to the rising sophistication of consumer surveillance technologies in the twentieth century. Communication scholar Oscar Gandy describes the proliferation of mechanisms that provide advertisers and retailers with granular information gleaned as consumers engaged in various market and non-market transactions (1996: 132–155). Databases were developed to store this information and evaluate the economic worth of groups of consumers. These data also inform customer lists that are populated with details about demographics, hobbies, and past purchase behaviours. Advertisers find these lists valuable for determining which groups to target with their messaging campaigns. According to those in the advertising industry, this approach allows retailers to focus their attention on the consumers most likely to re-

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spond to specific sales pitches. Informed by patterns gleaned from aggregated information, marketers argue they can increase the efficiency of advertising through customization, thereby reducing the number of unwanted messages consumers encounter.

Proponents of these advertising strategies talk about the benefits of so-called targeted advertising for consumers whose media environment is relieved of unwanted and extraneous content. Advertisers use the language of relevance to argue for the benefits of advertising that speaks directly to consumers based on their particular interests. There are, however, consequences of carving up the population for the purposes of more efficient commercial messaging strategies. Elsewhere, Joseph Turow has argued that the actions of advertisers to divide up American audiences throughout the twentieth century have shifted the balance of media from what he calls society-making media to segment-making media. Segment-making media are those that encourage small slices of society to talk among themselves, while society-making media are those that have the potential to promote conversation across segments (Turow 2011: 194). Both types of media have benefits and drawbacks for supporting a healthy society. While segment-making media tend to offer their audiences a narrow set of views, society-making media have a track record of marginalizing particular voices. Together, however, these two types of media create the possibility for engagement within and across interest groups. The work of (p. 1150) advertisers in recent decades to carve up audiences threatens the balance between these two essential media formats.

This movement away from society-making media towards segment-making media is the result of an advertising strategy that works to search out and exploit differences between consumers. Media channels that speak to narrowly defined parts of the population offer advertisers the ability to speak directly to groups they deem valuable. The result is as much about determining the audiences to avoid as of finding valuable targets. As Gandy notes:

Part of the difficulty with the collection and use of personal information to support the marketing and sale of a variety of goods and services rests in the fact that personal information is not only used to *include* individuals within the marketing scan, but may also be used to *exclude* them from other life choices linked to employment, insurance, housing, education and credit.

(1996: 132)

Gandy refers to this process as the *panoptic sort*. It involves monitoring, identifying, and classifying individuals, which allows retailers and advertisers to direct their communication efforts towards groups they believe represent good investments while ignoring those who are deemed unlikely to yield a profit. While the point about sorting categories and constructing profiles from them is certainly on target, some scholars have moved away from the 'panoptic' metaphor because it implies a singular eye on people, a kind of big brother perspective. Solove (2013) is among those who see comparison with Franz Kafka's novel *The Trial* as more apt than George Orwell's *1984*. They see the contemporary predicament as many organizational eyes looking at us from many different places,

and we have no clue when, where, and how they are doing it. Those organizations may be concatenating numerous profiles about each person that are used at different times by different entities in ways often unknown or not understood by the individuals profiled. The implications can be profound, particularly when these profiles are used to make decisions about how people will be treated. ‘Turning individual profiles into individual evaluations’, Turow writes, ‘is what happens when a profile becomes a reputation’ (2011: 6). Those reputations, which assign worth to individuals and groups, play a central role in determining the promotional content an individual encounters and can be hard to shed.

Advances in media and surveillance technologies throughout the twentieth century, coupled with enticing language from advertisers about market efficiency and relevant content, helped entrench the logics of market segmentation. A mutual commitment seemed to be emerging between media producers and marketers to deliver content to narrower and narrower groups of people (Turow 1997: 190). In 1978, Barnouw wrote about the power of advertisers to inform media content decision: ‘A vast industry has grown up around the needs and wishes of sponsors. Its program formulas, business practices, ratings, demographic surveys have all evolved in ways to satisfy sponsor requirements’ (1978: 4). The development of (p. 1151) media content that allows advertisers to speak directly to homogeneous groups of consumers supports the logics of mass customization, which imagine an approach to selling where groups’ personal needs, values, and desires inform promotional content. Targeted advertising received a massive boost with the proliferation of interactive, digital technologies. Digital and mobile consumer products, such as Wi-Fi-enabled laptops and smartphones, offer advertisers tools that allow for the simultaneous collection and reflection of individuals’ behaviours and preferences. The level of detail afforded by these new technologies has helped support the fine tuning of consumer reputations and the advanced targeting of advertising.

4. From Segmentation to Personalization

Technologies of the twentieth century, such as radio, magazines, and television, allowed media producers to create content intended to appeal to a particular social segment—for example, women, African Americans, and teenagers—whom advertisers wished to reach. If we think of these platforms as technologies of segmentation, we can think of digital media platforms as providing technologies of personalization. Where twentieth-century technologies allowed advertisers to pursue homogeneous groups, presumed to have a consistent set of shared consumer tastes, digital media increasingly provides opportunities for the creation and dissemination of personalized content, offering advertisers access to audiences of one. The affordances of interactive technologies allow media producers to capture audience behaviour, analyse those practices to infer preferences, and reflect those preferences back in the form of promotional content. Moreover, in the digital era, audiences are often involved in the development of the consumer reputations that inform personalized media content.

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Contemporary marketers will say that they have always used data to distinguish among potential customers, so this new media world is really not new; however, the capability to gather hundreds of data points about people without their knowing it and then to use sophisticated computational analytics for evaluating, scoring, and predicting their behaviour adds a new dimension to the practice. The interactive capabilities of digital media have extended strategies for monitoring and allowed for the more detailed parsing of audiences. Strategies for grouping people based on shared demographics and lifestyles are based on *classification* systems. They label people based on the demographic characteristics and lifestyle markers they share with others. One example of how classification strategies inform advertiser decision (p. 1152) comes from the PRIZM geo-demographic segments developed by the consumer research company Claritas (Turow 1997). Using consumer information collected from a range of sources, the PRIZM programme, acquired in recent years by Nielsen, groups the American population into consumer segments such as Bohemian Mix, Young Influentials, and Grey Power. Claritas includes a range of information about each group that may be of interest to advertisers including where they reside and what media products they consume. The Young Influential, for example, tend to live in the suburbs, read *Details* magazine, and watch the television show *American Dad* (Nielsen 2015). This information allows advertisers to identify the parts of the country and media channels through which to disseminate their promotional materials.

Classification systems such as PRIZM are consumer reputation mechanisms that provide significant detail about the demographics and consumer preferences of the American population. The affordances of digital media, however, allow advertisers to collect information at the individual level that contribute to a personalized consumer profile. Tools that support these practices include the small data packets stored in their computer browsers called *cookies* that allow websites to track individuals' movements across the web. Let's say an individual visits a travel website to search for deals on trips to Paris. That site may drop a cookie into her browser and store within that cookie information about the type of trip she was looking at. When that individual navigates to another website, that cookie can be identified and a travel company may decide to buy space to serve an ad about trips to Paris. Simon Garfinkel observes that the introduction of the cookie and related technological developments supported the rise of highly personalized marketing: 'No longer are marketers satisfied with pools of potential customers extracted from mailing lists of records. Instead, they're aggressively seeking personalized information and creating computer systems that categorize individual consumers' (2000: 158). Moreover, in this interactive media environment, the processes that inform advertising are streamlined as digital and mobile devices act both as channels for disseminating promotional content and technologies of surveillance that determine which content will be sent.

Contemporary marketers work closely with database companies and web analytic services to watch and analyse user behaviour online. Using this information, marketers create consumer reputations—unique profiles of individuals' demographic information, shopping patterns, and web surfing behaviour that are used to assess interest in consumer products and create personalized advertising messages and customized deals. As individ-

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uals engage in retail and non-retail environments, they contribute to the growing trove of information that informs these reputations. Unlike the database technologies marketers relied on in the twentieth century, contemporary models are flexible, continuously adjusting to new information added to profiles to develop more complete images of consumers (Cheney-Lippold 2011). The flexibility afforded by these technologies offers advertisers an advantage over previous strategies of targeting based on a static set of characteristics. (p. 1153) John Cheney-Lippold notes that interactive digital media means individuals are no longer categorized using fixed data, such as those provided by census surveys; rather, they are subject to a continual process of classification based on an evolving set of categories informed by the data itself (2011: 173). The resulting reputation, which Cheney-Lippold refers to as a 'new algorithmic identity', is informed by an adaptable set of classification markers through which advertisers make sense of individuals. The specificity of these categories far exceeds the classification efforts informed by demographic and even lifestyle indicators.

Algorithms are applied to databases to search for patterns in consumer behaviour. Conclusions regarding the likely preferences of individuals allow digital advertisers to take advantage of the interactive features of contemporary communication technologies to buy ad space to serve highly targeted ads based on individual profiles. Through the aggregation of discrete pieces of information, advertisers create seemingly holistic consumer reputations, which are analysed to predict future behaviour. This form of knowledge creation derives its power from a confidence in the strength of data-based predictions. Mark Andrejevic writes about the 'promise' of these methods 'to unearth the patterns that are far too complex for any human analyst to detect and to run the simulation that generate emergent patterns that would otherwise defy our predictive power' (2013: 21). The application of predictive algorithms to anticipate future preferences and behaviours helps reconstruct disparate information as a useful resource. It also helps to narrow the diversity within personalized media environments in which individuals are shown media that reflects content with which they have demonstrated a propensity to engage.

Similar to those who defended the classification of consumer groups to inform advertising messages, proponents of addressable advertising describe strategies of customization as a boon for consumers who are no longer forced to confront irrelevant content (Negroponte 1995). Advertisements targeted based on the practices and preferences revealed in discrete consumer reputation profiles allow marketers to speak directly to the individual, further weeding out irrelevant content by eliminating the need to make assumptions about the collective desires of actors within a group. Some may argue that untethering individuals from profiles based on the characteristics they share with others, offering instead unique consumer identities informed solely by one's particular consumer behaviours, reduces categorical discrimination and increased individual autonomy. While there may be benefits to a personalized media environment that saves the viewer time in searching for relevant or interesting content, the lack of transparency regarding how consumer reputations are constructed and the limited opportunities to view or correct one's record contradict claims of individual autonomy (Rosen 2000; Solove 2004; Turow 2011).

Users are denied meaningful opportunities to opt out of an advertising system that sees everything they do while offering limited chances for users to return that gaze.

Moreover, data collected for one purpose, perhaps to track cell phone usage to improve signal quality in underserved areas, can easily be used for (p. 1154) additional purposes. As the costs for storing and analysing data fall, the information collected in these massive databases gains permanence and the uses to which that information can be put multiplies. Although much consumer information is explicitly collected for use in the short term—to provide accurate shipping or billing, for example—its prolonged existence increases the likelihood that information will be used for purposes other than those for which it was originally collected. The multiple use of data is particularly troubling in light of Gandy's observation that data analysis techniques, which may appear benign when used to find patterns that identify profitable consumers, have a different set of stakes when employed to address issues of local and national security (Gandy 2006; Andrejevic 2013: ch 2).

5. Involving Audiences: The Role of Interactive Advertising

The interactive nature of digital-media technologies has led to a variety of perspectives on audience autonomy. Media scholar Axel Bruns argues interactive media channels have given rise to a consumer with investment and authority in the production process. Bruns coined the term *produser* to emphasize the blurring between production and consumption made possible by the interactive characteristics of digital media. The produser achieves the perfect fusion of creation and consumption through a collaborative process 'where usage is also necessarily productive' (Bruns 2008: 21). Various media platforms are developing strategies to incorporate users' interest in such forms of engagement. Often, these opportunities to engage individuals in their media experience are promoted as opportunities for consumer empowerment. But there is another way to look at this phenomenon: consumers are increasingly being asked to participate in their own commercial surveillance and the construction of the consumer reputations. Rhetoric of empowerment refers to prevailing economic logics that argue personalized content enriches user experience by reducing the necessity of interacting with unwanted or irrelevant advertising and providing content to users for free. Current campaigns extend this logic by soliciting the assistance of individuals in their own commercial monitoring based on the promise of improved experience through engagement. In this final section we look at two platforms—social media networks and interactive television—that engage individuals directly in their advertising experience. Through these platforms, we examine the shifting relationship between advertisers, media producers, and audiences—and the implications for audience profiling.

**(p. 1155) 5.1 Facebook's Sponsored Stories: Advertisements Where You
Are the Star**

In 2011, the massively popular social network site Facebook introduced a feature on its platform to provide advertisers with a more organic way to reach consumers. The social endorsement programme, called 'Sponsored Stories' turned the activities of Facebook users into advertising content. When a Facebook user interacted with a company or brand that had paid for Sponsored Stories, the action could show up in his or her friends' newsfeeds as part of an advertisement (Fowler 2011). As an example, let's assume the clothing company Banana Republic paid for Sponsored Stories. If Eric checked in at Banana Republic or shared the company's products on his own Facebook page, his friends might see an advertisement in their Facebook feed displaying Eric's name and picture as well as any comments or photos from his original post. The goal of the programme was to support businesses by creating more visibility when users engaged with their products. In so doing, Facebook hoped to create a platform to support buzz marketing campaigns—those campaigns that harness the power of 'word of mouth' promotion—to generate authentic excitement around products and brands (Serazio 2013: ch 4).

When introducing Sponsored Stories, Facebook stressed the value of social context for increasing the relevance of advertisements to audiences. A post in the Facebook Newsroom stated:

We know social enhances ad resonance; people are influenced by this type of word-of-mouth marketing. Research from Nielsen, comScore, and Datalogix shows that social context can drive awareness and return on ad spend, so we want to make it easier to add it to our ads.

(Simo 2013)

The logic here is advertisements that display recommendations based on a friend's experience have greater relevance to the user. José van Dijck describes the power of this form of social advertising resulting from its presentation of a personal narrative (van Dijck 2013: 2016). By using individual engagement to create 'context' around a product, Facebook implicated individuals in their partners' advertising strategies. Willingly or not, Facebook users were confronted with the possibility of having their actions co-opted by companies to create more authentic ads for friends, resulting in what Taina Bucher has called the 'commercialization of friendship' (2013: 488).

According to Facebook, the programme would honour users' privacy settings since only those people given access to an individual's Timeline posts would see a Sponsored Story featuring that user (Facebook 2012). In fact, users were not able to determine which of their friends would see *each* Sponsored Story, nor were they able to decide *which* of their activities would be subject to possible inclusion in advertising copy. Instead, the highly contextual advertisements could be based on any user activity and were potentially visible to any friend who was allowed to see content a user shared on her profile. Consumers who felt their privacy rights were **(p. 1156)** being violated criticized the Sponsored Stories

programme. In 2013, Facebook settled a class action lawsuit for \$20 million regarding the privacy violations associated with this programme (Hendricks 2014). In 2014, Facebook reported that they would end the Sponsored Stories campaign, which the company said had become redundant, because they had introduced contextualized content in all of their advertising options (Hendricks 2014).

There are a number of conceivable explanations as to why users may have responded poorly to the Sponsored Stories programme. One possible reason is that the programme challenged contemporary understandings of privacy. Although 'liking' and 'checking in' are semi-public acts—visible to those in your online friendship networks—the practice of reframing these *social* acts as *commercial* behaviours blurs an important distinction between the public and private self (Bednarz Beauchamp 2013). Philosopher of technology Helen Nissenbaum (2010) asserts that our experience of privacy is contextual. While we may be very comfortable sharing particular information with our doctor, we might be less inclined to share that same information with more intimate members of our community, such as a spouse, child, or parent. It is not the information itself that is private, but the context in which that information is shared. A similar principle may be operating here: even though the act of sharing or liking may not be expressly private, the display of these behaviours is viewed as out of place in a commercial context. Moreover, despite the argument by advertisers that such stories generate highly contextualized content, it is possible that, in reproducing behaviours in the context of an advertisement, the meaning of the initial behaviour is altered.

A second reason Sponsored Stories may have been met with contempt by consumers is that, even for consumers who had become used to retargeting—the practice of serving digital advertisements to an individual based on content they had previously searched online—featuring in the advertisements themselves crossed an ethical line (Hendricks 2014). The programme represents a stark repositioning of audiences, not simply as consumers of promotional content, but as spokespeople for that content. This extends the implicit trade-off of content for data—a trade-off research shows many Americans are uncomfortable with (Turow, Hennessy, and Draper 2015)—far beyond its existing parameters. Moreover, it makes explicit the commodification of personal relationships through metrics such as 'likes' and 'shares'. The class action lawsuit brought against Facebook's Sponsored Stories platform hinged on the issue of consent. The complaint asserts that Facebook 'unlawfully used the names, profile pictures, photographs, likenesses, and identities of Facebook users in the United States to advertise or sell products and services through Sponsored Stories without obtaining those users' consent' (*Fraley et al v Facebook Inc* 2011). Questions about the ethical use of data and appropriate methods of capturing consent have plagued Facebook and other social media platforms that rely heavily on advertising. The Sponsored Story case is unique in that it makes visible the ways in which data is used to infer and reflect individual preferences.

(p. 1157) **5.2 Interactive Television: The Internet Comes to Television**

In the 1990s, cable TV and telephone companies began rolling out the infrastructure that would allow for two-way data communication to flow to and from American neighbourhoods (Sherman 1994). Advances to telecommunication technology generated excitement about the possibilities of interactive television. Plans to lay wires carrying two-way cable signals into American households allowed advertisers to imagine a new version of direct selling that would provide consumers with the ability to browse and order products based on direct marketing tailored to their particular interests. In 1994, Bill Gates, the billionaire CEO of Microsoft and tech visionary, described the exciting possibilities of interactive television:

You're watching *Seinfeld* on TV, and you like the jacket he's wearing. You click on it with your remote control. The show pauses and a Windows-style drop-down menu appears at the top of the screen, asking if you want to buy it. You click on 'yes'. The next menu offers you a choice of colors; you click on black. Another menu lists your credit cards asking which one you'll use for this purchase. Click on MasterCard or whatever. Which address should the jacket go to, your office or your home or your cabin? Click on one address and you're done—the menus disappear and *Seinfeld* picks up where it left off.

(Sherman 1994: para 1 quoting Bill Gates)

The possibilities afforded by two-way cable repositioned viewers as active consumers in the television viewing experience. A *Fortune* article pointed out the central limitation of standard broadcast television when compared with the possibilities of interactive television:

None of these channels give viewers control over what they see when. In a truly interactive system, product pitches could be recorded in advance and stored, much like voice-mail messages today, in powerful central computers called servers. Then anyone interested in, say, rodeo belt buckles with cubic-zirconia adornments could zip straight to the relevant video.

(Sherman 1994: para 3)

Advances in the communication infrastructure foreshadowed profound changes in the television landscape that forced advertisers to begin to rethink their strategy in the battle over audience attention (Lee and Lee 1995). Interactive video, in many ways the ideal medium for selling, promised to offer viewers control over the entertainment and commercial content they consumed.

The particular version of interactive shopping imagined by Bill Gates and others has not materialized. Although video-on-demand platforms, the trails for which were already generating excitement in the 1990s (Sherman 1994: para 2), allow viewers to access television shows and movies for immediate consumption, the forms of addressable advertising imagined by Gates have been slower to develop. Some in the marketing industry have

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questioned whether television, the ultimate mass medium, is well suited to addressable advertising. Scepticism notwithstanding, (p. 1158) advances in digital technologies have created a range of opportunities for viewers to engage with media content and shape their media experience. Moreover, advertisers have begun to apply some of the logics that inform web-based advertising to television. Consumer database companies are combining information about shopping practices and viewing habits to help advertisers determine where their television advertising dollars are best spent. A company called Simulmedia, for example, uses the logics of data-driven targeted advertising to identify shows that appeal to the particular audiences sought by advertisers (Perlberg 2014). Television rating powerhouse Nielsen has entered a joint venture with retail marketing company Catalina to combine loyalty card data with television viewing information (Perlberg 2014). This would allow the company to determine which types of products people who watch particular shows purchase. While these ventures are focused on efficient advertising placement on national television programming, there is evidence that some industry actors are looking ahead to the possibilities of addressable advertising, which would allow television networks to send different ads to neighbours who were watching the same programme based on their consumer reputation. Nielsen has also acquired the data management platform eXelate, a move that some industry experts interpreted as an attempt to shore up its advantage in addressable television (Nail 2015).

Digital platforms that allow users to stream television content offer a preview of the future of addressable television. The online television platform Hulu, for example, engages users directly in their viewing experience by asking them to select their preferred 'ad experience'. The platform offers viewers three commercials—from either the same brand or three different brands—that they can choose to view. An updated version of this program, the Ad Swap platform, allows users to switch advertisements midstream. Hulu emphasizes the benefits of these advertising platforms for both the viewers and advertisers:

Hulu Ad Swap is the next evolution in user choice and control—an ad innovation designed to dramatically improve the advertising experience for users and results for brands. Hulu Ad Swap puts complete control in the hands of the user by enabling them to instantly swap out of an ad they are watching for one that is more relevant.

(Colaco 2011)

Rather than relying on information gleaned from databases of consumer information and behavioural data to generate relevant ads, the Hulu Ad Swap program enlists the user in the creation of her own viewing experience. Another Hulu feature allows users to provide the company with feedback on the relevance of particular advertisements. Using a button in the top right corner of the screen, viewers can indicate whether or not a particular ad was relevant to them. Based on a user's response, the Ad Tailor feature will personalize future ads to match the viewer's tastes. Again, the company promotes the value of this feature for multiple stakeholders: 'The more efficiently we can match ads up with users, the more everyone benefits. Users see more relevant ads, and advertisers reach a more

targeted and (p. 1159) receptive audience' (Hulu Help Center 2015). Through these interactions, Hulu not only serves advertisers looking for engaged and interested audiences, it also adds to its own viewer database. With each viewer interaction, Hulu gains more information about the behaviours and preferences of audience members. This information can be used to supplement consumer reputations.

While Hulu is using audience interaction to shape the advertising viewers receive, two other online television platforms are using audience data to shape content decisions. Netflix, the online television and movie-streaming platform, introduced original content in 2012. The platform's turn to original programming has been quite successful with Netflix shows such as *House of Cards* and *Orange Is the New Black* receiving Golden Globe nominations. In a 2013 *New York Times* article, David Carr (2013) described how Netflix's collection of data on audience viewing habits has helped the company develop shows destined to be hits. Although production decisions, including which projects to green-light, have long taken into consideration information about what types of shows audiences prefer, these calculations are enhanced by the depth of data provided through interactive technologies. Although the data that helps shape original content is based on the aggregate preferences of viewers, promotional material for that content is highly personalized. Trailers for *House of Cards*, shown to viewers when they logged into their Netflix accounts, varied depending on whether past viewing patterns characterized them as fans of the show's star Kevin Spacey, partial to movies with strong female leads, or film buffs (Carr 2013: para 11).

Online retail giant Amazon has pursued a similar strategy through its own turn towards original content. Amazon began allowing subscribers to its Prime delivery service to stream movies and television shows in 2011. In 2013, the company launched *Alpha House*, a half-hour dark comedy starring John Goodman as a Republican senator from North Carolina, available to Prime members (Spangler 2013). *Alpha House* was one of five shows selected from among 14 pilot episodes posted to the Amazon website to be turned into full series (Sharma 2013). Decisions about which shows to pursue were based on viewers' responses to the 14 original pilots, including data on number of views, strength of ratings, and number of times the pilots were shared with friends (Sharma 2013). Much like Netflix, Amazon has turned to audience data to predict which shows will be profitable; however, the online retailer has taken this strategy one step further to explicitly engage viewers in the decision-making process by allowing them multiple ways to provide feedback on the shows they like (and, in some cases, dislike). In addition to looking at data about viewing and sharing behaviour, Amazon offered audiences the chance to provide feedback through surveys and focus groups (Sharma 2013).

Strategies such as those taken by Hulu, Netflix, and Amazon to deeply engage viewers in constructing the promotional and entertainment content they receive suggest a new paradigm for thinking about audiences. As David Carr wrote:

(p. 1160)

Film and television producers have always used data, holding previews for focus groups and logging the results, but as a technology company that distributes and now produces content, Netflix has mind-boggling access to consumer sentiment in real time.

(2013: para 6)

These consumer preferences, mined from data about how fast programming is consumed, or how quickly viewers abandon content, play a central role in determining the viability of a show or movie. On the one hand, this puts viewers in the driver's seat regarding their media options. There are, however, those who argue that crowdsourcing art may have its limitations. These critics cite concerns that big data analysis will restrict and constrain the creative process (Sharma 2013). Others note these analytic-based predictions can only take into account what people have liked in the past, limiting the possibility of a truly innovative show that fills a gap in the existing media landscape (Carr 2013: para 17). In addition to stifling artistic creativity, the use of data analytics to predict the types of content likely to appeal to groups and individuals contain many of the characteristics of segment-making media. While these strategies have the power to appeal to audiences by reflecting their interests back at them, they are unlikely to result in the consumption of content that challenges viewers' political or social realities.

6. The Limits of Reputation for Consumer Empowerment

Reputations have both a social and an economic function. Economic theory argues reputations are used to facilitate markets in which buyers and sellers are not necessarily known to one another (Whitfield 2012). Reputation metrics—anything from credit cards to eBay scores—are a measure of one's past behaviour in the marketplace. This is based on the premise that past behaviours are a good predictor of future behaviours. Reputations, however, also have a social function. The potential harm that can result from a bad reputation encourages people to behave in ways that closely align with community expectations. Consequently, reputations operate as a highly effective approach to enforcing social norms (Nock 1993). Our commercial reputations have a similar social function. If we learn how to read them, they can reveal to us how much advertisers value our attention. These reputations, revealed through media messages, can signal our worth to others and to ourselves.

In the US, there have been limited attempts to regulate how advertisers use data to construct and deploy consumer reputations. Unlike the European Union, which (p. 1161) gives individuals the right to access the information companies have about them, the US lacks comprehensive privacy legislation. Based on concerns that policy interventions could stifle regulation in the burgeoning technology sector, regulators have generally opted to encourage industry actors to self-regulate. The result has been the introduction of industry-backed solutions, such as website privacy policies and icons that identify targeted adver-

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tisements, both of which critics have generally decried as ineffective. In the absence of sufficient industry self-regulation and government intervention, a number of companies have cropped up to help consumers manage their consumer reputations online. Companies such as Personal.com and DataCoup are developing tools to help individuals bring together data from multiple sources including financial information and social networking data. In so doing, they imagine the creation of a market for information in which individuals would be able to sell their personal data to companies in exchange for profit. The result, they argue, would be a more efficient marketplace in which individuals profit from the sale of data and consumer reputations are more accurate reflections of personal preferences.

By encouraging individuals to participate in the construction of these consumer reputations, marketers are asking them to engage in a system that is designed to evaluate and assess their worth. For some, this is a great deal. Those whose attention advertisers covet will be able to provide information that will shore up their reputation as valuable consumers. Others, however, will likely continue to be dismissed by a system that fails to recognize their needs as profitable or whose practices of data collection fail to see them altogether (see Lerman 2013). This is why positioning personalized advertising as empowering is misleading. It ignores all of the ways in which advertising works to reproduce systems of inequality by focusing on certain consumers and brushing others aside. Involving individuals in such a system through interactive advertising is not empowering—it is exploitative.

The use of technologies of surveillance to segment audiences and shape media content does not reflect an approach that is unique to the digital age. As we have shown, such approaches extend to the era of mass media when content was developed to appeal to a broadly conceived middle-class audience. As media technologies and the corresponding tools for measuring audience preferences and engagement have grown more sophisticated, so too have attempts to create content that reflects the unique preferences of those audiences. Not surprisingly, media practitioners working in areas partially or entirely underwritten by advertisers have worked to create content they predict will be likely to attract the most valuable audiences, thereby driving up the advertising rates they can charge. We have noted the problems with this approach. The practices of segmenting and evaluating audiences, actions that reside at the core of contemporary advertising regimes, mean that certain groups will receive more favourable attention in the media landscape thereby marginalizing those voices advertisers feel they can safely ignore. These practices (p. 1162) remain unregulated in the US. Consumer protection laws and privacy rules offer limited protection to consumers who are disadvantaged because of their commercial reputation.

The move to a personalized media landscape—one in which promotional and entertainment content reflects the individual reputations—does not fundamentally challenge this prevailing model. Rather, it extends existing practices in ways that are liable to entrench rather than eradicate disparities in how media producers and advertisers allocate their attention to audiences. If advertisers will pay higher rates for consumers deemed to be

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more desirable, it is likely that content will be refined to reflect the preferences data analytics predicts will be more attractive to these preferred audiences. It is notable that one writer reported Amazon passed on his show in part because it appealed primarily to young audiences—a demographic unlikely to pay for the Prime membership required to stream the show (Sharma 2013). It is not a stretch to imagine similar calculations being made about content popular among other, less affluent, populations.

The extent to which marketers use consumers' information, behaviours, and patterns of engagement to generate statistically driven profiles that shape the media environments they encounter does damage to consumer-business relations in the twenty-first century. Surveys repeatedly demonstrate that individuals are sceptical about these practices, even as they are resigned to engage with the platforms where they occur (Turow and others 2009; Madden 2014; Turow, Hennessy, and Draper 2015). That marketers and media producers employ in these activities out of the sightlines of the vast majority of viewers is deeply problematic. The reputations that follow individuals and shape their media experiences may bear little relation to an individual's self-perception and viewers are provided few opportunities to correct possible misconceptions (Turow 1997). Strategies to allow individuals to participate in the construction and sale of their own consumer profiles may facilitate improved treatment for some, but do not eliminate the inequalities inherent in a commercial system that pays more attention to those deemed profitable. Arguments that personalized advertising works do not mean that the labels projected onto audiences are correct. Moreover, the fact that individuals participate in campaigns to select relevant advertisements, shape their media content, or shape their reputations is not evidence that they feel empowered. As media practitioners continue to refine audience construction to meet the needs of advertisers, we need to rethink what it means for an audience to truly be empowered and the role that policy interventions can play to facilitate this shift. Empowerment does not mean that the predicted preferences of elite audience members determine the media content that is produced. Nor does it mean that individual audience members are able to determine their own content, insulating themselves against ideas they find disagreeable. Empowerment requires that individuals are able to understand and influence the institutional forces that define them.

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Audience Constructions, Reputations, and Emerging Media Technologies: New Issues of Legal and Social Policy

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Water, Energy, and Technology: The Legal Challenges of Interdependencies and Technological Limits

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Abstract and Keywords

The water-energy nexus describes the reality that the provision of water always requires energy, while the production of most forms of energy requires significant amounts of water, particularly electricity production in thermoelectric power plants. As a result, electricity production and water supply are always intimately related, and changes in one of these arenas directly affect the other. However, law and policy rarely acknowledge this technology-mediated interrelationship, even though climate change will impose increasing stresses on both sides of the equation. While technology can help to mitigate these stresses, water law and energy policy could both do more to consider the trade-offs among water supply, energy production, and environmental protection.

Keywords: water-energy nexus, desalination, water treatment, electricity production, hydropower, cooling water, water transportation

1. Introduction

THE phrase ‘water-energy nexus’ describes the reality that water use and water supply demand significant amounts of energy, while energy production—particularly electricity production—requires large amounts of water. On the water supply side, energy is needed to pump, treat, and transport drinking water and to treat the resulting wastewater before it is returned to natural streams, lakes, and rivers. On the energy side, almost all forms of electricity production require water.

The energy demands of public water supply are often already significant. In the United States, for example, California spends about 20 per cent of its total state electricity use—48 terawatt-hours per year—and 30 per cent of its natural gas use on ‘[t]ransportation and treatment of water, treatment and disposal of wastewater, and the energy used to heat and consume water’ (California Energy Commission 2016). **(p. 1170)** However, the energy demands of water use are likely to increase in the future, as drought-stricken and

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climate change-impacted parts of the world increasingly turn to more energy-intensive methods of procuring potable water, such as wastewater reuse and desalination of both brackish water and seawater. In April 2013, for example, the United Arab Emirates opened the world's largest desalination plant, Jebel Ali, in Dubai, which uses natural gas to produce both electricity and up to 140 million gallons of water per day (Simpson 2013). A year later, China announced that it would build a coastal desalination plant to supply Beijing with water (Wong 2014). Both of these water supply solutions come with significant energy costs, although Jebel Ali helps to mitigate those costs by co-locating electricity production and desalination.

In turn, energy, especially electricity, production is vulnerable to changing water supplies. Hydropower is the obvious example: without water to turn the turbines, a hydroelectric plant generates no electricity. Perhaps less obviously, thermoelectric power plants require significant amounts of water for cooling and for steam generation. In the United States, as of 2005, thermoelectric power plants (coal, natural gas, and nuclear) withdrew about 210 billion gallons of water per day and represent 49 per cent—almost half—of water use in the country (US Geological Survey 2015). Even solar energy electricity production can require significant amounts of water. In particular, '[p]arabolic trough and power tower solar plants consume about the same amount of water as a coal-fired or nuclear power plant (500 to 800 gal/MWh)' (Solar Energy Industries Association 2010). Only wind farms and solar photovoltaic cells generate electricity without using and consuming significant amounts of water.

One consequence of the water-energy nexus should be—but often is not—that nations craft their water and energy laws and policies to ensure that each sector considers the impacts of its projects on the other. Such mutual considerations become increasingly important as technology expands the types of solutions available and the costs—economic and ecological—of those solutions. As one example of many on the water policy side, the island of Cyprus is experiencing increasing water shortages as a result of over-pumping of groundwater (which is causing saltwater intrusion), increasing population growth, and climate change (Gies 2013). Northern Cyprus seeks to solve its water problems through a water pipeline from Turkey that travels through the Mediterranean Sea and carries 19.8 billion gallons a year, at a financial cost of 1 billion Turkish lire (about US\$550 million). The southern Republic of Cyprus, in turn, is turning to water recycling and desalination for new water, relying on five desalination plants that together can purify 250,000 cubic metres of water per day. Technology thus offers new access to water, but at an energy cost. Indeed, one reason the Republic of Cyprus is pursuing recycling is to reduce its dependency on fossil-fuel-run desalination (Gies 2013).

Conversely, failure to consider water issues can thwart energy policy. In the United States, for example, energy policy is often a federal prerogative, while water allocation is inherently a state responsibility. In 2006, the US Department of Energy issued a report to Congress that, among other things, evidenced the Department's (p. 1171) frustration that state law water allocations could interfere with its plans for energy development. For example, it reported that the '[o]peration of some energy facilities has been curtailed due to

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water concerns, and siting and operation of new energy facilities must take into account the value of water resources' (US Department of Energy 2006). Thus, despite technological capability, governance issues and lack of available water can hamper energy policy.

In many respects, the water-energy nexus operates as a market failure and demonstrates that both water and energy are, at least at a policy level, commons resources. For example, there is wide agreement that conservation of both water and electricity represents the first-best, 'low-hanging fruit' strategy for ensuring that this unavoidable nexus thwarts neither water supply needs nor energy production desires. However, pricing and metering regimes for both water and electricity can fail to encourage conservation, as can legal policies that force electric utilities to depend on increased use for their financial stability or that encourage water rights holders to consume as much water as possible to maintain the continuing viability of their water rights. Moreover, while cutting-edge technologies can aid in conservation on both sides of the equation, generally by increasing efficiency, installation of these technologies by municipalities and other governments, or even industries, can impose substantial upfront costs that act as a barrier to adoption, even when the long-term savings would easily justify the investment. Thus, the water-energy nexus provides an arena in which carefully considered national subsidies and investments in research and development to improve conservation and efficiency could produce substantial and, over the long-term, cost-effective results, while still preserving basic human rights to adequate supplies of potable water and sufficient energy for healthy and productive lives.

This chapter provides a brief overview of the water-energy nexus in terms of the interrelationship of electricity and water, emphasizing emerging issues and the costs and limits of the technology involved on both sides. Section 2 considers the energy demands of water supply, looking at water extraction (pumping), transportation, treatment (including reuse), and desalination. Section 3 examines water use in electricity production, including the potential environmental impacts of such use. Section 4 turns to the additional stresses that climate change is inflicting on the water-energy nexus, concluding that all nations would be well served to ensure that their legal and policy considerations of water use and energy production each actively consider impacts on the other. Overall, while some technological developments might seem to be ideal solutions in terms of reducing water use and maximizing energy production, there are usually trade-offs with other interests and distinct geographical influences at play, and the policy picture is only further complicated by a changing climate. Legal and regulatory approaches to both energy production and water use are deficient to the extent they do not take into account this interconnected and complex picture.

(p. 1172) 2. The Energy Demands of Water Supply

Supplying water for various uses comes with an energy cost. As one example, as a national average in the US, supplying water accounts for about 3.5 per cent of all electrical energy consumed (National Research Council 2008). Water law and policy must thus ac-

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knowledge and account for this energy demand. At the same time, however, all aspects of the water supply process are mediated by technology—technology that may be amenable to improved efficiency. As such, technology can have significant implications for the laws and policies governing this aspect of the water-energy nexus.

2.1 Energy Use to Extract (Pump) Water

Before we can use water, it must be extracted from its source. Extraction can require almost no external energy, as when topography allows surface sources of water to fill ditches and channels through gravity, or when the natural pressure in artesian aquifers carries groundwater all the way to the surface of the relevant land. In most other circumstances, however, some sort of pumping technology is needed to make water available for use. Moreover, when wells become too deep or the volume of water extracted from a surface water source becomes too great, human labour is no longer sufficient to move the water to where it is needed. Some sort of mechanized pump is required.

At that point, pump efficiency directly impacts how much energy will be required to extract water from a source. Water pumps generally consist of a motor, a water discharge head pipe (the pipe from which water exits the pump), a shaft leading from the top of the pump to the water source, and a series of bowls and impellers in the water source that lift the water into the shaft. Overall pumping efficiency depends on the combination of the motor's efficiency, transmission efficiency, and bowl efficiency, which is both the least efficient part of the pump and the most variable. Pumps are considered to have good efficiency when their overall efficiency is 66 per cent, but pumpers can significantly increase pumping efficiency by matching their specific pumping conditions (water head and gallons pumped per minute) to specific pump technologies. In other words, pump selection can be tailored to the job at hand to significantly increase pump efficiency and hence to reduce energy use (Canessa 2013).

Pump efficiency, however, is not the only variable in energy demand. Importantly, the depth of pumping, or the height to which water needs to be raised on the surface, (p. 1173) will also affect total energy use. As one example, a study in California revealed that pumping groundwater from 120 feet below the surface uses 0.14 kilowatt-hours per cubic meter of water (kWh/m^3), while pumping groundwater from 200 feet below the surface uses 0.24 kWh/m^3 (National Research Council 2008: 142). Thus, regardless of increases in pumping efficiency, reaching deeper into aquifers for water or pumping water uphill will always increase the energy costs of water supply.

These technological realities suggest several improvements for law and policy. First, governments should consider energy costs when they contemplate using deeper aquifers or transporting water uphill to provide new sources of water, regardless of whether the governments themselves develop these projects or development occurs through private projects subject to government permitting. While increased energy costs almost always translate into increased economic costs, and hence will almost always receive *some* consideration as a practical matter, increased energy costs do not always factor into the

legality of the proposed new water supply scheme. As a result, decisions to pump deeper or to pump uphill may turn purely on public *water* demand and economics, without full consideration of the larger public impacts on *energy* demand (especially in terms of cumulative energy demand), the potential resulting need for new energy supply, and the ecological impacts of both the water withdrawals and transfers and increased energy demand, including increased greenhouse gas emissions. Second, to the extent that investments in more efficient and better-suited pumping technology are being thwarted because of the upfront costs of new technology, government subsidies, grants, and loans to encourage such investments would be an appropriate energy conservation strategy. Third, however, governments should also consider whether there are less energy-intensive sources of water available, including increased conservation, which could avoid altogether the need for water from more energy-intensive sources.

2.2 Energy Use to Treat Water, Including Water Reuse

In industrialized nations, very few consumers are legally allowed to consume untreated drinking water. In the United States, for example, the 1974 Safe Drinking Water Act imposes health-based water purity requirements on public water supplies, while the European Commission's 1998 Drinking Water Directive accomplishes the same end for the European Union. In addition, water quality legislation often requires that sewage and other wastewater be treated before it is discharged back into rivers, lakes, or streams. While these requirements protect both public health and environmental quality, they also come with a significant energy cost. Nevertheless, treating water, particularly in the context of wastewater reuse, may impose significantly less energy demand than other potential water supply solutions, especially long-distance transport of water and desalination. Indeed, treating (p. 1174) wastewater after use requires energy on about the same scale as preparing drinking water (Webber 2008; European Environment Agency 2012). As such, wastewater reuse should often become, as the Republic of Cyprus recognized, a preferred water supply solution to the more energy-intensive technologies of fossil-fuel-based importation and desalination.

Moreover, as with pumping, water treatment facilities can often reduce their energy costs. For example, the US Environmental Protection Agency has identified a number of ways in which water supply and treatment facilities can reduce their energy consumption, most often through increases in technological efficiency (US Environmental Protection Agency 2013). As with water extraction, efficient pumping systems can save energy in many phases of water treatment and distribution, but so can more efficient disinfectant systems, aeration equipment, anaerobic digestion, and even lighting and heating, ventilation, and air conditioning (HVAC) systems. Cogeneration (the generation of electricity from water treatment by-products), the capture of energy from gravity-dependent systems, an increased use of onsite renewable energy, and recycling water can also reduce the need for traditional generation of electricity.

Improving and changing these kinds of technologies can lead to fairly dramatic reductions in energy demand. When the Green Bay, Wisconsin, Metropolitan Sewerage District

installed new energy-efficient blowers in its first-stage aeration system [at one of its treatment plants, it] reduc[ed] electricity consumption by 50 percent and sav[ed] 2,144,000 kWh/year—enough energy to power 126 homes—and avoid[ed] nearly 1,480 metric tons of CO² equivalent, roughly the amount emitted annually by 290 cars.

(US Environmental Protection Agency 2013: 4)

Combined heat and power (CHP) systems at wastewater treatment plants are a newer technological innovation that can result in significant energy savings, because wastewater flow can generate biogas and produce considerable amounts of heat and often electricity as a result (US Environmental Protection Agency 2013: 4). Again, however, the up-front capital costs of purchasing and installing improved technology at wastewater treatment plants or to create municipal-scale water reuse facilities can be daunting. For example, in California, Orange County's extensive wastewater reuse and aquifer recharge facility—the world's largest—cost US\$481 million to build in 2008 and US\$150 million to expand beginning in 2013 (Cocca and Vargas 2013). The expanded facility will produce 100 million gallons (378,540 m³) of potable water a day, but '[d]espite the large output, the replenishment system uses less than one-third of the energy needed to desalinate ocean water, and less than half the energy needed to import water from Northern California' (Cocca and Vargas 2013). While Orange County is a wealthy municipality, even it had to depend on state and federal grants and a creative financing arrangement with the nearby county wastewater treatment facility to finance its water reuse facility. Less wealthy (p. 1175) municipalities and other water providers around the world would similarly benefit from higher government subsidies and grants for investments both in more efficient wastewater treatment facilities and in water reuse facilities.

However, governance issues can also pose barriers to implementing water reuse technology. For example, the European Commission endorsed water reuse in April 2012, finding it 'to have a lower environmental impact than other alternative water supplies (eg water transfers or desalination)', but also noting that water reuse 'is only used to a limited extent in the EU' (European Commission 2015b; 2015a). Its April 2013 report on the subject found that, '[w]hile for most countries the substitution potential is less than 0.5%, Malta, Cyprus and Spain could cover up 26%, 7.6% and 3% of their future water demand respectively' (European Commission 2013). The European Commission views the lack of adoption of water reuse technology as a governance failure—specifically, 'the lack of common EU environmental/health standards for reused water and the potential obstacles to the free movement of agricultural products irrigated with reused water' (2015a; 2015b). In September 2015, the European Commission issued its 'roadmap' for a new initiative, 'Maximisation of water reuse in the EU', emphasizing that '[b]ecause reusing water consumes notably less energy than alternative supply options (desalination/inter-basin transfers) and because it may allow for less energy consumption in waste water treatment this initiative can contribute to make EU countries less dependent on energy imports' (2015b).

2.3 Energy Use to Transport and Apply Water

Water is heavy, and transporting it any distance can require significant amounts of energy. Nevertheless, water transportation across long distances is a centuries-old water supply technology, and, as Northern Cyprus indicates, it is a technology still being pursued. In 1903, for example, Western Australia built the 330-mile Goldfields Water Supply Scheme (Australian Department of the Environment 2016). Libya is home to the 1,700-mile Manmade River, which transports 3,680,000 m³ of water pumped from a deep aquifer (Water Technology 2016). The Cyprus pipeline would be 80 kilometres long and run about 250 metres deep through the Mediterranean Sea, with water movement being driven by pumps in Turkey. Investors in Germany are also proposing a Euro Water pipeline project that would take water from northern Europe and transport it to southern Europe and northern Africa (Euro Water Pipeline 2013).

These projects often require substantial amounts of energy, which has been perhaps best documented in the American Southwest. The aqueduct system of the Central Arizona Project, for example, was substantially completed in 1993. It runs 336 miles from Lake Havasu on the Arizona-California border to south-west (p. 1176) of Tucson, delivering Arizona's share of the Colorado River to farmers, Native American tribes, and 50 communities, including Phoenix and Tucson (US Bureau of Reclamation 2011). Delivering the Project's 1.5 million acre-feet of water each year 'consumes about 4% of all the energy used in Arizona' (Pierce, Sheesley, and White 2011).

California also has a vast system of water transportation projects. Two of the largest, the Central Valley Project, which is a federal project, and the State Water Project together are designed to deliver about 9.3 million acre-feet of water per year from northern California to farming communities in central California and southern cities such as Los Angeles and San Diego. In turn, the All-American Canal and Colorado River Aqueduct deliver, together, about 4.2 million acre-feet of water from the Colorado River along the California-Arizona border to farmers and communities in southern California (Association of California Water Agencies 2016).

The fact that southern California depends so heavily on transported water leads to significant disparities in energy consumption related to water supply at the two ends of the state. Specifically, while energy consumption figures are similar in northern and southern California for drinking water treatment, water distribution, and wastewater treatment, water supply and conveyance in northern California averages 150 kWh per million gallons delivered (0.04 kWh/m³), while in southern California water supply and conveyance requires 8900 kWh per million gallons (2.35 kWh/m³) (California Energy Commission 2006). Similarly, transportation of water from the Colorado River Aqueduct to San Diego (the farthest destination) uses 1.6 kWh/m³, while transportation of water through the State Water Project from the San Francisco Bay Delta to San Diego (again, the farthest destination), uses 2.6 kWh/m³ (National Research Council 2008: 142), making it the largest user of electricity in California (US Environmental Protection Agency 2015).

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Water transportation thus clearly adds significantly to the energy costs of water supply. To add insult to injury, most of these transport systems are aqueducts, carrying water through deserts in open and often unlined canals. The resulting loss of water to evaporation and seepage can be considerable. For example, a 2009 project to line 23 miles of the All-American Canal was expected to save 67,000 acre-feet (over 82.6 million m³) of water per year, at a project cost of US\$300 million (Perry 2009).

Thus, water transportation imposes both a significant energy cost and, potentially, a significant water loss cost on water supply provision. These costs make water reuse a much better option in many circumstances. Particularly because the upfront investment costs in the technological infrastructure for water pipelines can be as significant as the costs of more efficient water treatment and water reuse technology (witness the costs of the Cyprus pipeline), governmental policies should encourage—through legal (e.g., permitting and water rights) requirements, subsidies, and grants—conservation and water reuse investments over investments in water pipelines and aqueducts. Moreover, when such pipelines and aqueducts are (p. 1177) deemed necessary, governments should ensure that they operate with both peak energy efficiency *and* peak water efficiency, minimizing water losses and contamination in transit.

2.4 Energy Use in Desalination

As the United States' National Research Council (NRC) observed in 2008, '[n]early all of the Earth's water is found in the world's oceans, while only about 2.5% exists as freshwater' (National Research Council 2008: 13). Thus, desalination has long been considered 'the Holy Grail of water supply, [offering] the potential of an unlimited source of fresh water purified from the vast oceans of salt water that surround us' (Cooley, Gleick, and Wolff 2006). In Europe, for example, Spain has invested heavily in desalination, as have many nations in the Middle East.

Desalination is, of course, a technology-dependent source of freshwater. However, as traditionally constructed, desalination is a particularly energy-intensive source of water supply. Nevertheless, combinations of increasing populations, depleted groundwater resources, and more intense and more frequent drought are increasingly driving governments around the world to propose and invest in desalination as a solution to water supply problems. California is one of these places. Notably, even in a state where water supply already represents a significant percentage of the state's energy demand, desalination 'would add more demand. A comparison of energy use for different water sources suggests that seawater [reverse osmosis] requires about 10 times more energy than traditional treatment of surface water' (National Research Council 2008: 141–142).

Nevertheless, after a hiatus because of the 2008 financial crisis, California is proceeding with desalination as a water supply strategy, driven by drought, persistent reductions or cessations in water deliveries from the Central Valley Project and State Water Project, and increasing threats to California's allocation of the Colorado River. In May 2009, Poseidon Resources received the final approvals for one of the first of a proposed series of

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new plants in Carlsbad, California, which will use reverse osmosis processes to produce 50 million gallons (189,270 m³) of drinkable water a day (Gorman 2009). The plant opened on December 14, 2015. It cost Poseidon about US\$1 billion to build, and the water that the plant produces costs more than twice as much as the San Diego Water Authority pays for most of the rest of its water supply (Kasler 2015). Specifically, 'San Diego has agreed to pay \$2,131 to \$2,367 an acre-foot for Poseidon's desalinated water, including the cost of piping the finished product to the authority's aqueduct. By comparison, ... the authority pays just under \$1,000 an acre-foot for water imported from Northern California and delivered to San Diego's doorstep by Metropolitan. An acre-foot is 326,000 gallons' (Kasler 2015).

(p. 1178) Australia also turned to desalination for 'water security', to supply water in a time of severe drought. In 2000, the national government identified 21 priority regions in Australia salinity contaminated water supplies (Pannell and Roberts 2010: 439). The plan expired on 30 June 2008, but it identified and promoted the use of desalination in Australia (Mercer 2009; Australian Department of the Environment 2002). Specifically, it was expected that '[b]y 2013 a total of approximately 460 giganlitres per annum (GL/yr) of drinking water will be produced from desalination plants operating in Melbourne, Sydney, Perth, Adelaide, and parts of south-east Queensland' (UNESCO Center for Membrane Science & Technology and National Water Commission 2008). The reality, however, has turned out somewhat differently: although desalination plants were built at a cost of billions of dollars and about AU\$200 million per year to maintain, many of the plants produced no water from 2012 until 2014 (Ferguson 2014) and possibly since then.

In general, desalination technologies all remove salts from seawater or brackish water to leave fresh water (National Research Council 2008: 19). Worldwide, two general techniques represent almost all of the existing desalination capacity: (a) thermal distillation, a form of desalination that depends on heated water; and (b) membrane filtration techniques such as reverse osmosis (Library Index 2016). Costs of desalination can vary considerably, depending on the conditions in the particular location, the desalination technique employed, and the salinity (salt concentration) of the water used. As a result, the costs of desalinating seawater are generally higher than the costs of desalinating brackish water. Even with these many variables, however, until recently, desalination has almost always been more expensive than conventional water supply methods (Radford 2008). Worldwide, the lowest costs for reverse osmosis plants have been US\$1.70 per thousand gallons (3.79 m³) in Singapore, ranging up to US\$5.60 per thousand gallons in the Bahamas and US\$5.40 on Cyprus. Costs of water produced by thermal distillation methods run from about US\$2.65 per 1000 gallons at a plant in Abu Dhabi to US\$5.03 to US\$6.93 per 1000 gallons at a thermal distillation plant in Kuwait (Cooley, Gleick, and Wolff 2006: 40).

More recently, however, costs of desalination have been decreasing (UNESCO Center for Membrane Science & Technology and National Water Commission 2008: ix). In addition, drought and shortages can make desalination competitive with other water supply options. In California, for example, water produced at desalination plants generally ranges

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in price from US\$1,000 to US\$4,000 per acre-foot (1233.5 m³), while traditional sources supply water at US\$27 to US\$269 per acre-foot and new non-desalination sources can deliver water for US\$600 to US\$700 per acre-foot (Library Index 2016). As a comparison, the much delayed and over-budget Tampa Bay Water desalination plant in Florida finally delivered water for US\$1,100 per acre-foot, but San Diego, as noted, is paying over US\$2,000 per acre-foot for water from the Poseidon plant (Kasler 2015). In addition, drought can change the cost equation. For example, during the 1988 drought, the city of Santa Barbara, California, which traditionally depended solely on its own reservoir for water, paid US\$2,300 per acre-foot of water and faced costs of US\$1,300 per acre-foot if it decided to permanently join the California Water Project (Library Index 2016). Instead, it opted to build its own emergency desalination plant, although it did eventually hook into the larger project.

Desalination also imposes environmental costs that need to be factored into energy and water policy decisions. Many of the environmental concerns related to building desalination plants are the same concerns that arise any time a major facility is built in the coastal zone: the site of the facility; effects of the construction on coastal ecosystems such as wetlands, mangroves, and estuaries; and disposal of wastes, including trash and sewage generated by the human operators. These concerns, while significant, are for the most part no different for desalination plants than for construction of any other major coastal facility (UNESCO Center for Membrane Science & Technology and National Water Commission 2008: 16). However, desalination plants do create two environmental concerns particular to their operations. First, the intake of brackish water or seawater can have environmental impacts, such as entrainment and impingement of fish and other organisms or alteration of nearshore currents. The second and more difficult environmental issue is disposal of the brine that desalination creates, which can harm coastal marine organisms and ecosystems (UNESCO Center for Membrane Science & Technology and National Water Commission 2008). Technological fixes, such as slowing the intake of water and deep-sea disposal of the brine, can mitigate some of these impacts in many situations, but as a policy matter they still represent environmental and potentially economic trade-offs in pursuing a desalination strategy.

Therefore, traditional desalination using fossil-fuel-based energy is probably not a first-best water supply option in most places, particularly when seawater desalination is involved. Use of alternative energy, however, may make desalination a more palatable option in many regions. For example, the Kwinana reverse-osmosis desalination plant in Perth, Australia, buys its energy from the Emu Downs wind farm, and Texas is considering using wind energy to power its brackish water desalination facilities. Chile, Saudi Arabia, and California are all pursuing solar-powered desalination.

Other technological innovations can help to mitigate both the environmental and energy costs of desalination. For example, co-locating a seawater thermal desalination plant with a power plant that uses seawater for cooling—as the San Diego Poseidon plant did—allows the desalination plant to use the power plant's used cooling water for desalination, saving energy costs associated with heating water, and to use the rest of the cooling wa-

ter waste stream to dilute the brine from desalination, reducing environmental impacts. Thus, desalination represents a water supply solution that could still benefit considerably from government investment into research and development, both to improve the many technologies involved and to develop desalination technological ‘best practices’ under a variety of conditions.

(p. 1180) Even so, however, many coastal communities and even communities considering desalination for brackish water treatment would still save on energy use by investing in water treatment efficiency and water reuse facilities rather than in desalination. As a legal and policy matter, therefore, governments like Australia and American states should more carefully consider the best place for desalination in a water supply portfolio, particularly in places where desalination would represent excess water supply capacity most of the time.

3. The Technological and Legal Challenges of Reducing Energy Production’s Impacts at the Water-Energy Nexus

3.1 Hydroelectric Power

Hydroelectricity generation is one of the most obvious examples of the water-energy nexus—a nexus that technologically limits hydropower’s dependability as an energy source. Because of its dependence on river flow, which in turn already varies widely from year to year, hydropower is a highly variable source of electricity. For example, in the United States, the difference in power production between the high-flow year of 2003 and the low-flow year of 2001 was 59 billion kilowatt hours (US Climate Change Science Program 2008).

While climate variability is the usual source of variation in hydropower production, policy, legal issues, and legal requirements can also play a role. In the United States, for example, the distribution of upstream water to water rights holders and adjustments to operational regimes (e.g., to ensure enough flow for aquatic species in order to comply with the federal Endangered Species Act) can reduce the amount of water flowing through a hydroelectric facility, reducing the amount of power produced (US Climate Change Science Program 2008: 41).

Hydroelectric power plants are close to carbon-neutral and thus promote climate change mitigation policies. However, they are not environmentally benign and have damaged river ecology, and particularly anadromous (salmon and steelhead) fish runs, worldwide. Where the variability in electricity supply and increasing environmental regulation render hydroelectric dams commercially unviable—as has been occurring with many smaller dams in the United States’ Pacific Northwest—dam removal to restore aquatic ecosys-

tems and natural water flow may represent (p. 1181) the wisest legal and policy course, despite hydroelectricity's status as a renewable energy source.

3.2 Thermoelectric Power

Globally, 80 per cent of electricity generation comes from thermoelectric power plants (Byers, Hall, and Armezaga 2014). Electricity production through the generation of heat from fuels is water-intensive, mostly because of demands for cooling water. In many nations like the United States, Canada, England, and Wales, water withdrawals for cooling water at these plants account for about 50 per cent (or more) of all water withdrawals (US Department of Energy 2006: 9; Byers, Hall, and Armezaga 2014: 17; European Wind Energy Association 2014). Even though actual consumption of cooling water is limited, it must be available in order for power plants to operate. Indeed, water supply is usually a factor in siting new power plants. Moreover, in most places, demands for cooling water are expected to increase in the future. For example, based on population growth alone, the US Department of Energy projects that '[i]f new power plants continue to be built with evaporative cooling, consumption of water for electrical energy production could more than double by 2030 from 3.3 billion gallons per day in 1995 to 7.3 billion gallons per day' (US Department of Energy 2006: 10–11).

The water demands in thermoelectric power generation depend on both the type of cooling technology and fuel employed. On the fuel side, for example, to produce one megawatt-hour of electricity, gas/steam combined cycle plants need 7400 to 20,000 gallons of water, while coal- and oil-fired power plants require 21,000 to 50,000 gallons and nuclear power plants require 25,000 to 60,000 gallons (Webber 2008: 38).

There are four main types of cooling technology: (a) 'once-through' or 'open loop' technologies, where cooling water is used once and then discharged; (b) 'closed-loop' technologies, where cooling water is reused; (c) air-cooled technologies that use almost no water; and (d) hybrid technologies (Byers, Hall, and Armezaga 2014: 17). Each varies in the amount of water withdrawn, the amount of water consumed and the 'energy penalty'—that is, the amount of energy lost to production at the power plant from the cooling technology. For example, open-loop cooling systems withdraw lots of water—43 to 168 liters per kWh produced—but consume very little of that water (0 to 1 per cent) and impose only small energy penalties (0.7 to 2.3 per cent of electricity output). Closed-loop wet towers, in contrast, require withdrawals of only 1 to 5 liters per kWh but consume 61 to 95 per cent of that water and impose energy penalties of 1.8 to 6.3 per cent of electricity output. Air-cooled systems require no water but come at an energy penalty, 3.1 to 11.2 per cent of electricity output. In addition:

(p. 1182)

Cooling systems which use less water tend to have both higher capital and operational costs; the former from cooling tower construction whilst an energy penalty from pumping, fans and a higher condenser back pressure all affect the economics of operation, although to an extent that is contested between theoretical and em-

pirical studies. On this basis, open cooling is usually the preferred choice of developers, if there is water available and environmental regulations permit.

(Byers, Hall, and Armezaga 2014: 17)

In general, therefore, energy efficiency considerations and economics drive power plants to cooling water technologies that withdraw larger volumes of water from local surface water sources. Once-through cooling technologies, however, come with environmental costs. In addition to local (and perhaps significant) dewatering of surface water bodies, the intake pumps at power plants can kill aquatic organisms, leading in the United States to the USEPA's cooling water intake rules (US Environmental Protection Agency 2014). Moreover, discharging the hot water post-cooling can disrupt the function of the receiving waters, a fact reflected in discharge standards imposed on cooling water in the US, the European Union, and Australia, among other countries.

What constitutes the 'best' cooling technology, therefore, will often depend on specific local circumstances, and governance systems need to take these local realities into account. Where cooling water is plentiful—and especially when the law requires power plants to operate with intake screens and thermal discharge requirements—once-through cooling systems may remain the most reasonable choice in light of the energy penalties that other cooling technologies impose on electricity production. Where cooling water is in short supply, however, or where environmental impacts are significant, use of other cooling technologies may better balance the trade-offs among energy production goals, water supply goals, and ecological goals. However, government investment in research and development to improve cooling technologies—and especially to lessen the energy penalties of more water-efficient technologies—would be a prudent investment for the future.

3.3 Solar Power

Solar power is often touted as a climate-friendly alternative energy source, which can be true. However, different kinds of solar power come with different water costs. The two main categories of solar energy generation are photovoltaic solar cells and concentrating solar thermal power plants or concentrated solar power (CSP).

Photovoltaic technologies exploit the fact that certain materials release electrons when struck by sunlight. Most photovoltaic cells in use rely on two layers of semiconductor materials, usually composed of silicon crystals that have been 'doped' with impurities like boron or phosphorus (Union of Concerned Scientists 2016a). When sunlight strikes the semiconductors, they generate a current of electricity. Photovoltaic cells require no water to operate, although significant amounts of water are required to manufacture the semiconductors (Union of Concerned Scientists 2016b).

(p. 1183) Concentrated solar power (CSP) is a different type of solar energy production technology. At CSP plants, '[b]anks of mirrors focus solar rays onto a small area, which gets very hot. This heat makes steam that drives a turbine to generate electricity. The

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steam then passes through a cooler to turn it back into water so the cycle can start again and keep the turbine turning' (European Commission 2014). As a result, CSP plants operate very similarly to thermoelectric power plants when it comes to cooling water, and they use the same kinds of cooling technologies. Unlike for most thermoelectric power plants, however, deserts are often considered good locations for CSP plants, which would generally require air cooling or dry cooling. Unfortunately, 'dry-cooling technology is significantly less effective at temperatures above 100 degrees Fahrenheit' (Union of Concerned Scientists 2016b). Nevertheless, technological innovations might reduce the water intensity of CSP plants and increase the efficiency of dry cooling. The European Union, for example, is funding and promoting new technology that uses water-free dry cooling at CSP plants, allowing them to operate in deserts (European Commission 2014).

There are, of course, other environmental concerns regarding solar electricity besides water. Compared to conventional power plants, for example, both kinds of solar power have significant land use requirements at the utility scale. 'Estimates for utility-scale [photovoltaic] systems range from 3.5 to 10 acres per megawatt, while estimates for CSP facilities are between 4 and 16.5 acres per megawatt' (Union of Concerned Scientists 2016b). In addition, manufacture of the semiconductors for photovoltaic solar energy produces a number of hazardous chemicals. Thus, despite the fact that neither form of solar energy generates greenhouse gases during electricity production, solar energy, and particularly CSP, at the utility scale is not necessarily a 'solution' that law and policy should blindly promote.

3.4 Wind Power

With respect to the water-energy nexus, wind energy is widely recognized as the most water-benign method of producing electricity. In the United States, for example, '[t]he electricity that will come from wind energy in the US during 2013 will avoid the consumption of more than 35 billion gallons of water, or save 120 gallons per person each year which is equivalent to 285 billion bottles of water' (American Wind Energy Association 2015). In Europe, similarly, '[w]ind energy avoided the use of 387 million cubic metres (mn m³) of water in 2012—equivalent to the average annual household water use of almost 7 million EU citizens'—and avoided economic costs of €743 million. Projections to 2030 for the EU indicate that 'wind energy will avoid between 1.22 [billion] m³ and 1.57 [billion] m³ of water' (European Wind Energy Association 2014).

Like all energy sources, however, wind power cannot provide the 'silver bullet' to resolve problems at the water-energy nexus in all places. First, not all places have (p. 1184) enough wind on a regular enough basis to support reliable energy production. Second, like hydropower, wind energy is subject to variation from day to day and year to year. Third, like solar power, wind energy farms have a relatively large footprint—30 to 141 acres per megawatt of electricity—but the spacing between wind turbines allows much of the land to be used for other purposes, like farming or ranching. Fourth, wind farms can kill birds and bats, although there may be ways to mitigate some of these impacts (Union

of Concerned Scientists 2016b). Finally, as with all new or replacement technologies, up-front capital costs for wind farms can be significant.

Offshore wind may offer many coastal nations an effective compromise. The United Kingdom, for example, has been aggressively pursuing offshore wind, and a new report in February 2015 noted that the costs of offshore wind have dropped 11 per cent in three years (Hill 2015). While the United States lags behind the United Kingdom and Europe in pursuing offshore wind energy, its energy agencies estimate that it has a gross wind power resource of '4,223 [gigawatts] off the coast of the United States', 'roughly four times the generating capacity of the current US electric grid' (Bureau of Ocean Energy Management 2016). In such nations, therefore, increased legal and policy incentives for governments and private companies to invest in offshore wind may be an especially appropriate means to encourage renewable and carbon-neutral energy production, while saving significant amounts of fresh water at tolerable environmental costs.

4. Looking to the Future: Climate Change Considerations at the Water-Energy Nexus

Climate change and its impacts mean that careful consideration of the water-energy nexus and the technologies available for adaptation will only become increasingly important. Specifically, climate change affects both sides of the nexus, and in terms both of supply and demand.

4.1 Climate Change and Water Supply

One of the most confidently predicted impacts of climate change is widespread change—and often reduction—in water supply. Especially at the regional scale, these changes may be significant, in terms both of the absolute quantities of water available for all uses and of the timing of water availability.

(p. 1185) In its most recent *Fifth Assessment Report* (2014), the Intergovernmental Panel on Climate Change (IPCC) concluded that, globally, the risks to freshwater resources increase with increasing greenhouse gas emissions. The risks come at both extremes:

For each degree of global warming, approximately 7% of the global population is projected to be exposed to a decrease of renewable water resources of at least 20% (multi-model mean). By the end of the 21st century, the number of people exposed annually to the equivalent of a 20th-century 100-year river flood is projected to be three times greater for very high emissions than for very low emissions for the fixed population distribution at the level in the year 2005.

(Intergovernmental Panel on Climate Change 2014: 232)

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According to the IPCC, most dry, subtropical regions of the planet will have reduced renewable surface water and groundwater resources. In addition, climate change is likely to increase the frequency of droughts in dry regions, while 'water resources are projected to increase at high latitudes' (Intergovernmental Panel on Climate Change 2014: 232).

Decreased water supplies as a result of climate change threaten to increase energy demand by prompting investment in energy-intensive sources of water supply: deeper aquifers, water pipelines and desalination. In addition, climate change is also likely to degrade water quality. As the IPCC notes:

Climate change is projected to reduce raw water quality, posing risks to drinking water quality even with conventional treatment. ... The sources of the risks are increased temperature, increases in sediment, nutrient and pollutant loadings due to heavy rainfall, reduced dilution of pollutants during droughts, and disruption of treatment facilities during floods.

(Intergovernmental Panel on Climate Change 2014: 14).

Thus, climate change's impacts on water supply are also likely to increase the energy required for water treatment in many parts of the world.

Finally, impacts on freshwater supplies brought about by climate change will likely exacerbate existing ecological issues created by water infrastructure and human water use. According to the IPCC:

Climate change negatively impacts freshwater ecosystems by changing stream-flow and water quality. ... Except in areas with intensive irrigation, the stream-flow-mediated ecological impacts of climate change are expected to be stronger than historical impacts owing to anthropogenic alteration of flow regimes by water withdrawals and the construction of reservoirs.

(Intergovernmental Panel on Climate Change 2014: 232)

4.2 Climate Change and Water Demand

Decreasing water supplies as a result of climate change will create increasing demand for water in those regions. Reductions in fresh water supply 'will intensify competition for water among agriculture, ecosystems, settlements, industry, and energy (p. 1186) production, affecting regional water, energy, and food security' (Intergovernmental Panel on Climate Change 2014: 232).

Agriculture and thermoelectricity production are currently the most demanding users of water in most countries, and climate change will only exacerbate that fact in parts of the world projected to become hotter and drier. On the agriculture side, increased air temperatures, changing precipitation patterns, and longer growing seasons may all increase demands for irrigation water. In the United States, for example, climate-change-induced

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alterations to precipitation were initially expected to contribute to an overall *reduction* in agricultural irrigation of 5–10 per cent by 2030 and 30–40 per cent by 2090 (US Global Change Research Program 2003). However, more recent analyses suggest that, while predicting crop water consumption in the face of climate change impacts is a complex task, overall ‘the lengthening growing seasons due to global warming likely will increase crop water requirements’ (US Global Change Research Program 2006: 39; see also US Global Change Research Program 2008, 2009).

Thermoelectric power plants’ demand for water will not decrease even when water supplies are decreasing, potentially reducing electricity production (see Section 4.4). In addition, when nations require fossil fuel-powered plants to implement carbon capture and sequestration technology to mitigate climate change, water demands ‘per MWh electricity generated can double’ (Intergovernmental Panel on Climate Change 2014: 665). Finally, options for adapting to reduced water supplies are relatively limited, especially at existing power plants, and include:

exploiting non-traditional water sources and re-using process water to measures such as installing dry cooling towers, heat pipe exchangers, and regenerative cooling, all which increase costs. Water use regulation, heat discharge restrictions, and occasional exemptions might be an institutional adaptation.

(Intergovernmental Panel on Climate Change 2014: 667)

4.3 Climate Change and Energy Demand

Especially at a regional level, the impacts of climate change, such as increased temperatures, may directly increase or decrease demands for energy, in terms of both the amount and the type of energy required. In the United States, for example, the US Climate Change Science Program (USCCSP) concluded in 2008 that ‘the net effects of climate change in the United States on total energy demand are projected to be modest’ (US Climate Change Science Program 2008: 1). Nevertheless, globally, the *form* of energy demanded is likely to change, because ‘[c]limate change will reduce energy demand for heating and increase energy demand for cooling in the residential and commercial sectors’ (Intergovernmental Panel on Climate Change 2014: 662), precipitating a shift to electricity from wood, heating oil, and (p. 1187) natural gas. Moreover, while the net changes in energy demand for the entire country may be modest, changes in energy demand may be substantial in particular regions and localities. Finally, the demands for increased electricity for cooling are likely to be greatest in the areas that are also anticipated to experience reduced (and hotter) water supplies.

In addition, actions undertaken to adapt to climate change impacts in other sectors, such as water supply, may simultaneously change demands for energy. For example, withdrawing water for agriculture and transporting it to fields and livestock already demands sig-

nificant amounts of energy, and climate change impacts that increase demands for irrigation water will simultaneously increase energy demands to deliver that water.

4.4 Climate Change and Energy Supply

Climate change impacts may limit the amount of energy available. In general, the effects of climate change on energy production are harder to predict—and hence less certain—than the effects on energy consumption and demand. Nevertheless, as the National Academy of Sciences has observed for the United States:

[c]limate change impacts on the energy industry are likely to be most apparent at subnational scales, such as regional effects of extreme weather events, reduced water availability leading to constraints on energy production, and sea level rise affecting energy production and delivery systems.

(America's Climate Choices 2011: 48)

Warming temperatures decrease generation cycle efficiency at conventional power plants. However, not all power plants are equally sensitive, so far as efficiency is concerned, to temperature changes, a fact that should be factored into energy infrastructure investments for the future. In particular, nuclear and coal-fired power plants show little change in efficiency in response to changes in ambient air temperature, while petroleum, natural gas, and dual-fuelled plants are more sensitive to such changes. Gas turbines are particularly sensitive to ambient temperature, and studies have shown that 'a 60°F increase in ambient temperature, as might be experienced daily in a desert environment, would have a 1–2 percentage point reduction in efficiency and a 20–25% reduction in power output' (Wilbanks 2009: 42). In its most recent report, the IPCC noted these heat-related losses in thermoelectric power production, emphasizing that '[a] general impact of climate change on thermal power generation (including combined heat and power) is the decreasing efficiency of thermal conversion as a result of rising temperature that cannot be offset per se' (Intergovernmental Panel on Climate Change 2014: 665). In addition, technological innovations at power plants to resolve other problems, like greenhouse gas emissions, only exacerbate the problem. As the IPCC described, when (p. 1188) carbon dioxide (CO₂) capture and storage equipment is added to fossil-fired power plants, 'energy efficiency declines by 8 to 14%' (Intergovernmental Panel on Climate Change 2014: 665). However, it also emphasized that new technologies, such as supercritical and ultra-supercritical steam-cycle plants, are likely to more than compensate for temperature-related efficiency losses.

More critical are the impacts of changes to water supply on electricity generation. For example, water supply reductions in regions where hydropower is important will almost certainly reduce local electricity supply. Indeed, '[t]he sensitivity of hydroelectric generation to both changes in precipitation and river discharge is high', and '[c]limate impacts on hydropower occur when either the total amount or the timing of runoff is altered, for exam-

ple when natural water storage in snow pack and glaciers is reduced under hotter climates' (United States Climate Change Science Program 2008: 41).

More commonly, the most direct effects of climate change on thermoelectric power plants will relate to cooling water. First, like all water users, thermoelectric power plants are vulnerable to reductions in water supply. Moreover, technological innovations can accomplish only so much. 'Plant designs are flexible and new technologies for water reuse, heat rejection, and use of alternative water sources are being developed; but, at present, some impact—significant on a local level—can be foreseen' (United States Climate Change Science Program 2008: 31). Second, thermoelectric power plant cooling technologies are also vulnerable to increases in air and water temperatures. Power plant cooling technologies have three relevant temperature requirements: (a) the temperature of the water on intake into the electric power plant; (b) the ambient air temperature, if air cooling is used at the power plant; and (c) the temperature of the water when it is discharged back into the relevant water body. With regard to cooling water intake, in order to perform adequately as cooling water, the water withdrawn needs to be cool enough to take heat away from the electric plant. In the face of increasing air and water temperatures, the ambient water temperatures may become too hot, especially in summer, for cooling water to do its job. Notably, moreover, climate change-induced temperature problems with cooling water can occur even when an ample supply of water exists. As a result, climate change's impacts on power plant cooling water are more complex than simply dwindling water supplies.

In some power plants, cooling water circulates through a cooling tower before being discharged. For these towers to work effectively, the temperature of the air surrounding the tower must be significantly lower than the used water's temperature. However, if the air is too warm—as is increasingly likely with climate change—the cooling tower cannot properly perform its function.

Finally, temperature can also become an issue for cooling water discharge. Increasing air temperatures will lead to increasing water temperatures. These changed ambient conditions may make it more difficult for power plants legally to discharge heated cooling water into nearby lakes, streams, rivers, or even the ocean. (p. 1189) Plants that cannot legally discharge their cooling water cannot operate; moreover, they can interfere with water users downstream who are depending on the power plant's return flow.

5. Conclusion

In this climate change era, the water–energy nexus becomes a multi-faceted, complex policy issue with multiple feedback loops and, potentially, incredibly vicious cycles of decreased production and availability on both sides. This problem will only be complicated further by population growth, as at least two billion more humans create a separate source of rising demand for both enough clean water and sufficient energy to satisfy human rights goals.

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Technology can provide some improvements, but almost all technological ‘solutions’ come with significant trade-offs. Desalination can increase water supply, but only at a high energy cost that is also likely to increase the demands for water. Depending on the source of the energy, moreover, increased desalination may come at the cost of increased greenhouse gas emissions, as well. Thermoelectric power plants can run on less water, but generally only at the cost of decreased energy production. Moreover, these plants’ current water use practices in the face of increasing water and air temperatures will likely both decrease the efficiency of electricity production and increase the risks to the aquatic environment.

Better approaches to ‘big technology’ solutions *are* emerging. On the water supply side, more efficient water pumping and treatment technologies can reduce current energy costs in water supply, while water reuse can make ‘new’ water available to thirsty populations at significantly less of an energy cost than either long-distance water importation or desalination. Energy production from wastewater treatment and co-location of various kinds of plants also offer promising improvements in energy demand. On the energy side, improvements in cooling technologies and increased investment in offshore wind offer viable paths to reduced water use in energy production, as do some forms of solar energy, such as rooftop photovoltaic solar in regions with sufficient sunlight.

Nevertheless, and especially in the face of climate change and its unpredictability, conservation and more efficient use of both energy (especially electricity) and water should become important first-best, ‘no-regrets’ (that is, no significant negative trade-offs) water and energy policies. However, given the significant upfront capital costs of first developing and then building more efficient infrastructure, governments should promote investment in energy-efficient water technology and (p. 1190) water-efficient energy technology. As a matter of governance, law, and policy, such promotion can take many forms, the particular combination of which should reflect local circumstances, needs, and norms. Such governance reforms could include legal requirements (such as in permitting regimes) for use of proven efficient technologies in new infrastructure and requirements for periodic technology upgrades in existing infrastructure; subsidies and grants to help municipalities and industrial facilities invest in capital-intensive new technologies; consumer-oriented subsidies (such as for insulation, rooftop solar technology, heat pumps, and low-flow toilets and showers), metering requirements, pricing structures, and rewards programs that encourage conservation of both electricity and water at the household scale; and/or significant investment in research to promote the continued development of ever-more-efficient water and energy technologies and best practices, such as solar and wind desalination.

More generally, a nation’s water laws and policies should consider energy demands and climate futures as important factors in decision-making about water supply sources and water use, particularly with regard to long-term infrastructure investment. Similarly, a nation’s energy laws and policies should consider water supply and climate futures in decision-making about new energy production to meet increasing demand. In both sectors, policymakers should resist the knee-jerk reaction to ‘build more’ to meet increasing de-

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mand, seeking instead to capture first the low-hanging fruit of reduced waste, reduced use, recycling, and increased efficiency.

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Technology Wags the Law: How Technological Solutions Changed the Perception of Environmental Harm and Law

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Abstract and Keywords

This chapter examines how the introduction of technological regulatory standards in environmental law changed the terms of environmental policy debate in an unexpected manner. Technology as one tool to reach environmental goals began to be discussed in policy and legal research as if the technology standard was itself the ultimate policy goal. This led to debates and critiques over the merits of technology as a matter of environmental policy. Attacks came from the right in the form of efficiency critiques of laws requiring certain technologies or processes, and from the left in a general attack on the use of technological controls instead of changes in lifestyle or consumption patterns. This in turn skewed the terms of environmental policy debate, particularly in relation to underlying policy values. Only by a recognition of the original purpose and role of technological standards can these underlying policy debates be appropriately discussed and debated.

Keywords: environment, environmental law, technology, pollution, technology forcing, market control, consumption

We need to make technology serve man, not endanger him. We need to conserve our planet and the complex life systems which make it habitable, not disturb its balances for the sake of short-term economic gains.

Senator Edmund Muskie, Introduction of the Environmental Quality Improvement Act of 1969

There is no effective way as yet, other than land use control, by which you can intercept that runoff and control it in the way that you do a point source. We have not yet developed technology to deal with that kind of a problem.

Senator Edmund Muskie, Federal Water Pollution Control Act Amendments of 1971

Science and technology ... must be applied to the identification, avoidance and control of environmental risks and the solution of environmental problems ...

Principle 18 of the Stockholm Declaration of 1972 from the UN Conference on the Human Environment

(p. 1195) **1. Introduction**

MODERN environmental law is traced to new stronger laws on a host of environmental issues passed in the United States from the late 1960s to the mid 1970s. These laws heralded a new era in environmental law globally in at least two ways. First, they elevated public health and environmental concerns in public policy and regulatory terms to an extent never before seen. Rather than focus on making certain adjustments to policy, these laws boldly enshrined values such as protecting public health without regard to cost and recognizing that natural values themselves could trump economic concerns (Flatt 2004b: 1).

Second, early environmental law relied on technological solutions as the primary tool to reach these strongly enunciated goals (McCubbin 2005: 31). Since that time, however, the legal requirements for technological controls in environmental law have taken on a life of their own. Rather than being merely a tool to reach a goal, they have been praised and critiqued as if they themselves were the main goals. Because of this, regulatory tools—both technological controls and others such as market mechanisms—have occupied the central debate in environmental law and policy, changing the way we perceive environmental harms and solutions and obscuring the underlying policy values that should be at the heart of policy and legal choices and debates.

2. What Happened to Saving the Environment? Technology as the Focus for Solutions and Debate

When environmental laws and pollution control moved into the modern era, technology took on a much larger role in pollution control. This created a new way of debating and viewing environmental policy, with a reduction in the focus of basic environmental protection values.

2.1 Technology can Save the Environment: A History of Early US Environmental Regulation

Initial attempts to control pollution in the United States were undertaken by states and localities as early as 1866 (Andreen 2012: 633). However, each state had difficulty

(p. 1196) unilaterally raising standards when other states could lure away business and economic development through lower required environmental benchmarks (Flatt 1997:

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3). With seemingly little success and growing industrial pollution, in the mid 1960s, the federal government entered the fray to prod states to set water and air quality standards (Andreen 2012: 633). Both the US and UK revisited efforts for air pollution control in the 1950s and 1960s (Clean Air Act 1956; Reitze 1991: 1586–1587). Nothing, however, seemed to stem the tide. In hindsight, these attempts would be criticized as feckless because of the lack of enforcement mechanisms or incentives to comply with the requirements (Flatt 2004a: 600).

With the confluence of high-profile pollution events and failures to improve the situation, the United States altered course and passed landmark laws in the early 1970s that would eventually become the model for environmental legislation worldwide. In addition to carving out strong protections for health and the environment, these laws for the first time supported these goals with direct technological controls on pollution sources (Blais and Wagner 2008: 1715–1716). For instance, in addition to requiring that the entire country was to reduce ambient pollution levels to a point at which public health would not be harmed, the 1970 Clean Air Act required new and modified sources of air pollution to install the ‘best pollution control’ that had been ‘adequately demonstrated’ (Clean Air Act 2012). The 1972 Amendments to the Clean Water Act, in addition to enshrining a goal of increased water quality for health and the environment, directed the Environmental Protection Agency (EPA) to set technology-based limits for pollutant discharges from existing industrial point sources (Clean Water Act 2012). While technological requirements in these federal laws had their critics, the conventional story is that these controls were the first really successful method of reversing pollution in the United States and moving the country towards meeting its public health and environmental goals (Andreen 2012: 629).

Why the United States finally embraced specific technologically related requirements to reach its public health and environmental goals at this time has many plausible answers. One explanation involves the popular view of technology at the time as a saviour providing benefits to humanity. While the impacts of technological progress and advancement on human life can be seen from Roman times, the acceleration of technological achievement starting in the early 1900s brought technology’s promise to a much wider audience. By the end of the First World War, the US was at the forefront of technology due to its cultural ‘openness to experimentation and innovation’ (Knoll 1996: 1602). There were electric washers, dryers, refrigerators, and lights. By 1960, there were jet airplanes, radio, television, moving pictures, and even spacecraft. Only 60 years earlier, innovations like these were mostly unknown to the world’s citizens (Lancaster and Connors 1992: 1753). Visions of the future from this vantage point foresaw further amazing developments: supersonic aircraft, visual telephones, self-cleaning houses, and mechanical brains (Lee 1964; Stiger 2000). This ‘Jetsons’ view of the future, embodied in the 1964 New York (p. 1197) World’s Fair, Disney’s *Tomorrow Land*, and later EPCOT, showed the world moving in one progressive direction with technology (Sullivan 1999; Schulmiller 2014). ‘The New York World’s Fair gave 50 million visitors a glimpse into a hopeful future, powered by ... the belief that all the world’s problems could be solved by corporations and their technological wonders’ (Schulmiller 2014).

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What was not new at this time was pollution. Choking coal dust and ash had covered most Western cities for at least a century; the manufacturing process for modern steel construction was responsible for the Donora Killer Smog in the 1940s; and 'normal' coal use in London caused the death of 4,000 people in one air inversion incident from 1952 (*Water and Air Pollution* 2009). Technological innovations leading to a more comfortable life allowed greater recognition of these environmental harms. The increased standard of living allowed by newly deployed technologies, many historians believe, is what gave the final push to create stronger environmental protection laws in the United States, then in Western Europe, Oceania, and Japan (Chen 2001: 56). Unsurprisingly, given the societal focus on technology as a saviour, the powerful trend around the world to stop pollution sought to utilize the technology that had provided and promised so much. The United States had put a man on the moon; surely it could employ more prosaic technology to bring down pollution to a level that could protect public health.

Howard Baker, a Republican senator who was one of the sponsors of the new Clean Air Act, believed 'that the American technological genius should be brought to bear on the air pollution problem, and that industry should be required to apply the best technology available' (Ridge 1994: 170). As noted by Professor Oliver Houck, the thinking at the time was that '[a]fter all, it was the scientists, such as Rachel Carson, Jacques Cousteau, and Yuri Timoshenko, who had sounded the alarm; they were the ones to put out the fire' (Houck 2003: 1926). Rather than depending on human judgement and resolutions, which were being discredited (Guruswamy 1989: 481) and had accomplished precious little in addressing air and water pollution, the new environmental laws emanating from the United States called for scientific objectivity and strict technological controls on pollution sources (Andreen 2012: 655–656). As stated by Professor Wendy Wagner, '[d]ue to the considerable scientific uncertainty that surrounds policy discussion of man's impact on nature and public health, [technology] standards' finger-in-the-dike approach' provided the most reliable method for controlling pollution (Wagner 2000: 85).

These technological standards for reaching newly strengthened environmental goals soon proved to be much better tools at actually reducing pollution in some realms than the exhortation model that had preceded them. Instances in which Congress had not specified technological standards in new stronger pollution laws, such as with toxic pollutants in the air and water, continued to show little progress. For toxic pollutants in the Clean Water Act, which include carcinogens, Congress was unwilling in 1972 to abandon the health-based regulatory programme for a technological standard, but it did put the onus on the EPA rather than the states to implement the scheme. (p. 1198) The legislature mandated that the Agency set standards that would provide an 'ample margin of safety' to protect public health, which, like water quality standards, required the regulators to try to make a detailed inquiry into the risks posed by a pollutant in a water body to declare a 'safe' level (Clean Air Act 2012). That inquiry proved far too complex to be implemented in a timely fashion, and, after five years, the EPA had only proposed 'ample margin of safety' standards for nine toxic water pollutants, and had finalized none (Murchison 2005: 551). Consequently, with the 1977 Amendments to the Clean Water Act, Congress required the EPA to establish technology-based 'Best Available Technology' standards for

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existing sources of toxic pollutants (Clean Water Act 2012). Similarly, in the Clean Air Act, the spectacular failure of the EPA to control toxic air pollutants after 20 years, prompted the last big technological requirements in US environmental laws, namely, the Maximum Achievable Control Technology (MACT) requirements for Hazardous Air Pollutants in the 1990 Clean Air Act Amendments (Flatt 2007a: 115).

Hence, by 1990, for both toxic and non-toxic pollutants, the United States had fully abandoned its failed 'health-based only' environmental regulatory system, which calculated the precise risks to public health and the environment posed by industrial sources and restricted discharges of pollutants to 'safe' levels. Instead, legislation now required each regulated source to meet technology-based discharge limits that reflected the EPA's selection of the pollution control technology available for that source (McCubbin 2005: 6–11).

Much of the rest of the world followed the US model of technological solutions. In the United Kingdom, there was the 'best practicable means' (BPM) standard, and, by 1990, the European Union had adopted the model of 'best available techniques not entailing excessive costs' (BATNEEC). However, beginning in the 1980s, Europe also charted its own path on pollution control, focusing more on risk regulation and less on absolute standards (Wiener 2003: 224). While many associate this development with the EU being more protective against environmental harms, the technological mandates in the United States in fact often exceed those of the EU (Wiener 2003: 224). Europe has never moved to completely ambient-based pollution standards, but it is fair to say that technology is less revered there than in the United States, giving rise to more variety in environmental pollution control, including through preventive and risk control strategies (Faure and Johnston 2009: 264).

2.2 Technology Reframes Thinking about Environmental Law

While technology controls for environmental problems in the United States had proved themselves effective at reaching the goals of pollution control, their very (p. 1199) effectiveness and ubiquity began to change how scholars and policymakers thought about environmental law and how they addressed underlying values debates about environmental and health protection versus other interests.

First, because the results of technological fixes can be analysed relatively easily (how much pollution coming out of the pipe now versus before), technology appeared to be an 'easy' fallback way to enforce environmental standards:

[B]ecause the reference point is a definable technology for which numerical standards have been nationally developed, technology-based requirements are almost always clear, easy to codify, and easy to reflect in permit requirements. (Wagner 2000: 101–102)

Technological solutions ignore questions of trade-offs (Driesen 2005: 4). However, this simplicity is illusory. Merely having a 'number' does not necessarily reflect progress. It is easy for these 'numbers', or decisions about numbers, to appear as objective choices,

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even if underlying decisions may be driven by values (Wagner 1995: 1617). This allows important policy and values questions to be subsumed as scientific questions, when they are not (Wagner 1995: 1617). In other words, if technology is our solution, all our answers determined by these technological standards must be objective. As noted by Jim Salzman and Martin Doyle, 'preconceived reference frames take on a role almost in and of themselves in shaping many disciplines' (Salzman and Doyle 2015: 9). *Perspective matters*, shaping 'our understanding and application of environmental law' (Salzman and Doyle 2015: 9). Or, as explained by Eloise Scotford, technological processes create a context which affects and constructs environmental information and understanding (Scotford: 2). Whether this alteration of perspective was ever the direct intent of the embrace of technological solutions is unclear, but technology's quick embrace and staying power may indeed be related to its ability to de-emphasize disagreement over pollution control goals and instead to focus on the tool (Babich 2003: 123).

The fixation on technological controls on pollution outflows (or effluent) also makes possible the conception of the pollution source as the entire problem and gives rise to the related *polluter pays* principle (Nash 2000: 466). When the costs of control are directly imposed on polluters (as with technological end of pipe controls), it focuses on only one side of the equation, production, without looking at the other side, consumption. If the first responses to pollution had been focused on product consumption associated with pollution, technological 'end of pipe' solutions might not be a major focus. A consumption focus re-frames the pollution problem into a problem with the system, not with the effluent itself. As had others, Aldo Leopold believed that no amount of pollution control could work if the systemic desires of consumption were not addressed (Freyfogle 2013: 241-242).

But at the beginning of the modern environmental movement, technological solutions permeated law and policy in the United States (and to a lesser extent in other parts of the world), influenced how we saw environmental problems, and also influenced how the regulated community would react to these impositions.

(p. 1200) 2.3 Attacks on Technological Control Requirements from the Right

Though technological solutions seemed to be the first effective pollution control devices to reach the environmental and health based goals of the major laws, critiques of these requirements from the 'rational right' began in the 1980s (Hardin 2008: 1147-1148). As championed by NYU law Professor Richard Stewart in several articles, technology controls in environmental laws were accused of being inefficient, leading to both 'too much' and 'too little' control (Stewart 1996). This stock critique has spawned its own subgenre of environmental law, with both supporters and detractors (Cole and Grossman 1999; Wagner 2000: 85). By 2000, Professor Wendy Wagner would report 'virtually all of the literature on the subject is critical of technology-based standards' (2000: 107).

But this critique of technological standards as inefficient only makes sense if the technological achievement is seen as a goal on its own. This causes two problems. First, if the

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technological control itself is the goal, it dampens incentives for better environmental protection than the initial technological standard. A polluter 'has no incentive to reduce the harmful effects of his processes on the environment, and, perhaps even more seriously, to research into new, more efficient, forms of abatement' (Richardson et al. 1982: 39).

Nothing in the Clean Water Act (CWA) or Clean Air Act (CAA) would require such a static technological regulation (Driesen 2005: 2). Both allow consideration of the relative costs of different technology levels, as that would be necessary to determine the 'best' part of control technology. Additionally, because the technology-based standards eschew the notion of cession of the pollution activities as the solution, these standards must be considered 'cost sensitive' (Driesen 2005: 11). Nevertheless, because of the technology mindset of environmental solutions, the majority of courts have treated CWA and CAA technology references as monolithic requirements set by objective standards alone. This in turn gives some credence to the rationalist cost-benefit critics, but also shows how the focus is on the system of regulation, not the protection of the environment (McCubbin 2005: 4). Howard Latin, a lone voice for the effectiveness of the technological approach in these debates, tried to refocus attention on whether technology worked to solve a goal rather than whether it was the 'best' system of control, but most critics were unfailingly focused on the best 'system' of control rather than on environmental progress (McCubbin 2005: 4).

The second, perhaps more fundamental problem with these critiques is that while seemingly an attack on the parts of the major environmental laws requiring specific technological solutions, such as the 'best system of emission reduction' (Clean Air Act 2012; Clean Water Act 2012), these critiques are more about the perception and goals of economic inefficiency (Driesen 1998: 350). In this vision (p. 1201) of environmental problems, aligning economic incentives with pollution control would bring the power of the market to control pollution, providing a more efficient or cost-beneficial solution (Stewart 1996). However, this obscures the purpose and the underlying values of our environmental laws.

By being the *bête noire* of the so-called 'rational' approach to environmental regulation through cost-benefit analysis, technology brought about an approach to environmental regulation which essentially ignored the original goals of environmental protection and instead changed the debate to cost-benefit decisions as a goal in and of themselves, without references to rights or entitlements to a healthy environment (Stewart 1996). Once activated as a necessary correction to inefficient regulation (such as one-size-fits-all technological controls), cost-benefit analysis consumed debates in regulatory efficiency in the 1980s and 1990s (Hardin 2008: 1147-1148). This approach not only applied to administrative actions, but emphasized the rational individual decision maker (Bejesky 2001: 285). This strain of regulatory reform ultimately called for not just regulations that were cost-beneficial, but underlying *policy* that was cost beneficial from its proponents' perspectives (Guruswamy 1989: 503-505). This undermined the underlying environmental policy values of our major environmental laws such as supremacy of human health goals (Flatt 2001: 350).

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While debates about ‘market controls’ as ‘tools’ to reach environmental goals have continued to permeate the academic environmental law journals (Keohane et al. 1998: 313–314), major policy debates switched to efficiency per se, a *sub rosa* attack on the very environmental law goals themselves (Flatt 2001: 359–360). What started as an academic critique of specific technological requirements in the major US environmental laws (requirements still in existence) began to embody a whole approach to regulation and governance. Rather than technological or market based controls being viewed as choices to reach an environmental goal determined in a policy realm (Flatt 1999), they became viewed as competitors in forming underlying policy. As noted by Bruce Ackerman and William Hassler, ‘by giving statutory prominence to technological means of purification in new plants, section 111 [of the Clean Air Act] would distort policymaking perceptions for years to come’ (1980: 1479).

The call for rational regulation decoupled the original purpose of the technology first requirements and substituted a straw man of command and control regulation. Political debates were no longer about protecting us from the harms of others or values trade-offs, but about cost-efficient pollution control. Technology was no longer a saviour; it wasn’t even a tool. It was the enemy of efficiency. If the technological standards themselves had already been bastardized by the public’s projection of an aura of scientific objectivity, the attack on these standards further separated the policy debate from the original purpose of the technological requirements and the hopes they would bring to environmental protection.

(p. 1202) Even when market-based control debates are correctly framed as debates about policy tools, this distinction can be overlooked in political debates. For instance, the automatic assumption of market-based trading systems in proposed US legislation on greenhouse gas control obscured some of the underlying values choices that needed to be considered (Flatt 2007b: 128).

Similarly, in the international arena, the focus on market fine-tuning has obscured more fundamental debates on climate change. The current worldwide consensus approach to climate change represents a distinct departure from earlier environmental goals of natural, healthful, or background pollution levels (Clean Air Act 2012); it instead jumps to a cost-beneficial goal from the start. The implications of this are still seen in the debate over targets and the disassociation of morality from parts of the debate (Wood 2009: 96).

2.4 Technology Is Not ‘Natural’: Critiques from the Left

Technology also has its critics from the left, or those who might be known as preferring the natural world. As early as the mid-nineteenth century, Thoreau bemoaned the impact that technology was having on human existence. Famously, he noted that for all of the ‘time-saving’ that technology created, it required more investment in time to earn the money to pay for the technology (Thoreau 1937). In a different vein, Aldo Leopold during the early 1900s critiqued the lessening understanding and relationship of humans with their surroundings (Freyfogle 2013: 241). While this was not a critique of technology per

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se, it echoed the themes of communal experience with the natural environment, which machines generally did not promote (Freyfogle 2013: 241). Similarly, Garrett Hardin in his famous discussion of the 'tragedy of the commons', focuses more on social structures and the problem of consumption rather than technical 'fixes' to environmental problems. Technology itself also produced some backlash of its own. The massive chemical and plastics industry that arose after World War II, with new fertilizers, pesticides, and wonder materials served as a warning shot of the dangers of unbridled technological progress'.

In the early 1960s, this new view of the natural world as being 'against technology' began to gain prominence in certain segments of the US and European populations. Ecological interdependence, brought to the forefront by author Rachel Carson in her controversial *Silent Spring*, produced an image of nature in which all natural systems, including the bodies of human beings and other living things are intensely interconnected and even inter-permeable, an echo of Garrett Hardin (Guruswamy 1989: 509). This view guided some reformers and ordinary citizens in making sense of and organizing a web of new problems rooted in pollution and (p. 1203) toxic contamination. The new goal became preservation and restoration of nature's resources, although this soon proved to be elusive both conceptually and practically.

This view also fit into the emerging anti-war movement and the civil rights movement, which focused on problems that had to be fixed with the spirit rather than with technology. The institutional developments of this period were interwoven with the youth of the era's defining philosophy of the human place in nature—ecological interdependence (Guruswamy 1989: 509). This was founded in an image of the physical world as composed of complex, long-distance, and frequently invisible webs of cause and effect, forming an interdependent whole rather than a collection of relatively freestanding parts. The most salient implication of interdependence was that people and natural systems alike were vulnerable to the effluents of industrial technology: once released, wastes could return in unexpected and undetectable ways, through wind, rivers, food chains, and bloodstreams. Rachel Carson's *Silent Spring* describes these interdependent systems, treating the passage of pesticides through air, water, land, then plants and animals, and finally, human bodies (Carson 1962: 39–83). By the end of the 1960s, it had become a standard position of the left to say that industrial society endangered everyone in novel ways, and that ecology, the science of interdependent relations, was the key to understanding this (*The Age of Effluence* 1968: 52).

Even after the use of required technological controls in environmental law had definitively improved environmental protection, some of the ecological movement, while not criticizing technological pollution reduction per se, continued with the view that technology was unnatural and much of it unsustainable. Technology was seen as a mere patch, fostering continued unsustainable consumption. *The Limits to Growth*, a controversial book published in 1972 with millions of copies sold worldwide, constructed a simulation model of the world (World 3) and fed into it a model using past exponential growth trends in population, industrial production, and pollution to predict future conditions (Meadows 1972; Cole 1973; Greenberger et al. 1976: 158–161). Since the world in its physical as-

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pects is finite, exponential growth must eventually hit a limit. Measures to avert the projected catastrophe would involve radical 'value changes' in policies. For example, goals were to reduce birth rates to the point of death rates, to hold capital investment equal to depreciation, to reduce consumption and change its emphasis from material goods to services, and to recycle resources (Meadows 1972: 163–164; Greenberger et al. 1976: 161).

As technocratic critics were quick to point out, the authors of *Limits*, despite paying much attention to exponential growth, neglected it in the case of technology (Cole 1973; Greenberger et al. 1976: 161–176). Take *that* growth into account, and suddenly the future looks more promising. It appeared possible that many, if not most, of the alleged ills of increasing population, production, and consumption, and of apparently diminishing natural resources, could be remedied without drastic measures. Malthusian prospects could be avoided (at least in some circumstances) without the basic alterations in social values, organization, and behaviour urged by (p. 1204) the pessimists. According to this worldview, the view that embraced technology, the ultimate problem of 'running out' is not really a foreseeable problem at all. It can be forestalled by exponential technological advance. We have already seen the idea of 'technology can save us from technology' as one of the original bases for the technological environmental solutions.

This debate over whether technology can provide solutions to carrying capacities began to cast the technological controls in environmental laws as the enemy of more holistic consideration of the world, when it was never intended to be imbued as such (Andrews 2006: 253). The critique of technology also expanded to the now-fashionable market-based responses to environmental law, discussed earlier, for similar reasons of ignoring consumption questions (Beder 2002). This critique of environmental problems thus became a critique of consumption (as opposed to pollution). From that perspective, technologically based and market-based legal solutions are completely the wrong system for environmental control.

The direct relationship of economic growth to greenhouse gas production has given new impetus to this movement to double down on consumption controls while eschewing technological or market tools to reach a goal, spawning large protests at COP15 in Copenhagen and in subsequent climate change conference of the party meetings. It has led to a refocus on attention to a greenhouse gas level that is more associated with the 'natural' baseline rather than an 'optimal' baseline (Wood 2009: 96). Coupled with the financial crisis of 2008 and the following years, the calls to re-examine fundamental presumptions about societal organization and its application to environmental issues has grown. As stated recently by Catherine Phillips, 'enduring environmental problems relate to indelible aspects of our current economic system, making their solutions impossible without addressing the underlying system' (2013: 230).

This claim has found particular resonance in agriculture. The anti-genetically modified organism (GMO) movement is extremely strong in the EU, and has also faced continuing debate in the United States (Borg 2004: 683; Poorbaugh 2005: 71). Criticism in the United States has also been lodged against the industrialization of food (Bratspies 2013: 927–

930). While this is not only about the environmental issues of artificial pesticides and fertilizers, it is resolutely in the camp of seeking more consumption-based solutions to problems, a turning away from technology, and a connection with the economic system that supports this industry. As Mark Bittman has written in the *New York Times*, ‘the problem is that real food isn’t real profitable. It is hard to “add value” to fresh fruits and vegetables’ (Bittman 2014).

Unfortunately, perhaps because of the path dependency of the last 40 years of environmental debate, the left’s indictment of the harm caused by the current economic system by its nature must be sweeping, and thereby it fails to spare technology or technological solutions as a policy tool. Thus, from the left’s critique, technology’s primary place in the environmental laws has created a situation in which technology is viewed as a belief system, rather than a tool. While the calls for (p. 1205) a reconsideration of the economic system and a return to natural values might solve many worldwide problems, a blanket denunciation of technology seems to leave much unexamined.

3. Conclusion—The Technology/Environment Dance Frames Technology and Environmental Law

Early modern environmental law employed technological solutions in a new and dynamic way, and this seemed to address many heretofore unmanageable problems. This set in motion a process and path by which the debate over the future direction of environmental policy became about technology as paradigm and not technology as tool. As a paradigm, technological fixes to environmental problems could be critiqued on efficiency grounds by the political right, and on the grounds that they blocked holistic consideration of societal problems by the political left. This has had impacts relating to the trust of technology in law and policy generally. The politicization of climate change science in the United States can be seen as one consequence of this paradigm fight as political debate. So too can the many anti-technology crusades against alar, vaccinations, genetically modified organisms, and nanotechnology (Reynolds 2003: 187).

As environmental law debates have fixated on and swirled around the role of technology, this has obscured the fundamental principles underlying environmental law—including the notion of entitlements to bodily integrity and property, and the protection of nature for reasons other than exploitation. ‘Understanding the nature of our rights is going to be critical to having them, enforcing them, and balancing them against other interests’ (Flatt 2004b: 4).

Thus, the technological pieces of the first modern environmental laws and the subsequent obscuring debates about technology, markets, and consumption have put our society in a dangerous place in terms of environmental protection. It seems to have ruptured environmental law from its foundational principle, and left the general public, particularly the poorest, exposed to administration and policy debates that could undermine the protec-

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tive gains that these modern environmental laws brought. This is particularly true in the US. Though the rest of the world is not immune to these currents, Europe has long ago modified sole reliance on technological fiat with examination of individual environmental risk, and the large scale use of environmental assessment and safety and risk planning (Faure and Johnston 2009: 264). The international arena has also seen growing acceptance and (p. 1206) understanding of the hybridization of economics, environmental protection, and the integrated roles of humans and nature in the sustainable development movement. Sustainable development can certainly be a vehicle for a re-understanding and appreciation of technology as but one factor in our societies, and one tool for environmental protection and human enhancement.

The discussion and recognition of the path that our environmental protection and environmental law debates have taken is an important step. As Keith Hirokawa notes in his excellent new book, *Environmental Law and Contrasting Ideas of Nature*, '[t]he system of law provides a complex and ever-evolving set of rules that govern interaction between and among competing constructions of nature' (Hirokawa 2014). So it does for the entire world, including our environment. Understanding that this is a construction by describing how the construction came about may remind us what our original track was, and bring us back to the fundamentals of the environmental movement, which was focused on both the protection for human health and the natural world. Technology, markets, and alteration of consumption preferences are regulatory tools, some more effective than others, depending on the situation. They do not define our environmental values and goals.

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Novel Foods and Risk Assessment in Europe: Separating Science from Society

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In the 2015 revision of the EU Novel Foods Regulation, risk assessment processes remain separated from those of risk management in the regulation of novel foods. This chapter examines why this structure has emerged in Europe, and shows how both legal and political constraints ruled out a more integrated model. Although the European Commission has been strongly supportive of the science information model that emerges under the European Food Safety Authority, the chapter argues that ‘ring fencing’ questions of scientific risk assessment has proved problematic, as has excluding from that assessment wider factors that might inform it. This chapter then reviews the resultant difficulties across three areas of technology, the food products of which are regarded as novel under the Regulation: cloning, genetic modification, and nanotechnology.

Keywords: food, safety, risk, Europe, technology, GMO, cloning

1. Introduction

IT might be thought that a volume on the regulation of technology would have much more dramatic and weightier issues to address than food technology. Yet food is so essential that it was one of the earliest arenas in which humans began to consider and develop technologies—many of which proved fundamental to sustaining life and well-being. From the knife and the pot, the oven and cooking oils became essential components of food preparation. In terms of growing food, irrigation and crop rotation systems, as well as tools such as ploughs and threshing machines, improved productivity. The grinding and milling of food changed from hard labour to tasks powered by both wind and water. Methods of preserving food in barrels and bottles (and eventually cans) reduced reliance on immediate seasonal produce and allowed food to be stored and transported over greater distances, the latter even prior to refrigeration technologies. Fermentation, pasteurization, and sterilization became part of food processing, and processed foods became ever

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more popular in the twentieth century as microwave radiation was introduced to the kitchen.

(p. 1210) These early food technologies indicate that there remains space for yet more technological innovation along the food supply chain, from production through processing, transportation, distribution, sale, and preparation. The embedded nature of these technologies, and our dependence on them, means that they are not merely accepted, but taken for granted by the consumer. Being ‘unseen’ by the consumer, they are largely uncontroversial, even though certain modes of production and processing may give rise to social costs in terms of human health, animal welfare concerns, and environmental impacts in particular. Significantly, such technologies advance alongside wider scientific understandings.¹ Pressures to improve the shelf life, quality, and safety of food products have accelerated the development of food processing technologies (Jermann and others 2015), with cold pasteurization techniques such as high pressure processing (HPP) being used to eliminate the need for heat treatment and reduce reliance on additives. There is also a wide variety of irradiation or similar techniques including: infrared and ohmic heating; microwave; ultra-violet light; pulsed electrical fields; and ultrasound. Ozones, carbon dioxide, electrolysed water, and cold plasma might all be employed for antimicrobial, decontamination, and preservation purposes. However, it is reported that commercialization of these types of technologies is slow, mainly because of the size of investment needed to re-orientate food systems (Jermann 2015: 25). On the whole, while the tendency to purchase and consume more processed food continues,² the consumer does not seem quizzical, for the most part, about how everyday food is processed. Occasionally, a breach in safety or quality standards, such as that represented by the horsemeat episode of early 2013, may open a window into the scale and complexity of food systems that are more industrial than agrarian, but this tends soon to close, leaving patterns of production and consumption largely unaffected in the longer term. On the other hand, there may be mounting resistance to new food lines or new technologies, as is explained and explored later in the chapter.

Food safety has historically been a matter of national concern. The Assize of Bread and Ale of 1266³ offers an early example of concerns with public protection once food is prepared outside the home. When the types of technologies discussed in this chapter began to be employed, the ambit of legislation broadened to accommodate not just fears of adulteration, but also issues of safety (MacMaoláin 2015). Moreover, within the European Union, as food crosses borders, regulatory safeguards such as labelling, minimum standards, and prohibition of certain substances as foodstuff depend on increasing harmonization of rules across Member States, such as that today within the EU, where the introduction of novel foods to the market is carefully regulated by legislation. As part of this progression of food safety regulation, the main legislative measure regulating EU novel foods has been recently revised.⁴ In light of these developments, the chapter considers the reform of the regulatory structures for novel foods, particularly to throw wider light on technology regulation within European single market structures.

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The chapter suggests that the regulatory model of informational, science-led regulation in which the European Food Safety Authority (EFSA) leads on risk (p. 1211) assessment, divorced from wider issues of risk governance, is a model borne out of legal and political constraints. It is a model, however, to which the Commission has firmly committed and it makes for an uneasy relationship between science and politics in the EU governance of food. The Commission's preference for scientific regulation, a strong form of which is represented by the Food and Drug Administration (FDA) in the US, has proved politically unrealizable in Europe. As a result, the model of food regulation remains circumscribed by historic concerns with free movement of goods and limitations to functionalist achievements of the EU itself. Member States, historically in control of food safety at a national level, have an awkward and complex relationship with EFSA. This is reflected also in relationships between institutional actors in the EU (European Commission, European Parliament, EU Council, and the Court of Justice of the European Union (CJEU)), which render problematic the accommodation of a wide range of interests and issues. These include moral, ethical, environmental, and cultural issues, and concerns such as provenance, sustainability, and social responsibility, which arise out of both present and future agri-food production systems. The chapter argues that the separation out, or even isolation and ring-fencing of, questions of scientific risk assessment not only make such wider issues and concerns harder to address, but may also be seen to marginalize or disregard these concerns.

In some senses, EU structures can be presented as forms of deliberative engagement in which comitology processes allow voices to be heard, opening up what might otherwise be narrow technocratic decision-making (Jorges and Neyer 1997). It might also be claimed that the separation of risk assessment from risk management allows a greater degree of deliberation over the enshrining of risk governance in law and in other policy instruments. However, neither claim constitutes an accurate depiction of the EU model since science, somewhat narrowly conceived, carries a primacy based on epistemic claims that carry their own legitimating force in practice (Lee 2008). The separation of risk assessment as an expert determination makes later stages of risk management less open and more problematic. These issues will be explored by examining three specific types of technology identified by the revised EU regulatory structure as producing food which is to be considered as novel: food produced by the cloning of animals, by genetic modification, and by nanotechnology. Before that, however, the wider context of European food regulation is explained.

2. Food Safety in a Single Market

Unsurprisingly, a central objective of European food policy has always been to eliminate national barriers to trade in food in the interests of the internal market. (p. 1212) This might seem an essentially deregulatory exercise, but that would ignore the nature of food as a credence good. This means that while consumers know that food is closely related to well-being, they may still find it difficult to assess the impact of various types of foods or food supplements on their utility. Trust, therefore, becomes vital to market activity and

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trust in the food system was badly disrupted by a series of food scandals and crises in the 1990s (Baggot 1998, Bartlett 1998, Jasanoff 1997). These included BSE (bovine spongiform encephalopathy) in cattle, salmonella in eggs, E-coli 0157 in contaminated meat, and dioxin residues in poultry (Knowles and others 2007). The internal market ramifications of these scares were significant in relation to import bans across the supposed single market. Thereafter, the EU's food safety agenda widened significantly and rapidly to accommodate concerns for consumer protection and food safety (Vos 2000). This may have been necessary, and Roberta Sassatelli and Alan Scott (2001) have argued that, while trust is more easily embedded in localized, traditional agri-food systems, it may have become disembedded in the highly liberalized, industrialized systems capable of generating food crisis. In contrast, Marsha Echols (1998) has argued that a major difference in EU food regulation, as compared with the US, is that the population of the US tends to trust technological innovation in food systems, but distrusts certain forms of traditional produce (like soft cheeses and cured meats)⁵ that are regarded as more risky; in Europe, this trend is reversed, where scepticism is attached to technological innovation.

Beginning with a *Green Paper on European Food Law* (European Commission 1997) after the BSE crisis in the early 1990s, the EU was drawn into this risk arena, and developed risk-based regulation that assessed hazards associated with specific food products to allow for effective controls. This made integrated systems of data gathering and monitoring necessary in order to support appropriate risk assessment as a basis for risk management. However, the resultant structure has been described as comprising 'ingenious but complex regulatory patterns by means of which they reconcile the tensions between product safety, market integration, and legitimate national regulatory concerns' (Vos 2000, 229). This seems to imply (quite correctly) that the systems of risk governance designed in Europe are shaped by the political imperative of reconciling competing policy objectives and, at times, tensions between institutional actors.

The broad effect of this reconciliation was to temper the model of the US FDA that the Commission seemed otherwise minded to follow. The European Parliament's Medina Report had called for integration of food safety responsibilities, arguing that earlier compartmentalization of competencies among various Directorates General had 'facilitated the shifting of responsibility for maladministration between various services of the Commission and points up the lack of an integrated approach' (European Parliament 1997, 14). The European Commission's subsequent *White Paper on Food Safety* had expressly referred to the FDA as providing a model of an 'Authority (which) should have a legal existence and personality separate from the (p. 1213) current EU Institutions in order to carry out independently its role in terms of risk assessment and risk communication, so as to maximise its impact on consumer health protection and confidence building' (European Commission 1999, [39]). The White Paper expressly referenced (but ultimately rejected) the work of three food scientists engaged by the Commission to model a new agency. That expert report (James and others 1999) suggested that the success of a single market in food products had overtaken the capacity of the Commission to regulate food safety. Drawing on the criticisms in the Medina Report (European Parliament 1997), they saw the answer as lying outside of the Commission in an independent, integrated regulatory

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agency modelled on the FDA and the US Centers for Disease Control and Prevention. This was not to be.

Had a European FDA been put in place, it would doubtless have generated a much stronger model of scientific regulation of food safety, free from political intrusion into risk governance decisions. The US FDA deploys significant human and financial resources as an enforcement agency charged with protecting the public. In so doing, it pursues a unified model of risk assessment and risk management relying 'exclusively on scientific and not on social factors' (Alemanno 2006, 253). The legal basis of the FDA is strong—it operates primarily under the Federal Food, Drug, and Cosmetic Act, part of the United States Code of all general and permanent US laws. The FDA can introduce regulations based on the Food, Drug, and Cosmetic Act and other laws under which it operates by employing the Administrative Procedure Act. This so-called 'notice and comment rulemaking' allows for public input to any proposed regulation, which will take effect as federal law once passed. In addition, it can issue FDA guidance on regulatory issues which, while not legally binding on the public or FDA itself, is nonetheless a strong sign of its independence.

In the end, however, the Commission's 1999 White Paper was not prepared to advocate the integrated FDA model, confining the role of its new Authority, EFSA, to: advice and support for legislation and policy on food (and feed) safety; the provision of information on associated matters; and risk communication. Broadly, the Commission's reluctance to recommend an integrated model seemed to be due to the limitations of the functionalist capacity and limited competence of the EU. The White Paper mentions the possible 'dilution of democratic accountability' attaching to an independent authority along FDA lines (European Commission 1999: [33]), but much here depends on how one regards democratic accountability in Europe. In a system in which risk assessment is determined by EFSA and then risk management determined by the Commission, there is also no strong guarantee of wide participation or of ample opportunity to influence science-based decision-making at the instance of the EU citizen. Rather, in this model, Member States simply lose regulatory control, having historically been sovereign in this area. Coinciding with burgeoning arguments regarding approvals for GM crops (see section 5 of the chapter), there were strong prospects of a realist push back by Member States and their citizens against EU risk management decisions. Intriguingly, in presenting this (p. 1214) argument, the White Paper states that 'a high degree of accountability and transparency ... could be difficult to replicate in a *decentralised* structure' (European Commission 1999, [33]). In practice, however, the creation of EFSA and the revision of food safety law in European Regulations was highly centralizing in its effect.

Within its recommended model, the Commission was not prepared to contemplate conceding the enforcement function to EFSA, stating that it must retain the essential control function on behalf of the European citizen to ensure that recommendations for action are followed up: 'the Commission must retain both regulation and control if it is to discharge the responsibilities placed upon it under the Treaties' (European Commission 1999, [33]). In practice, the Commission has oversight of the control or enforcement function of food safety regulation, which remains with Member State regulators in every day terms. The

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Commission's claim here is that the devolution of this function would be a constitutional impossibility: 'an Authority with regulatory power could not be created under the current institutional arrangements of the European Union, and would require modification of the existing provisions of the EC Treaty' (European Commission 1999, [33]). Whether or not this was so depended on how EFSA was to be structured and where it would be located within the Community's institutional structure. Nonetheless, any mandate for a regulatory authority, and certainly for any Treaty revision to facilitate it, would have been strongly resisted by Member States.

The White Paper did not mention the important question of resources, other than to say that an authority must be adequately resourced and must work within those resources. An authority with the capacity to determine, promulgate, and enforce risk management controls across the whole of the European single market would constitute a huge undertaking and require significant financial resources; Member States would be reluctant to sign off on this, since doing so would be to support a shift of power away from domestic agencies. The only option therefore was to introduce a food safety authority that followed the model of an 'information and co-ordination' agency, which could peer review activities of national regulators and seek to promote best practice. This model invokes expertise as a source of indirect legitimacy, with the agency providing expert opinions to the Commission, which ultimately controls authorisations to place food products on the market (Chalmers and Chaves 2014). EFSA was subsequently set up to follow this model, and other European agencies, such as the ECHA (European Chemicals Agency) and EMA (European Medicines Agency) follow a similar pattern. Although the ECHA can deny market access under its 'no data, no access' rule (Heyvaert 2007), in general, the objective of these bodies is risk assessment and this function, certainly in the case of the EFSA, is separated out from risk management, which remains within the control of the Commission. Nonetheless, within these models, the risk assessment outcomes help authenticate the management decisions reached.

Alongside control of novel foods, introduced following the White Paper, sits Regulation 178/2002, which is generally referred to as the General Food Law (p. 1215) Regulation,⁶ since it provides the foundational principles and requirements of food law. While the focus of this chapter is on the regulation of novel food, behind this sits the requirements (and enforcement mechanisms) of the General Food Regulation that only safe food, of any sort, be placed on the market. This Regulation positions EFSA as an independent agency responsible for scientific advice and support, and sets out a broad underpinning framework for the development of food and feed legislation both at EU and national levels. As such, the Regulation is concerned with principles and procedures to inform decision-making in relation to the safety of food and feed during its production, distribution, and sale. This includes procedures to be invoked in the case of food scares or emergencies, with EFSA helping to co-ordinate national regulation through a Rapid Alert System for Food and Feed (RASFF). The Regulation promulgates a standard of high-level protection of human life and consumer protection, and seeks to balance this with the effective functioning of the internal market. It is interesting to posit whether market functioning is a rele-

vant factor in risk assessment, or whether the only focus should be on the high level of protection, as the answer to this is highly illustrative of the remit of EFSA.

2.1 Risk Assessment versus Risk Management

The 1999 White Paper called for a ‘clear separation between risk management and risk assessment’ (European Commission 1999, [32]) and EFSA itself makes a virtue of it saying that: ‘the decision to separate the tasks of risk assessment and risk management just over a decade ago has transformed the safety of Europe’s food’ (EFSA 2014). At the heart of the argument advocating such a regulatory structure is scientific independence. The White Paper expressed the hope that EFSA would: be guided by the best science; be independent of industrial and political interests; be open to rigorous public scrutiny; be scientifically authoritative; and work closely with national scientific bodies. The legitimacy of the body is seen to lie in its independence through expertise that can be isolated from wider social and political interests. As Gerrard and Petts (1998) point out, a mission to separate out risk assessment in this way begins to appear as a logical positivist stance that imbues the scientific expertise with objectivity. This is to be favoured over a more culturally relativist approach, which would suggest that striving for such objectivity may be illusory, since science is a social process bound up in political and institutional structures in which subjective value judgements will prove inescapable. This is not to say that those charged with the design of EU food safety structures necessarily believed in the objective nature of scientific endeavour but, charged with a political imperative to limit the role of the EFSA to that of risk assessment, they were certainly prepared to employ science in this manner as a legitimating force.

(p. 1216) Debate about the separation of risk assessment processes from risk management has been fiercely conducted in the US, and this is perhaps unsurprising, given the extensive risk management powers allowed to agencies like the FDA. In the early 1980s, it was feared that too much extraneous interference was creeping into what ought to be scientific risk assessment by the FDA. In a National Research Council report, which favoured two stages of risk assessment followed by a risk management determination, with a bridging risk assessment policy between these stages, ideas of a ‘Chinese wall’ between the two stages were rejected on the basis that ‘administrative relocation will not improve the knowledge base and because risk assessment is only one element in the formulation of regulatory action, even considerable improvements in risk assessment cannot be expected to eliminate controversy over those actions’ (National Research Council 1983, 6). A later government report stressed the need for a more integrated process with the early involvement of all parties charged with risk governance so that the risk management problem could be considered in context of the real-world goals of risk reduction (Presidential/Congressional Committee 1997).

This US experience suggests that science cannot be isolated and that the earliest stages of characterizing the risks of certain foods—what is seen as hazardous, who should be protected, from what pathways to harm, and so on—are all fundamentally informed by a range of policy considerations. That is only the beginning, however, and thereafter the

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heuristics of risk assessment measures and protocols will be no less shaped by judgments that are likely to be more robust as a result of transparency and debate, which must be opened up beyond the scientific community, if only to begin to recognize the subjective influences on decisions reached. The process of risk assessment involves significant elements of peer review and, as with any peer review process, this involves the formulation of a considered opinion, with one commentator observing how odd it is 'that science should be rooted in belief' (Smith 2006). Yet, in reaching expert opinion, the work of the EFSA seems something of a closed process, not least because the science involved is not laboratory work or testing. EFSA does none of this. Working groups within EFSA analyse and assess existing data with a view to advising on and communicating about levels of risk, sometimes at the request of Member States, their national regulators, or the European Parliament. Curiously, EFSA are clearly charged with risk communication, even though risk management lies outside of their control.

Alemanno (2006) has examined the legal status of EFSA scientific opinions and has concluded that, while EU institutions must take EFSA opinions into account in drafting and adopting community measures,⁷ there is no formal authority to regard these opinions as binding, although the first condition for authorization under Article 7 of the Novel Foods Regulation is that the 'food does not, on the basis of the scientific evidence available, pose a safety risk to human health'. This also makes for a curious and complex relationship with national authorities in the working of the General Food Law Regulation, which, in the interests of a high level of protection of (p. 1217) human health, suggests in Article 1(1) that a basis of 'strong science' should underpin decision-making on food safety. In terms of incorporating national views on food safety, Article 30(4) of the Regulation addresses the question of substantive divergence over scientific issues between a Member State agency and EFSA. In such cases, EFSA and the national body are obliged 'to cooperate with a view to either resolving the divergence'⁸ or, where this is not possible, publish a joint document clarifying the contentious scientific issues and identifying the relevant uncertainties in the data. Ultimately, however, EFSA is not a decision-making body. This is quite telling, because it indicates the continuing dominance of a structure based on mutual recognition to support market access. The creation of the EFSA was not so fundamental as to sweep away such structures, which reflect realist constraints on the functionalist ambitions of the EU.

As for the isolation of risk assessment within European food safety regulation, this is seen as necessary to accommodate political pressures, but it can be criticized from a risk governance perspective. It has been suggested that addressing technological risk will always engage strong political feelings since, in a risk society, we deal with the allocation not just of goods but also of 'bads' in the form of hazards (Beck 1992). As constructed, there is a danger that the risk analysis, assessment, and communication functions of EFSA operate in a single direction—from EFSA to the European citizen—via institutional and domestic frameworks. This ignores much learning (European Environment Agency 2013), which suggests that an iterative, two-way process may be much more fruitful (Habermas 1996), both in allowing wider public understandings to be factored into risk assessment models as well as in building up trust in the outcomes of that assessment (Petts and Brooks

2006). It also means that societal concerns and wider ethical or moral questions are addressed only at the later, risk management stage of the risk governance process, at which point something may have been assessed as 'safe', thus foreclosing the ambit of risk to be considered at the management stage. All of this gives the appearance, at least, of the primacy of scientific findings in the risk governance process. It is suggested that this is already problematic, but that it also may become more so in the domain of food manufacturing, as technologies encroach even further into food production and consumption. The following sections address these issues in the context of novel foods, looking first at the revised regulatory regime for such foods.

3. Dealing with Novelty

The reform of the Novel Food regime has had a long and 'tedious' history (Ballke 2014, 285). Originally introduced in 1997, the Novel Food Regulation⁹ demanded (p. 1218) authorization for any food or food ingredient with no history of significant consumption in the EU prior to 15 May 1997. To gain authorization, the food was required not to present a danger to or mislead the consumer. Where a food or ingredient was intended to replace a product already on the market, it could not differ to such an extent that consumption would be nutritionally disadvantageous to the consumer. Action on reform of the 1997 Regulation began as early as 2002, coinciding with the establishment of EFSA, partly to address the types of rapid technology shifts in the food sector discussed in the Introduction. In particular, GM food and feed was proving a highly divisive subject politically, with EU approvals for such products having ground to a halt. However, partly due to this political impasse, it took until 2008 to produce a draft for legislative reform. That revision was abandoned in March 2011, amid heated disputes between the Commission and the Parliament on issues such as food from cloned animals and the presence of nano-materials in food. Before discussing these examples, this section considers the reform of the novel food regime, which was finally adopted in November 2015, following a re-drafted regulation proposed in December 2013.¹⁰

Under the revised Novel Food Regulation of 2015, novel food continues to be defined as food that was not consumed to a significant degree in the EU before 15 May 1997,¹¹ but which now falls within at least one of ten categories listed in Article 3 of the new Regulation. Before going on to review Article 3, it should be noted that establishing whether or not a particular food was consumed by humans to any significant degree more than twenty years earlier may pose evidential difficulties (European Commission 2009). Moreover, the assumption that foods already on the market prior to that date posed no risk seems improbable given that the original Novel Food Regulation of 1997 was largely a response to a persistent series of food scares that shook the European market. Article 3 of the revised Novel Food Regulation lists food isolated from various sources (such as minerals, algae, and fungi) and thereafter focuses on the products of certain techniques and technologies, including: non-traditional propagating practices or breeding techniques,¹²

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certain cell or tissue cultures, and food consisting of engineered nanomaterials. These different categories of novel foods are considered in later sections of the chapter.

Article 4 of the Novel Food Regulation places upon food businesses the responsibility of ascertaining whether a food is 'novel' within the meaning of the Regulation. The first reference point in cases of doubt as to novelty is the competent authority of the Member State in which the food is to be marketed. Article 4 envisages various procedures, including consultation, to help determine questions of novelty and marketability. However, these procedures are not yet in place since we await detailed rules for the implementation of several provisions in the Regulation. There is also a new notification procedure¹³ for traditional foods from third countries seeking entry to the EU market. These must have a demonstrated history of safe use within (p. 1219) the EU market dating back at least 25 years. Authorization will then depend upon no safety concerns being raised by Member States or EFSA within four months of notification. Note the joint and seemingly equal responsibility on domestic authorities and on EFSA.

Where it is clear that a product will require authorization as a novel food, Article 10 provides for a centralized authorization procedure with fixed time limits. Applications for authorization are submitted to the European Commission, which is charged with verifying its content before passing it, within one month, to EFSA. EFSA must then conduct a safety assessment and deliver a scientific opinion within a nine-month timeframe as part of its risk assessment function. There are then seven months, from the date of publication of the scientific opinion, for the Commission, exercising its risk management function, to produce a draft proposal for the Standing Committee on Plants, Animals, Food, and Feed (PAFF), which is made up of representatives from Member States. Where the recommendation is to authorize a novel food, this cannot be vetoed by the European Parliament. The formal shifting of responsibility within particular timeframes from the Commission to EFSA and then back again suggests formalized separation of risk assessment from risk management, even in the reformed structure. Note also the conspicuous proceduralization of the authorization process, in marked contrast to the freedom of EFSA to determine risk assessment methodologies.

At the time of writing, implementing legislation prescribing the administrative and scientific requirements of both the application and the EFSA scientific opinion was yet to be introduced.¹⁴ As is the case in other forms of scientific informational regulation within the EU, this means that the Regulation itself forms little more than a framework leaving the detail, where the devil may lie, to be filled in by protocols or guidance. In a different regulatory context, Vaughan demonstrates that this detailed guidance will be generated, and thereafter be carefully followed and applied, by the relevant authorities (Vaughan 2015).

Article 6 of the Regulation introduces for the first time an EU list of authorized novel foods that should be compiled by the Commission by 1 January 2018. The list will begin with novel foods authorized under the earlier procedures of Regulation 258/97. Entry on to the list is crucial since, with effect from 1 January 2018, only authorized novel foods included in the positive list may be marketed in the EU. The list, which will be updated by

implementing measures, would include details of any conditions of use, labelling, and monitoring requirements. Again, this model tends to follow the type of informational provision common to EU centralized authorities, in this case not dissimilar to registration under REACH.¹⁵ This regulatory structure is now evaluated by examining how it has coped to date, and is likely to apply in the future, in three areas specifically singled out by the Novel Food Regulation for regulatory attention: the cloning of farmed animals, transgenic crops, and nanomaterials in food.

(p. 1220) 4. Produce from Cloned Animals

In 1996, a group led by Sir Ian Wilmut (Wilmut and others 1997) cloned the first mammal, a sheep named Dolly, by transferring the nucleus of an adult somatic cell. While there was speculation as to the possibilities opened up to conserve endangered species or even revive extinct species, there was also a host of opportunities for commercialization ranging from organs for xenotransplantation to milk with therapeutic protein content. One prosaic opportunity lies in food production. In January 2008, the US FDA approved the marketing of cloned animals and their offspring for food, notwithstanding protest from animal welfare, consumer, and environmental NGOs, as well opposition from members of Congress. The conclusion reached in the FDA risk assessment was that cloning posed no unique risk to animal health when compared with other reproduction methods, and the composition of products from clones or their offspring would not differ from that of animals bred through conventional methods. That being so, any food would be ‘as safe as food we eat every day’ (FDA 2008). Interestingly, in spite of the inclusion of food produced from cloned animals in the Novel Food Regulation, via Article 3, the FDA disavows any suggestion of novelty: ‘[c]loning doesn’t put any new substances into an animal, so there’s no “new” substance to test’ (FDA 2015).

This is essentially no different from the stance taken by EFSA (EFSA 2008), which published a final scientific opinion on the implications of animal cloning, concluding that that no differences exist in terms of food safety between food products from healthy cattle and pig clones and their progeny, compared with those from healthy conventionally-bred animals. It added that such animals posed no particular risk to genetic diversity, biodiversity, or the environment. The EFSA Scientific Committee endorsed this view in 2010 and, at the prompting of the Commission, an updated scientific assessment was published in 2012. This assessment largely re-iterated the previous findings, yet from the outset, the EFSA opinion accepted a degree of contingency in terms of the small number of studies undertaken with a limited number of animals in each study, and without an agreed uniform approach underpinning such studies. Such reservations, however, did not displace the inherent assumption that meat produced from cloned animals would not generate additional risk to human health.

There might be issues of animal health, however, review of which would demand a review of the science and might raise some cause for concern about producing food in this manner. Beginning with Dolly, there have been problems of cloned animals having abnormali-

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ties of the lungs and other organs, with an increased incidence of cardiovascular and respiratory problems, and with increased rates of mortality and morbidity compared with conventionally bred animals (Gaskell and others 2010). EFSA, while acknowledging such problems, do not appear to regard these issues (p. 1221) as falling within the risk assessment domain, which is more narrowly determined by issues of human health. Consideration of these issues thus has to await the risk management phase. This is problematic because of the emphasis placed in the WTO Sanitary and Phytosanitary (SPS) Agreement on risk assessment, so that any measures taken to restrict trade in meat from cloned animals or their offspring, including those relating to animal health, must be supported by scientific evidence.¹⁶

In the light of these animal health issues, in 2008, the European Group on Ethics in Science submitted to the Commission, alongside the EFSA opinion, the view that the use of cloning techniques, at current stages of development, could hardly be ethically justified for food production purposes (European Group on Ethics in Science 2008). This concern mirrors public opinion, as reflected in the 2008 survey by Eurobarometer, which showed a high level understanding of the technology among the public and a strong feeling that it should not be employed for food production, with only one third of European respondents prepared to support cloned meat production, even where this was employed to overcome World food shortage (Eurobarometer 2008). If it were to be placed on the market, 83% of European consumers would want to have meat from cloned animals or their offspring subject to labelling.

By September 2008, the European Parliament voted through a resolution, with 622 MEPs in favour and only 32 against (with 25 abstentions), seeking to ban the commercialization of cloning technologies, to prohibit imports of related products into the EU, and demanding action from the Commission accordingly. In 2015, a similar vote in the European Parliament (by 529 for to 120) called for a ban on cloning of all farmed animals, and the sale of such animals, their offspring, and any products derived from cloning techniques. This went wider than the provisional ban proposed by the Commission in 2013,¹⁷ which would have extended to cattle, sheep, pigs, goats, and horses. That legislative proposal, together with one on food from farmed cloned animals, had been put forward in an attempt to break the impasse in the passing of the revised Novel Food Regulation, by carving out issues of cloned farmed animals for separate consideration. The Commission sought to assert that a specific legislative framework could more appropriately define the boundaries of cloning for food production. However, since the proposals did not prohibit food from the offspring of cloned animals from entering the European market and included no requirement of traceability, they did little to assuage the doubts of the European Parliament.

As things stand, by virtue of Article 3, any attempt to place food on the European market that was produced from cloned animals would be caught by the Novel Food Regulation. However, in this event, the opinion of EFSA at the risk assessment stage is likely to be that such food presents no particular risk to human health as compared with products from conventionally bred farmed animals. We also know, however, that such a risk assess-

ment would prove unhelpful to the Commission in making any decision about the marketing of these products in the face of considerable (p. 1222) parliamentary and public opposition. The somewhat aspirational proposal by the Commission of a separate regulatory regime for cloned products not only seems far from agreement, but also the perceived advantages of this approach must be doubted, particularly if a component of that regime would also be a risk assessment from EFSA. This prognosis is supported by a history of risk assessment opinions relating to GM foods in the EU, as considered in the next section.

5. Produce from Genetically Modified Crops

Through an early approvals system,¹⁸ GM food made some inroads into the European market via national approvals before meeting the opposition of the European public. This opposition became more and more fierce and questioned, at the very least, the likely benefits of genetic modification (Poortinga and Pidgeon 2004). Potential benefits of disease and pest-resistant or hardier plants seemed remote and were by no means the only reason for genetic modification.¹⁹ Rather than a scientific body to approve GM applications, a petition under the EU's Citizens Initiative²⁰ sought ethical review and a moratorium on regulatory approvals pending the establishment of such a structure. Scientific assessments of risk to human health from GM products in the food chain have tended to begin from a position of scepticism since it is entirely possible that genetic modifications could equally be accomplished by traditional plant breeding techniques. This does not mean, however, that no contingency attaches to the cultivation and use of GM crops in the food chain because of the limited history and restricted geographical coverage of the cultivation of GM crops.

European opposition to GM crops grew out of factors other than simple concerns of risk to human health. In Austria, for example, protection of Alpine biodiversity, influenced by small field cultivation in which coexistence through barriers may be difficult to operate, has led to repeated bans of GM maize and oilseed rape approved for placing on the European market.²¹ Countries such as Greece and Italy seem to have based their opposition on concerns to protect local food cultures and to limit agricultural intensification. Coexistence of GM crops alongside conventional and particularly organic crops is also problematic and has inevitably led to opposition from certain sectors. Indeed, it has been suggested that the scientific work on separation or isolation distances for crops has been distorted (towards unnecessarily large separation) because 'coexistence has become another arena of contending (p. 1223) values and visions on future agriculture and on the role agro-food biotechnology might play therein' (Devos and others 2009: 11).

In terms of regulation of GM crops, EU regulatory approvals fell to Member States' authorities. A significant number of recalcitrant Member States that were aware that any approval would promote biotechnology across the market were, at the very least, slow in processing applications, notwithstanding a 90-day turn-around time theoretically possible under the then Directive 90/220,²² which provided the mechanisms for regulatory con-

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trols on the deliberate release of GMOs into the environment. The modification of that Directive to allow for labelling and traceability,²³ which now is governed by the Food and Feed Regulation,²⁴ failed to break this impasse. Alongside this, Regulation 258/97—the previous novel food regulation—did place tighter controls on foodstuffs, including for categories of novel GM or GM-derived foods.²⁵ At that stage, however, Regulation 258/97 operated under a decentralized model based on Member State responsibility and there is no doubt that the intransigence of Member States, in what amounted to a de facto moratorium on GM approvals,²⁶ influenced the move to a centralized system supported by EFSA. That moratorium triggered a WTO dispute brought against the European Union by a group of American countries,²⁷ and the handling of that dispute was not made easier by considerable risk assessment activity by EFSA largely dismissing concerns of Member States on the basis that the GM products in question posed no risk to human health.

Processes of risk assessment were widened in the case of GM food and feed by an alternative procedure introduced by the Food and Feed Regulation²⁸, whereby applicants needed to demonstrate that the GM food or feed did not have adverse effects on human health, animal health, or the environment. The hope was to introduce a process to hasten approvals and put an end to the de facto moratorium. This was unsuccessful simply because, on completion of the risk assessment, the work of EFSA was forwarded to the Commission (copied to Member States) to address questions of risk management prior to decisions about approval. Revised mechanisms included an appeal to a regulatory committee but, with Member States' representatives on that committee, it became difficult for the Commission to push through approvals when faced with concerted opposition from certain Member States. Even where approvals were forthcoming, this only heralded a resort to the safeguard clause in Article 23 of Directive 2001/18, which by then regulated the deliberate release into the environment of GMOs.²⁹ Article 23 could be invoked where new or additional scientific evidence relating to the impact of GM food or feed on environmental and human health raised concerns within a Member State post-approval. One variety of GM maize approved by the Commission was subject to safeguard actions by eight Member States. In no case was EFSA persuaded of the 'new evidence' so as to re-open earlier risk assessments, but the tactic effectively tied (p. 1224) up the approval process and rendered it unworkable. A court ruling by the CJEU ordering the Commission to refer to Council an authorization for GM maize³⁰ exacerbated rather than eased tensions, as many Member States in Council continued to oppose cultivation of the maize, even though the Commission pressed ahead with approval.

In a bid to break this impasse on approvals, during the Council meeting in March 2014,³¹ Member State Environment Ministers began to consider the text of what was effectively a compromise agreement under which Member States may ban GM crops based on certain limited grounds. The idea behind this measure was that GM food approvals might become easier if certain Member States could be assured that GM crops would not be grown within their territories. This was adopted by June 2014 and, by December 2014, a deal on GM crops in the form of an amendment to Directive 2001/18 on deliberate release of GMOs was agreed between the Council and the European Parliament,³² followed by a plenary vote in January 2015. As from 2 April 2016, Member States may opt out of growing

EU-approved GM crops. Existing EU risk assessment and decision-making processes remain in place but Member States are free to refuse to implement authorizations and to ban a GM crop on the limited grounds of: environmental policy objectives; town and country planning; land use; socio-economic impacts; agricultural policy; and public policy.³³ If, before EU authorization, a Member State can reach agreement with the applicant for authorization, it can exclude part or all of its territory from the geographical scope of the application. This does not rest on any justification as it is reached with the applicant's agreement. Post-authorization, a Member State can adopt measures to restrict or ban GMO cultivation on part or all of its territory, but measures should be justified by reasoned, proportionate invocation of one (or more) of the exceptional grounds above, providing that such grounds 'shall, in no case, conflict with the environmental risk assessment carried out' by EFSA as part of the approvals process. The Commission would have preferred to have only the first pre-authorization consent option, doubtless because it might have guarded against WTO challenges, but the compromise of post-approval exceptionalism was forced through by the Member States. The grounds for this are likely open to attack by non-European biotechnology companies seeking wider access to the European market.

Thus, there are local, agricultural, and environmental policy objectives that may support a GM ban, but the regulatory science of EFSA is protected from challenge. Throughout the whole episode of deep conflict over the approval of GM food and feed on the European market, scientific risk assessments have clouded rather than clarified the issues. Ironically, the centralization of regulatory structures around an informational science model has led not to greater harmony or efficiency but to marked fractures in the operation of a single market in food products.

(p. 1225) 6. Produce Containing Nano-Particles

In comparison with the history of GM food and feed, the final area of novel food—food containing nano-particles—is much more prospective. Nanomaterials are curious substances for regulatory control as novel foods, since they occur naturally in our foods. Interest in foams and emulsions in modern food preparation may well be because the structural components of these substances include nanomaterials, which may enhance both textures and tastes within the food. Similarly, it is not unusual to employ fumed silica in food production, as an anti-caking agent, to allow better mixing of ingredients. Dairy products may well contain material such as fat globules from milk or whey proteins on the nanoscale. Little regulatory attention has been given to these longstanding practices. However, it seems probable that far more attention will be given to the inclusion of nanomaterials in food in the future as technologists look to exploit the surface area effects of nanomaterials to boost flavour or to exploit anti-microbial capacities. This could immediately suggest benefits, including public health benefits of better food preservation or of reduced reliance on certain types of ingredient such as fat, sugar, or salt. Equally, vitamin or nutrient content of food could be improved.

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Nanotechnologies may be employed to augment not only food but also food contact materials, including surfaces for food preparation and food wrapping. One innovation is a plastic bottle incorporating nanoparticles as a gas barrier to improve the shelf life of the liquid (House of Lords 2009). Not only might food packaging be thinner and lighter, but it could contain nano-sensors to detect food past its best. Nanomaterials could be employed in other substances that may come into contact with food, from pesticides to frying pan coatings. Where these coatings contain metals such as nano-silvers, one might expect that, at the very least, there will be calls for risk assessment in terms of human health impacts. This is likely to be the case where nanomaterials are designed for and introduced into foods available on the market.

EFSA has published an opinion accepting that the current risk assessment paradigm is appropriate for nanomaterials (EFSA 2009). This is perhaps not so surprising. It is generally accepted that toxicological profiles of nanomaterials cannot be derived from data on equivalent substances in conventional form (Lee and Vaughan 2010). It was also said that there are limited data on oral exposure to nanomaterials and any consequent toxicity, and limited methods to characterize, detect, and measure nanomaterials in food or feed. It follows that, under the Novel Food Regulation, EFSA may have to proceed on a case-by-case basis when considering nano-particles in food in a manner distinct from the general acceptance of the safety case for cloned meat. Also, nano-particles may need to be regulated as food additives rather than simply as a novel food or as a food contact material.³⁴ Risk assessment in this area is (p. 1226) much more problematic for EFSA since, as it relies on the provision of reliable data from elsewhere to address potential hazards which are much more difficult to identify in this context. This being the case, there may be more need for, and certainly more calls to apply, the precautionary principle to novel food approvals in the face of data gaps on nanomaterials in food products.

In reviewing the issue of nanotechnologies and food, the House of Lords' Select Committee assumed that a precautionary approach would follow since it stated that there would be 'a selective moratorium on products where safety data are not available' (House of Lords Select Committee 2009: [8.11]). It proposed that the 'Government should work within the European Union to promote the amendment of current legislation to ensure that all nanomaterials used in food products, additives or supplements fall within the scope of current legislation'. The Committee also called for a workable definition of nanomaterials. In the event, it took some time for the revised regime on novel foods to ensure that engineered nanomaterials in food, as defined in the new legislation, would require novel food authorization. As for a definition, the definition of nanomaterials originally contained in the food labelling regulations³⁵ was replaced, but the definition still makes reference to materials which have 'properties that are characteristic of the nanoscale' (Novel Food Regulation: Article 3(2)(f)). The Select Committee had recommended a detailed list of what these properties comprise, but this does not extend, even in the revised definition, beyond the large specific surface area effects and the specific physico-chemical properties of the material. This definitional uncertainty is troublesome given that the burden will fall on the manufacturer to declare novelty.

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The Select Committee also called upon the UK Government to work with the food industry 'to secure more openness and transparency about their research and development and their future plans for the application of nanotechnologies in the food sector' (House of Lords Select Committee 2009: [8.29]). There is little evidence that this has happened. Similarly, its calls for public engagement on issues surrounding nanotechnologies and food have yet to be met. Failure to allow for deliberative dialogue and to ensure that the outcomes of deliberation feed into policy formation could undermine the research efforts of agri-food technologists. Any opposition will arise only when the first foods with engineered nanoparticles are placed on the market. The trajectory of opposition or acceptance will be determined by transparent dealings with the consuming public and openness about risk and uncertainty. Without this, risk assessment, however rigorous, is unlikely to assuage public fears. However, the closed and isolated models of risk assessment operated in the science regulation model may not be well suited to ease the passage of nano-enhanced products to the market. Given the ubiquity of nanotechnology and nano-materials in foodstuffs across the market, with innumerable substances serving a myriad of functions, it is perfectly possible to conceive of both beneficial and potentially harmful applications; a case by case approach may be left floundering if early risk (p. 1227) assessments fail to address the true concerns of the consumer. Experience to date of the risk governance model for novel foods does not inspire optimism.

7. Conclusion

Allowing a discrete process of scientific risk assessment to direct the process of risk governance for food tends to displace or even deride other concerns in the risk governance process as non-scientific and not pertinent when a risk assessment has shown conclusively that there is no relevant risk. Consequently, action taken by Member States cannot be seen as risk management, which is a task to be accomplished by the Commission at point of approval. While side-lining Member State concerns as parochial in this way, the stance overlooks the reality that existing risk governance processes have often failed to secure the confidence of a significant majority of Member States, or their citizens. It also introduces a distinction in approval processes between scientific assessment of risk and policy assessments that inherently lack scientific legitimacy in supporting precaution. Compromise though it may be, the EU food governance system repeats the enduring error of offering primacy to regulatory science and marginalizing other normative assessments of potential harm to the environment. The problem stems from the erection of frameworks for risk assessment that privilege certain assumptions and methods, while barring out wider claims or concerns. It is problematic to try and construct risk assessment frameworks that rest unequivocally on specific, carefully devised, and exclusive facts and assumptions since the very framing of risk assessment, and what is thought to count, are matters of choice that are open to contest. The Commission has failed to free itself of its investment in an idealized and artificial model of an impartial, objective assessment free of all contingency. In so doing, it has placed itself in a poor position from which to begin to deal with a wide range of concerns—social, ethical, cultural, and environmental—

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shared by the European Parliament, by Member States, and by citizens of Europe, all of which could and should inform a risk assessment process.

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Notes:

(1.) One simple example would be pasteurization. Pasteur's work initially focused on alcoholic beverages apparently because a wine-making father of a student sought his advice (Dubos 1998, 52 et seq). Drawing on germ theory and the role of bacteria he demonstrated that the souring and spoiling of foodstuffs could be greatly reduced by lowering numbers of pathogenic microbes. Actually, this insight drew on eighteenth-century knowledge that scalding and straining cream would increase the useable lifespan of butter.

(2.) Processed food exports climbed to more than \$45 billion in 2013, up from \$29 billion in 2009. Over those five years, exports in the 20 processed food categories monitored by the Foreign Agricultural Service (FAS) grew by 61 per cent: see FAS, *US Processed Food Exports: Growth and Outlook*, International Agricultural Trade Report, May 2014.

(3.) 51 Hen 3 stat. 1.

(4.) Framework Regulation (EU) 2015/2283 of 25 November 2015 on novel foods, amending Regulation (EU) 1169/2011 and repealing Regulation (EC) No 258/97 and Commission Regulation (EC) No 1852/2001 [2015] L327/11 ('Novel Foods Regulation'). The Novel Foods Regulation was adopted in November 2015 and will repeal the current Novel Foods Regulations 258/97 and 1852/2001. Most provisions of the Novel Foods Regulation will apply from 1 January 2018.

(5.) Which means that it is not without irony that the EFSA is located in Parma—the home of the most famous dry, cured ham: prosciutto.

(6.) Regulation (EC) 178/2002 of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety [2002] OJ L31/1 ('Food Safety Regulation').

(7.) Food Safety Regulation, art 22(6).

(8.) Food Safety Regulation, art 30(4).

(9.) Regulation (EC) 258/97 of 27 January 1997 concerning novel foods and novel food ingredients [1997] OJ L253/1.

(10.) See n 4.

(11.) Regulation 258/97, art 1(2).

(12.) Pending any separate legislation on the matter, food from clones but not offspring will continue to fall within the scope of the Novel Foods Regulation (see below).

(13.) Novel Foods Regulation, arts 14–20.

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- (14.) Novel Foods Regulation, art 13 demands that these be produced by 1 January 2018.
- (15.) Regulation 1907/2006/EC concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals [2006] OJ L396/1
- (16.) WTO Panel Reports, *EC—Hormones (Canada)* [8.104] WT/DS48/R/CAN; and *EC—Hormones (US)* [8.101] WT/DS26/R/USA.
- (17.) Proposal for a Directive on the cloning of animals of the bovine, porcine, ovine, caprine, and equine species kept and reproduced for farming purposes COM (2013) 892 final
- (18.) Council Directive 90/219/EEC of 23 April 1990 on the contained use of genetically modified micro-organisms [1990] OJ L117/1 and Council Directive 90/220/EEC of 23 April 1990 on the deliberate release into the environment of genetically modified organisms [1990] OJ L 117/15.
- (19.) So that one European approval was for a blue carnation: see Alan McHughen, *Pandora's Picnic Basket: The Potential and Hazards of Genetically Modified Foods* (OUP 2000) 195.
- (20.) For the ECI, see TEU, art 11(4) and TFEU, art 24(1) (as introduced by the Treaty of Lisbon). Note that the Parliament denied that the Greenpeace initiative on GM actually amounted to a petition under the ECI: http://www.europarl.europa.eu/aboutparliament/en/displayFtu.html?ftuId=FTU_2.1.5.html (accessed 1/7/2016).
- (21.) For the background and details, see http://bmj.gv.at/home/Schwerpunkte/Gentechnik/Fachinformation_Allgemeines/Description_of_Austrian_Regulations_on_Genetic_Engineering (accessed 1/7/2016).
- (22.) Council Directive 90/220/EEC of 23 April 1990 on the deliberate release into the environment of genetically modified organisms (now repealed: see n 32).
- (23.) As inserted by Directive 97/35/EC adapting to technical progress for the second time, Council Directive 90/220/EEC on the deliberate release into the environment of genetically modified organisms [1997] OJ 1997 L169/73.
- (24.) Regulation (EC) 1829/2003 on genetically modified Food and Feed [2003] OJ L268/24.
- (25.) This would not apply to GM products already on the market by 15 May 1997.
- (26.) France, Germany, Italy, Greece, and Luxembourg were operating a *de facto* ban on GM crops within their jurisdictions. Denmark, Belgium, and Austria later supported this action: see Robert Lee, 'Humming a Different Tune: Commercial Cultivation of GM Crops in Europe' (2015) 14(5) *Bio-science Law Review* 185–192.

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(27.) EC Approval and Marketing of Biotech Products (WT/DS291/R/USA); available at: http://www.wto.org/english/tratop_e/dispu_e/cases_e/ds291_e.htm (accessed 1/7/2016).

(28.) See n 26.

(29.) Directive 2001/18/EC of 12 March 2001 on the deliberate release into the environment of genetically modified organisms and repealing Council Directive 90/220/EEC [2001] OJ L106/1.

(30.) Case T-164/10 *Pioneer Hi-Bred International v European Commission* (not reported).

(31.) Council of the European Union 'Council reaches agreement on the cultivation of genetically modified organisms' press release 10415/14, 12 June 2014.

(32.) Now Directive (EU) 2015/412 amending Directive 2001/18/EC as regards the possibility for the Member States to restrict or prohibit the cultivation of GMOs in their territory [2015] OJ L68/1.

(33.) See Directive 2015/412, art 26b.

(34.) As regulated by Regulation 1935/2004 on materials and articles intended to come into contact with food.

(35.) Regulation (EU) No 1169/2011 of 25 October 2011 on the provision of food information to consumers [2011] OJ L304/22, art 2(1)(t).

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Carbon Capture and Storage

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Abstract and Keywords

The capture and long-term storage of carbon dioxide from power plants and other industrial installations may prove a key technology in climate change abatement strategies. Regulatory frameworks for carbon capture and storage (CCS) are now being developed in a number of jurisdictions. The European Union produced the first comprehensive legislation on the subject in 2009, which provides a compelling example of challenges associated with the design of regulation dealing with a novel technology. This chapter identifies three issues, each of which reflects aspects of regulatory legitimacy: the extent to which states within a federal or quasi-federal system should have the legal discretion to reject a technology; the way in which regulation provides for opportunities for public participation and engagement in issues concerning the new technology; and whether, and at what point, the state should assume responsibility for storage sites, given the long timescales necessary for secure storage.

Keywords: climate change, carbon capture and storage, novel technology, long-term liability, public engagement, EU legislation

1. Introduction

TO date, the story of regulatory framework development concerning carbon capture and storage (CCS) teaches us significant lessons about the relationship between law and new technologies. A robust legal framework can be important for securing industrial and public confidence in an unexplored area, yet at the same time it may unwittingly stifle innovation. This chapter explores a number of challenges that have arisen in the design of CCS regulation, with a particular focus on the European Union (EU), which agreed the first comprehensive piece of legislation on CCS in 2009 (Directive 2009/31/EC on the Geological Storage of Carbon Dioxide). The chapter avoids a comprehensive analysis of the legal regime, but instead highlights three areas where the introduction of a regulatory regime dealing with a novel (and potentially contentious) technology appears to have raised particular challenges: (i) the regulatory discretion deliberately given to Member States to

prohibit the technology within their jurisdiction; (ii) the extent to which the legislation provides for public participation in decision-making, and whether this adequately reflects challenges of engagement where a new technology is involved; and (iii) questions of long-term liability where distinctive legal issues are raised because of the very long timescales involved in this technology. All these issues touch upon notions of legitimacy, concerning how states should exercise their power in relation (p. 1233) to a new technology that carries risks of environmental harm. The first concerns the ability of states operating within a federal or quasi-federal system to take a political decision, whether on scientific or other grounds, to reject a particular technology; this is a power only recently conceded in EU legislation concerning the regulation of genetically modified crops.¹ The second reflects the extent to which public participation is now accepted in contemporary environment decision-making as an inherent part of good governance, but questions whether existing procedures are suited to handling more generic issues that can be associated with an emerging technology. Finally, liability questions are essentially concerned with fair risk-apportionment, and in this context, the extent to which it is legitimate for the state, at some point, to assume responsibilities from private sector industry.

2. The Technology

In its essence, CCS is the physical capture of carbon dioxide (CO₂) before it is emitted from a source, its transformation into liquid form, its secure transportation, and then long-term storage in deep pore space underground, either below land or below the seabed. Many of the individual technical elements of the technology are not, in fact, wholly new. Capture plants are associated with large sources of CO₂ such as power stations, chemical production, and cement manufacturing, and there are over fifteen large-scale CCS projects in operation around the world, with the first commercial-scale capture plant for a coal fired generating station opening in Canada in October 2014 (Global Carbon Capture Storage Institute 2015). Liquefied CO₂ has been regularly transported through pipelines over many hundreds of miles for many years, with some 60 Mt of CO₂ being transported in the United States (US) over nearly 6000 kilometres of pipeline (Morgan and McCoy 2012). In the US in particular, CO₂ has been regularly injected into oil fields for the purposes of enhanced oil recovery since the 1970s, with some 53 million tonnes of CO₂ being injected annually. In Norway, since 1996 nearly 1 million tonnes of CO₂ have been injected annually offshore in deep saline reserves as part of a project to remove excessive CO₂ from natural gas (Morgan and McCoy 2012).

There is, therefore, considerable experience with the components of CSS, but there are two aspects that are new in the current regulatory climate. First, current experience largely concerns individual components of the technology. The need now is to develop a regulatory system that encompasses an integrated system providing for capture from large industrial sources of CO₂ such as power stations, transportation, and final storage. Second, until now, the motivation for employing the technology has (p. 1234) been driven largely by the need to acquire CO₂ for its economic utility or to improve the output of oil wells; it is now being seen as a policy component in preventing CO₂ emissions from car-

bon-based energy sources reaching the atmosphere. Several implications follow from this policy shift. The technology must compete in the public arena with other policies and technologies for tackling climate change, including renewable energy, energy conservation, and nuclear power. Some Governments may advocate a mixture of approaches, but opponents of CCS can argue forcefully that the technology allows the continued use of fossil fuel at a time when policies should be supporting a move to a non-fossil fuel economy. In the context of legal regulation, this raises the question as to the extent to which these concerns are reflected in legal provisions concerning public engagement for CCS technology. At the same time, the technology must guarantee the effective permanent disposal of CO₂ once captured; any significant subsequent leakage of emissions back into the atmosphere clearly nullifies the policy goals. The very long-term nature of the storage operation itself raises difficult legal questions concerning liability in the event of leakage. Liability in this context relates not just to any physical damage caused (which is unlikely to be significant), but also in respect of economic advantages that may have been secured many years previously by the operator of a capture or storage plant as this is an activity carried out for the public good—e.g. allowances awarded under an emissions trading regime in respect of CCS projects.

3. The EU Directive on Carbon Capture and Storage

EU Directive 2009/31/EC on the Geological Storage of Carbon Dioxide (the Directive, or CCS Directive) is considered to be the first example in the world of a comprehensive legal framework for CCS, and was developed as a component of the EU's broader package of legislative measures dealing with Climate Action and Renewable Energy.² This section considers the nature of the regulatory framework, how it came about, and sets out its key provisions. Overall, the main focus in passing the Directive was to provide a regulatory framework for the long-term storage of CO₂, on the understanding that this process would be developed by the private sector and eventually on a commercial basis. Other than providing a regulatory framework, the Directive was not designed explicitly to promote the use of CCS technology, and it has a somewhat strange character in that it regulates, and thus helps to shape, a technology before it was used on a commercial basis. It is worth focusing on the Directive in some detail first; it was pioneering in terms of CCS (p. 1235) regulation, and therefore can provide lessons, both good and not so good, for other jurisdictions developing their own regulatory systems in this area. Second, the development and implementation of the Directive raises more generic issues concerning the relationship between law and new technologies, particularly questions of public engagement, liability provision, and the extent to which, within a federal or quasi-federal system of governance, discretion should remain at a national or local level to accept or reject a technology.

The European Commission's (EC) first formal proposal for CCS legislation at EU level was made in its Communication of January 10 2007—*Sustainable power generation from fossil*

fuels: aiming for near-zero emissions from coal after 2020 (European Commission 2006). In the Communication, the EC argued that a regulatory framework at EU level was needed for three reasons: (i) to ensure the environmentally sound, safe, and reliable operation of CCS activities; (ii) to remove unwarranted barriers to CCS activities in current legislation; and (iii) to provide appropriate incentives proportionate to the CO₂ reduction benefits. Compared with the timescale involved in the development of many environmental directives, securing agreement to the legislation in just over two years was a significant achievement, especially given the fact that the subsequent development of demonstrations of CCS has proved politically controversial in the majority of EU Member States. There were intense negotiations between the EC, the Council, and the European Parliament, which resulted in some significant changes that are discussed in this chapter, but there appear to be a number of reasons for the comparatively smooth passage of the legislation, which are relevant in the discussion of law and technology. First, the legislation provides a framework of controls but does not oblige any Member State to support or adopt the technology. Second, during the negotiations, there was no significant opposition to the proposals mounted by environmental non-governmental organizations; this was, in part, likely due to the recognition that it would be at Member State level that critical policy decisions would be taken, and it was therefore at that level that campaigning should be focused. Third, those who designed the legislation took a deliberate decision to use existing EU legislation wherever appropriate. The capture of CCS, for example, was to be regulated by amendments to the existing Directive on Integrated Pollution and Prevention Control.³ This approach had the advantage of presenting aspects of the proposal as a seamless addition to familiar regulatory requirements, rather than a wholly novel legal challenge, which could have courted greater political controversy, and was at the same time consistent with policies on reducing unnecessary new regulatory burdens. Despite the attractions of this approach, I argue that when it comes to questions of public engagement, the Directive was over-reliant on provisions in existing Directives which were not necessarily appropriate or suited to issues engaged by carbon capture and storage technology.

Given its structural approach, the main focus of the Directive was on providing a regulatory framework for the long-term storage of CO₂, and on the understanding (p. 1236) that this process would be developed by the private sector and eventually on a commercial basis. One further aspect of the proposal is significant. As mentioned above, different aspects of the technology were already being employed in other contexts, but it was clear that, in relation to CCS for climate change purposes, there would need to be a number of demonstration projects taking a number of years and supported by government funding before any actual commercial deployment of CCS took place. A different approach in dealing with a novel technology would have been to develop legislation solely dealing with demonstration plants, learning from the experience, and then promoting new legislation regulating the wider deployment of CCS, should demonstrations prove successful. This was the approach taken in 2003 by Western Australia in relation to a joint venture concerning gas production and the storage of carbon dioxide on Barrow Island, where site-specific legislation, the Barrow Island Act 2003, was passed dealing with authoriza-

tions for storage from the project. The possibility of the EU legislation initially dealing solely with the regulation of CCS demonstration projects was not explicitly discussed in the EC's background papers. It seems likely that the opportunity of a legislative slot, and the prospect of a comprehensive regulatory regime improving confidence in an emerging industry, both within Europe and internationally, was too attractive an option. This was coupled with an over-optimistic forecast of the pressures on industry to invest in carbon-free technology that would be brought about by the European emissions trading scheme (ETS). Following a collapse in market prices of EU ETS allowances in 2007, the carbon price increased to over 20 Euros per tonne of CO₂ in 2008 (at the time of the development of the proposals), with many observers considering that a price of around 40 Euros per tonne would be needed to drive industry investment into carbon capture (International Energy Agency 2012). However, predictions of a steady rise in the price of carbon proved unfounded, and by 2013 prices had fallen to under 3 Euros a tonne. Both the level of the price of ETS allowances, and the volatility of the price levels, were not likely to secure significant industry investment in CCS (House of Commons Select Committee 2014).

For a law dealing with new technology, the CCS Directive sensibly built in a review mechanism, requiring the EC to produce a report by the end of March 2015 on experience with the Directive 'on the basis of experience with the implementation of the Directive, in the light of experience with CCS, and taking into account technical progress and the most recent scientific knowledge' (CCS Directive, article 38(2)). No provision for review at a later date is provided, and clearly it was expected that, by 2015, there would be sufficient practical experience to have a meaningful analysis. At the time of writing, only one storage site had been approved under the provisions of the Directive and national implementing law (the Dutch Rotterdam Capture and Storage Demonstration (ROAD) Project: European Commission 2012), but the funding for the project has not yet been found (Carbon Capture Journal 2014). In the United Kingdom, two demonstration projects were announced in 2014 (Department of Energy and Climate Change 2013), although in September 2015, a partner in one (p. 1237) of the projects announced it would no longer invest beyond the feasibility and technology stage due to the changing financial and regulatory environment (Drax 2015), and the Treasury decision in 2015 to withdraw financial support led to a collapse of the second competition.

In terms of its regulatory mechanism, the Directive employs conventional regulatory tools of permitting by public authorities. Other accounts provide a fuller account of the provisions of the Directive (Doppelheimer 2011), but in essence, Member States must initially identify geographic areas where they may allow long-term storage of CO₂ (whether on-shore or offshore), following which they may grant exploration permits, followed by storage permits which provide the core mechanism for ensuring that storage is carried out without undue environmental risk. The Directive requires that applications be accompanied by monitoring plans, corrective plans (dealing with instances of leakage), and draft closure plans following cessation of operations. A number of features are distinctive, and two in particular could be said to reflect challenges in dealing with the novel nature of the technology.

First, responsibility for storage sites is channelled to a single operator (CCS Directive, article 6(1)). This was the result of an amendment added during the legislative process by the European Parliament, and is important for clearly locating responsibilities and liabilities in the context of public law, even though in reality there will be many complex commercial arrangements involving risk-sharing and indemnities of various sorts among the different economic actors involved. Second, while responsibility for issuing permits rests with Member States, all permit applications must be sent to the EC, together with any draft permit decisions. The EC has no power of veto over the decision of the Member State but, within four months of receiving the draft permit, 'may issue a non-binding opinion on it' (CCS Directive, art 10(1)). The competent national authority may depart from the EC's opinion, but if it does so 'shall state its reasons' (CCS Directive, article 10(2)). This is important in terms of transparency of decision-making, and provides a basis to both the applicant (where the permit is refused) and non-governmental organization (where granted despite opposition from the EC) for judicial review before national courts. This second distinctive feature of the regime involves a delicate balance of power between the EC and the Member State, and raises concerns of political legitimacy in relation to approving CCS as a technology.

4. Powers to Reject CCS Technology

Perhaps the most intriguing aspect of the Directive is the explicit recognition that it is up to the Member State to determine whether or not it will permit CCS storage within its jurisdiction. The text provides that Member States retain the right (p. 1238) to determine areas from which storage sites may be selected, but goes on to state that: '[t]his includes the right of Member States not to allow for any storage in parts or in the whole of their territory' (CCS Directive, article 4(1)). It is important to note that the provision does not require any technical justification for not permitting storage, such as geological or economic unsuitability, and in that that sense it is an intensely political provision. Member States do not have to provide a 'rational' reason for not allowing storage within their territory, or, as in the UK, for example, Member States can pursue a policy of only permitting CCS offshore, knowing full well that proposals for on-shore storage are likely to arouse intense political opposition.

There are, of course, many examples of legislation that provide a regulatory framework without in any way requiring the particular technology covered by the law to be pursued or supported by Government. The EU Directive on environmental assessment, for example, requires environmental assessment to be carried out for nuclear power stations, but it does not follow that Member States are obliged in any way to promote nuclear power (Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU). In that sense, Member States would already have had the discretion not to support CCS technology without the explicit provisions in the Directive. The clause granting explicit veto powers was not in the original draft proposal, but was added during the legislative process following intense discussions with the European Parliament, and reflected considerable unease

amongst certain Members of the European Parliament and within some Member States about the technology and its value.

But the existence of this clause in the Directive giving such explicit powers to a Member State to prohibit CCS storage within their jurisdiction—and there appears to be no equivalent precedent in other EU environmental legislation—has had a significant and unexpected impact on the conventional practice of transposition of EU law. A Directive represents an obligation on Member States, and Member States are obliged to transpose the provisions of a Directive into their national legal system within a specific period, normally two years. Texts of national legislation must be communicated to the EC, which has a responsibility to check that transposition is complete, and if not, to initiate infringement proceedings against the Member State concerned.

In the past, the EC has generally been insistent that a Member State must still transpose into national legislation provisions of a Directive, even though the country in question has no intention of promoting a technology or process to which the Directive relates. The Court of Justice of the European Union (ECJ) has tended to endorse the approach. For example, the ECJ held that Portugal could not claim it was exempt from reporting requirements under the Directive on Titanium Dioxide on the grounds that no waste from the Titanium Dioxide industry was produced in the country (*Commission v Portugal* [2000]). In *Commission v Netherlands* [1990], (p. 1239) the ECJ rejected the argument that certain provisions of the Wild Birds Directive need not be transposed in national law because the particular activities prohibited under the Directive were unknown in the country:

the fact that a number of activities incompatible with the prohibitions contained in the directive are unknown in a particular Member State cannot justify the absence of appropriate legal provisions. (para 22)

The underlying rationale was that national policies and circumstances could change, and piecemeal transposition of Directives amongst Member States would undermine the coherence of the European legal system. There has not, however, been complete consistency on the issue. In 1991, for example, both the EC and the ECJ appeared to accept that transposition of provisions on the Drinking Water directive was not required with the Brussels region, because no surface water in that area was used for drinking water (*Commission v Belgium* [1991]).

By the time it came to transposition of the CCS Directive, the technology had become controversial in a number of Member States. In Germany, for example, strong opposition had developed, and the German government was prepared to transpose the provisions of the Directive on storage, but only in relation to research projects (Kramer 2011). Any further transposition of the Directive to cover full commercial storage would have appeared to have endorse the technology prematurely and would have been unlikely to secure parliamentary approval at national level. The original CCS Bill in Germany was rejected by the Bundesrat in 2011, and the new Act (*Gesetz zur Demonstration und Anwendung von Technologien zur Abscheidung, zum Transport und zur dauerhaften Speicherung von Kohlendioxid*) eventually passed in 2012 is clearly confined to research, pilot and demon-

stration projects for CO₂ storage, with an annual storage for a site of no more than 1.3 million tonnes of CO₂, and a maximum storage capacity of an annual 4 million tonnes in the country. The Federal Government will report to Parliament on experience with the legislation by 2017 with the possibility of introducing new laws. The EC Legal Services had been very uncomfortable with the idea of a national transposition law being limited in this way, and in fora such as the International Energy Authority's Annual Regulators Meeting, EC representatives had indicated that such a limitation would expose the country to enforcement action by the EC. But, at some point in 2013, the Legal Services appeared to have agreed that because the Directive unusually gave such express powers to Member States not to permit storage of CO₂ in all or part of their jurisdiction, limiting the scope of the Directive in national legislation was not incompatible with transposition obligations. The EC's own report on the implementation of the Directive, published in 2014, notes that some seven Member States within the EU have prohibited the storage of CO₂ within their territories, and in a number transposition has been confined to research facilities only (European Commission 2014).

(p. 1240) There is a strong argument that there might have been less national political controversy had the EU CCS legislation be confined to pilot and demonstration projects from the outset. There would then have been a better understanding within Member States that, for the time being at least, any political endorsement was essentially confined to researching the technology before any commitment was being made to develop the technology further. As it was, the legislative process implicitly gave the impression that both the technology was being supported at the highest level, and that the essentials of the legislative requirements were fully understood despite the absence of practical experience. It is true that the Directive provided for a Review, requiring the EC to conduct an assessment 'on the basis of experience with the implementation of this Directive, in light of the experience with CCS and taking into account technical progress and the most recent scientific knowledge' (CCS Directive, article 38). But the provision provides for only one review to be completed by March 2015, and the EC's review that was launched in 2014 (ccs-directive-evaluation.eu), was clearly operating in something of a vacuum of practical experience, and is unlikely to be in a position to recommend significant changes to the provisions of the Directive. Stakeholder consultation conducted in 2014 as part of the EC's review concluded that the main reasons for lack of progress with CCS in Europe was the economic downturn and low CO₂ prices, rather than problems with the Directive itself. The general consensus was that, given the lack of practical experience with the Directive, re-opening debates on its provisions would only create more uncertainties, and the main focus should be to improve CCS supportive policies. A full review of the Directive should be delayed until 2020, as by that time more demonstration plants might be in play, with further reviews afterwards (European Commission 2014). In its 2015 report on the Directive to the European Parliament (European Commission 2015), the EC broadly endorsed these views. It concluded that the Directive provided the regulatory framework needed to ensure safe capture, transport and storage of CO₂ while providing sufficient flexibility to Member States, but that lack of practical experience with the application of the Directive precluded a robust judgment on its performance. Reopening discussion of

the Directive now would add uncertainty in a sector where investor confidence was already low and, without committing itself to any future date, the next review of the CCS Directive will be carried out when more experience is available with CCS in the EU. The EC essentially remained convinced that the EU emissions trading regime, rather than direct regulation by the imposition of emission standards, would eventually provide the incentive for CCS investment. In its the ongoing reforms to the EU emissions trading regime, including the introduction of a market stability reserve and more ambitious CO₂ reduction targets beyond 2020, was 'expected to substantially boost the investment climate for low carbon technologies over time'. Time will tell whether this prediction is correct, but it reflects fundamentally different views on the efficacy of conventional regulatory emissions (p. 1241) standards and economic market based systems as environmental policy instruments (Macrory 2011).

5. Public Engagement

Over the past thirty years, public rights of participation in decision-making have been increasingly recognized as an important element of contemporary environmental law, and represents one of the three pillars—alongside access to environmental information and access to justice in the 1998 UNECE Aarhus Convention (the Aarhus Convention), ratified by the EU and all Member States. The core participation rights in the Aarhus Convention are associated with consent procedures for individual projects, and require that parties 'shall provide for early public participation, when all options are open and effective public participation can take place' (article 6). When it comes to plans and programmes relating to the environment, the Aarhus Convention applies similar requirements (article 7), but in relation to regulations and legally binding instruments, the provisions are essentially exhortatory requiring parties 'to strive to promote effective participation at an early stage' (article 8).

There are a number of challenges that CCS presents to conventional notions of public participation rights. In relation to specific projects, the current policy of the UK is to focus on offshore sites for storage, but this raises questions of which members of the public should be entitled to participate in decision-making. Clearly, there may be interests in the area such as fishing interests or operators of other facilities, but it is less easy to identify other members of the public who should be engaged. EU environmental legislation—which clearly provided the inspiration for the core public participation provisions of the Aarhus Convention—requires environmental assessment of specific projects, incorporating rights of public participation (EU Directive 2011/92). Nevertheless, much discretion was left to Member States to define the public who should be engaged, and the form of participation that should be adopted. The 2001 Strategic Assessment Directive (EU Directive 2001/42) applied a similar requirement of assessment incorporating public participation at a higher level of decision-making covering 'plans and programmes' likely to have significant effects of the environment, but again giving wide discretion to Member States to identify the public who should be consulted and the form of consultation that should take place (article 6(4)). In relation to offshore plans and programmes, the practice to

date in the UK has been largely a conventional one of publicising proposals and seeking comments. The first Strategic Environmental (p. 1242) Assessment in the UK which incorporates a specific reference to off-shore carbon and storage was conducted over a three-month period in 2011 by the Department of Energy and Climate Change, and concerned plans to allow future licencing in the UK Renewable Energy Zone and territorial waters in England and Wales, covering renewable energy, oil and gas, and underground storage of CO₂. Copies of the Environmental Report required as part of the assessment were available of the departmental website, sent to statutory consultees, placed in coastal public libraries, and 24 national and local newspapers. Twenty-two responses were made, including a number of national authorities, trade associations, and four national environmental organizations (Department of Energy and Climate Change 2011). Carbon Capture and Storage received scant comment, with one organization requesting that improved guidance be issued for the environmental assessment of specific storage projects.

Effective public consultation for offshore activities may be inherently problematic, but more fundamental is whether the approaches developed in existing legislation to handle specific projects and plans are really appropriate for handling more generic issues of public concern that might be associated with a new technology, and how it fits in to the future direction of energy policy in the context of climate change.

The preamble to the EU CCS Directive suggests a context by stating rather enigmatically that:

Carbon dioxide capture and geological storage (CCS) is a bridging technology that will contribute to mitigating climate change, and then that '[t]his technology should not serve as an incentive to increase the share of fossil fuel power plants'. Its development should not lead to a reduction of efforts to support energy saving policies, renewable energies and other safe and sustainable low carbon technologies, both in research and financial terms

(Directive 2009/31/EU).

Pre-ambls in EU Directives have no binding legal force in themselves but provide an aid to interpretation. These are ambiguous and contestable statements—just how long, for example, is a 'bridging technology'? Additionally, there is no indication in the Directive itself whether there should be any public rights of participation in exploring these questions and how this should be conducted. Rather than develop any particular provisions concerning public participation that was designed to consider the implications and role of a new technology, the Directive simply resorted to existing models, by requiring that proposals for CCS, transport, and storage facilities would fall under the existing environmental assessment directive. An uncontroversial approach which provided regulatory simplicity but one that side-stepped the difficult challenge of securing public confidence in a new technology, and publicly engaging in issues of core concern.

From the EU perspective, it could be argued that given the early stages of the technology, it would be simply too early to engage in extensive consultation until more (p. 1243) realistic data was known. Alternatively, since it was left to the discretion of Member States whether to permit storage within their territory, it was the responsibility of Member States to determine any new forms of public engagement. Certainly, the public reaction to on-shore storage proposals in the number of EU Member States leading to bans on CCS in seven countries to date suggests that the opportunity for a more sophisticated and broad-based engagement exercise was lost.

Within the UK, the closest in recent years to a new form of public engagement over an emerging technology was the GM Nation exercise initiated by the Government in 2003, over concern about potential commercialization of genetically modified crops (Macrory 2008). The initiative was based on concepts developed by the UK Royal Commission on Environmental Pollution concerning the general exploration of public values concerning environmental policy and the Commission emphasised that:

[t]he fundamental purpose of these new approaches is not to produce a 'right answer' but to illuminate the value questions raised by environmental issues in order to identify the policies around which consensus is more likely to form and to enable decisions to be better informed and more robust

(Royal Commission on Environmental Pollution 1998).

GM Nation was overseen by an independent advisory body; nine workshops were held across the UK that were designed to help frame the issues that should be the subject of more detailed exploration. The formal debate was launched in June 2003 over an intense six-week period, and involving seven national meetings, 41 regional or county level meetings, and some 629 local-scale meetings. The GM debate website received over 2.9 million hits during the period, and some 37,000 feedback forms were sent. The results suggested a continuing unease and uncertainty with the technology, but with attitudes generally hardening against early commercialization, the more that was known. The Government's response was to reject any moratorium, but argue for a more cautious, case-by-case approach based on the precautionary principle.

There was subsequent criticism as to some of the methodologies used, the extent to which the exercise had truly engaged the general public, rather than those with committed views, and the tight timetable adopted by the Government (Horlick-Jones 2003). Nevertheless, it represented a bold experiment in the design of a public consultation exercise concerning a new technology, and one that went well beyond the traditional methods seen in existing regulatory requirements based on publishing proposals and seeking comments. It remains to be seen whether anything similar will be conducted in the context of CCS should it reach a stage of wider commercialization, and whether this should be reflected in the regulatory framework (Markusson, Shackley, and Evar 2012; Ashworth and Cormick 2011). Within the EU, the CCS Directive itself studiously avoided addressing the challenge, and it is doubtful whether the existing regulatory procedures for Strategic Environmental Assessment for policies and programmes, or environmental (p. 1244) assess-

ment for individual projects (Rydin, Lee, and Lock 2015; Hilson 2015), important though they are, are an effective substitute.

6. Long-term Liability Issues

One of the distinctive features of CCS that poses challenges in the design of a regulatory regime is the very long timescale involved. Storage of carbon dioxide must effectively be permanent if it is to contribute to the greenhouse gas reduction, well beyond the likely life of commercial companies initially carrying out storage operations. Nearly every jurisdiction developing CCS legislation (including the EU) has had to face the issue as to whether liability should at some point be transferred to the state. This, in turn, raises issues as to what exactly is meant by liability, what precisely is transferred, and the conditions of transfer. The solutions that have been adopted in legislation often display quite different approaches, reflecting views as to the purpose of liability regimes, and the extent to which the legislature was supporting the technology.

When it comes to the meaning of liability, it is important to distinguish different categories of liability and damage that may be involved. Leaks of CO₂ from a storage site can potentially cause damage to third-party interests such as groundwater supplies, either through direct leakage, or leakages causing subsurface pressure that moves brine or other subsurface material. Careful site selection and monitoring should reduce possibilities to a minimum, but nevertheless, there exists the possibility of civil liability—under common law in torts, such as negligence or nuisance—and here the issue is whether the state should at some point take on responsibility for such liabilities. The position is made more complex because it is imperative to distinguish between historical liabilities arising from leakage while the site is being operated but which, because of the slow nature of geological seepage, are not discovered or do not cause damage for many years after the event, and liabilities arising from leakages after the site has closed and been transferred to the state. Limitation periods for bringing civil claims may provide some protection from operators for long-tail liabilities, but there are many examples around the world of companies being held liable for events which occurred or began several decades earlier (Clarke 2011). The second category of liability is perhaps better conceived of as responsibilities for site management—monitoring and verification, for example—and taking action should some leakage problem occur. Finally, in some jurisdictions, CCS is in some way linked to an emissions trading regime in the hope that this will provide an added financial incentive for investment in the technology. Under the EU Trading regime, for example, the operator of a plant that captures CO₂ that is sent to (p. 1245) a storage site regulated in accordance with the Directive receives a credit in that the captured CO₂ no longer counts and as an emission which has to be matched by purchased allowances. The storage operator, assuming this is a separate entity, receives no credit as such, but must account for any leakages that occur by purchasing necessary emissions allowances to cover the emissions that have occurred. The extent to which the operator may recover the costs in-

curred from those who initially received the economic benefits will be a matter of commercial arrangements between the actors involved.

The EU Directive contains important provisions concerning transfer of liability (Art 18), but does not deal with third-party liability, leaving this to Member States to determine. This may have been due, in part, to the political sensitivities involved, but also to a concern that this issue fell outside EU legal competence. Commission officials were aware that the attempt to provide a directive on environmental liability dealing with the question of third-party liability involved over years of discussion and the impossibility of agreement on the issue by Member States. The Environmental Liability Directive (Directive 2004/35) that was eventually agreed avoids the issue of third-party liability, but is focused on the responsibility of operators and public authorities to take remediation action where the environmental action is threatened or has occurred.

The liabilities that may be transferred to the state under the Directive are confined to (i) the obligations under the CCS Directive relating to monitoring and the need to take corrective measures; (ii) obligations relating to the need to purchase and surrender of greenhouse gas allowances under the greenhouse gas emissions trading regime in the case of leakage and; (iii) obligations on an operator to take preventative and remedial action under the Environmental Liability Directive (CCS Directive, article 18(1)). The transfer of the continuing administrative responsibilities for the site is a feature found in other recent CCS legislation in other jurisdictions such as Canada and Australia, but it is the conditions that must be met before transfer takes place that some very real differences appear in approach in legislative design. Under Article 18 of the Directive, the site must be sealed, a financial contribution paid to the State for post-transfer costs, a minimum period of twenty years must have elapsed since the cessation of storage operations (this period can be reduced if the relevant national authority is satisfied all the other conditions have been satisfied) and '*all available evidence*' indicates that the stored CO₂ will be completely and permanently stored. The '*all available evidence*' test is especially strict, and can be contrasted with the wording, e.g. in Alberta, legislation which states as its core condition for transfer that 'the Minister is satisfied ... the captured carbon dioxide is behaving in a stable and predictable manner, with no significant risk of future leakage' (Mines and Minerals Act as amended by Carbon Capture and Storage Statutes Amendment Act 2010, s 120(1)). In the State of Victoria, Australia, the core condition is that the 'Minister must be satisfied that the greenhouse gas substances that has been injected in an underground geological formation in the (p. 1246) licence area and is behaving and will continue to behave in a predictable manner' (Greenhouse Gas Geological Sequestration Act 2008, s 170). In these jurisdictions, the trigger is expressly based on a Minister being satisfied that conditions have been met, with the implication that the decision would be difficult to challenge in court in the absence of irrationality.

In contrast, the EU Directive core condition is expressed in objective terms, and with no nuances in the legislation referring to risk, probabilities, or the preponderance of scientific evidence. On a literal reading it could be very difficult to satisfy: if, for example, an environmental group challenged the decision of an authority to accept transfer, and pro-

duced dissenting expert evidence, could a court be satisfied that the ‘all available evidence’ test was satisfied? The differences in the legislative design can be partly explained by the political background to the legislation. In Alberta and Victoria, the Governments promoting the legislation were largely supportive of CCS technology. In contrast, within the EU there was already considerable concern expressed, especially by Green MEPs in the European Parliament about the feasibility of CCS (Turmes 2008), and a number of Member States were deeply suspicious as to its real viability. The tough test on transfer was essentially one of the prices for securing political support. In practice, it may be somewhat tempered by the fact article 18 of the Directive requires the operator must prepare a report for the national authority demonstrating that the CO₂ is behaving in accordance with modelled predictions, there is no detectable leakage, and that the storage site is evolving towards long-term stability. That report may go a long way to satisfying the authorities that the ‘all available evidence’ has been satisfied, and the EC has issued Guidance which tends to equate the two requirements (European Commission 2011). A clearer reading of the Directive is that, though connected, these are two distinct tests.

Transfer under the Directive does not however completely relieve the operator of responsibilities to the state. There is a distinctive ‘claw-back’ provision, which does not appear to be replicated in CCS legislation in other jurisdictions, that allows government to recover costs can be traced to the ‘fault’ of the operator. Fault is defined in extremely broad terms, includes ‘cases of deficient data, concealment of relevant information, negligence, wilful deceit or a failure to exercise due diligence’ (CCS Directive, article 18(2)). The inclusion of ‘deficient data’ as justification for cost recovery appears to go some way beyond traditional notions of negligence, and reflects the scientific uncertainties of the technology.

As to the transfer of potential liabilities to third parties, one can see different models emerging. Clearly once the state has assumed responsibility for the site, it will be legally responsible for any leakages that occur after transfer has taken place, but here we are considering leakages that occurred during the period when the site remained in the control of the operator. The Alberta legislation, for example, provides that the Crown will indemnify the storage operator for any liability in tort if the act was attributable to an act done or omitted to be done in the exercise of rights (p. 1247) under the storage licence (Mines and Mineral Act, s 121(2)). An indemnification, however, can only come into play if the operator still exists and can be the primary defendant. In contrast, the legislation in Victoria, Australia, contains no provisions concerning indemnification or assumption of liabilities, a conscious policy decision at the time of the development of the legislation. Retaining civil liability with no prospect of transfer to the state was considered an ‘approach would help ensure that strong financial incentive remains for CCS proponents to conduct their operations in a manner that is safe to human health and the environment’ (Department of Primary Industries 2008). When it comes to Australian Commonwealth legislation dealing with offshore storage, another approach is adopted with an indemnity against civil liabilities provided after transfer, but an express provision that should the operator

cease to exist, the state will assume any liabilities (Off-Shore Petroleum and Gas Storage Act 2006; Swayne and Phillips 2012).

The EU Directive has left the question of third-party civil liability transfer to the discretion of Member States, and the UK regulations appear to contain the most generous of provisions to the operator by stating that on transfer and surrender of the site, any leakage liabilities incurred by the licence holder are transferred to the state. 'Leakage liabilities' are defined in extremely broad terms to include 'any liabilities, whether future or present, actual or contingent, arising from leakage from the storage complex to which the relevant licence relates and its liabilities for personal injury, damage to property and economic loss' (Storage of Carbon Dioxide Regulations 2011). It is a privileged position for the industry, and presumably reflects the UK Government policy at the time to encourage the commercial development of the technology, together with an assessment that in practice very few such liabilities will ever occur—a fairly realistic prospect given that current UK policy is only to permit offshore storage of CO₂.

Long-term liability issues create a potential dilemma for policy-makers and the industry operating in what many would still see as a field of novel technology with considerable uncertainties, and one where minimization of future risks that must, for the time being, largely depend on rigorous site selection and sound predictive modelling. Law which imposes on industry too many unpredictable future legal liabilities may simply deter commercial investment and risk taking, and at a time when third-party liability insurance in this field remains scarce (Climatewise 2012). On the other hand, if legislation goes too far in the transfer or assumption of liabilities, and well beyond comparable industries such as the waste disposal sector, this may undermine public confidence by suggesting that there is something inherently risky and unusual in the technology. Analogies with the nuclear industry where international treaties have produced a distinctive capped liability regime because of the unusual nature of the risks involved are not helpful to those trying to ensure confidence in CCS technology. For some, there remains a strong theoretical justification for maintaining operator's civil liability in that its existence ensures good standards and behaviour. This may be true for short-term risks, but is more (p. 1248) questionable how far it is a significant factor when it comes to longer-term potential liabilities well beyond the lifetime of current management (Adelman and Duncan 2011). Clearly, within in the EU, and countries currently developing CCS legislation, such as Canada and Australia, regulatory requirements concerning rigorous site selection and assessment rather than tough deterrent civil liability regimes are considered to be the prime legal tool to reduce the potential for environmental and public risks.

7. Conclusions

Designing regulation for handling a new technology raises distinct challenges. A degree of certainty and rigour in a regulatory regime is likely to be essential for securing commercial and public confidence, while flexibility is equally needed to accommodate the uncertainties that will exist in the absence of experience. Over-elaborate regulation may un-

wittingly stifle the development of a technology with potential public benefit, while exceptionalism may suggest that the technology presents distinctive risks from more familiar industries. The emerging regulatory frameworks for CCS provide compelling examples of some of the issues involved. The very long timescales required for storage security inevitably raises questions of legal liability and responsibility, and the extent to which it is legitimate for these to be assumed by the state at some point. Carbon Capture and Storage regulation is now being developed in the context of CCS as providing a technology for dealing with climate change threats, and as such is competing with other approaches and technologies. Some would argue that, given the continuing development of coal and gas fired power stations, especially in emerging economies, CCS is a technology that is essential if CO₂ emissions into the atmosphere are to be reduced to acceptable levels within the timescales required. But this is contestable, and others would say that the technology simply allows for the continued exploitation use of fossil fuels at a time when policy requires a rapid move to a fossil fuel-free economy. On this model, CCS at the most would be confined to industrial activities such as cement production, where no realistic alternative process is in prospect. While contemporary environmental regulation tends to incorporate rights of public participation as a core element of decision-making, this has largely been associated with particular project proposals. It is as yet underdeveloped when it comes to dealing with serious public engagement in the more generic issues associated with a new technology such as CCS, and the difficult public policy choices it involves, and where conventional models of (p. 1249) participation may be inappropriate. In this context, we may be moving beyond the appropriate scope of regulation as such, but failure to address the issue may simply provide opportunities for intensifying public concern and hardening opposition to the technology, as has already been seen in a number of European countries. Eighty years ago, the American lawyer Thurman Arnold wrote that the law 'preserves appearance of unity while tolerating and enforcing ideals which run in all sorts of opposing directions ... it functions best when it represents the maximum of competing symbols' (Arnold 1935). Regulatory regimes, especially those dealing with new and potentially controversial technologies, may equally have to reflect and accommodate difficult conflicting tensions, but this should be seen as a strength rather than a weakness.

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Notes:

(1.) See Directive 2015/412 amending Directive 2001/18/EC as regards the possibility for Member States to restrict or prohibit the cultivation of genetically modified organisms (GMOs) in their territory [2015] OJ L68/1. One could extend the analysis to considering whether regions or local communities within a state should have the power to prohibit technologies—see, for example, the proposed Energy Bill 2015 which would transfer the final decision on large on-shore wind farms from central government to local planning authorities.

(2.) Other elements of the package including amendments to the emissions trading regime (Directive 2009/29/EC), promotion of renewable energy (Directive 2009/28/EC), fuel quality (Directive 2009/30/EC) and Member State's efforts to reduce greenhouse gas emissions (Decision 406/2009/EC).

(3.) Now replaced by Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control) [2010] OJ L334/17.

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Nuisance Law, Regulation, and the Invention of Prototypical Pollution Abatement Technology: ‘Voluntarism’ in Common Law and Regulation

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Abstract and Keywords

The emerging idea that the private enforcement of nuisance injunctions can facilitate investment in pollution abatement technology raises important questions of the wider regulatory context of this area of tort. This chapter examines the role of the Alkali Inspectorate historically in facilitating progressive improvements in industrial production process standards to an extent comparable with nuisance law. It is argued that regulation in this field has demonstrably shaped the development of pollution abatement technology, but exceptionally so. The notion of ‘voluntarism’, which tort scholars have used to explain the scope and limits of nuisance law’s inventiveness, can be helpfully generalized. Voluntarism accounts for the success with which government inspectors set out to clean up industry through pushing the frontiers of clean technology, and the difficulties of sustaining this success with the passage of time. This is illustrated by a case study concerning cement industry pollution.

Keywords: nuisance, regulation, clean technology, voluntarism, Alkali Inspectorate, chemical industry, cement industry

1. Introduction

THIS chapter aims to add some nuance to the emerging argument that nuisance and regulation play complementary roles in the ‘clean up’ of polluting industrial technology (Pontin 2013a, 2013b). The argument as it currently stands is that nuisance law, in its strict liability English form, backed by the remedy of an injunction, facilitates (p. 1254) the invention of pollution abatement technology prototypes. These encompass, for example, improvements in the design of chimney flue to mitigate acid gas emissions, or modification of wastewater outfalls to mitigate rivers pollution. Regulatory law then renders the ‘common law prototype’ the ‘industry archetype’, in circumstances where it is considered by the competent regulatory body expedient in the public interest to do so.

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One issue that requires elaboration is the nature and the degree of the dependence of regulatory law (and indeed society) on nuisance law's capacity to facilitate innovation. If it is true that prototypical technologies for mitigating pollution are 'proved' in the living laboratory of neighbourhoods in which nuisance remedies are enforced, by private individuals with the means and the will to vindicate private rights, are we then to understand that regulatory law is incapable of facilitating innovation in technology independent of nuisance law? Is regulatory law concerned exclusively with archetype? Drawing on historical material relating to the modern origins of environmental regulation during industrialization, this chapter discusses overlooked areas where regulation has encouraged the invention of pollution abatement technology. However, these areas are exceptional and historically conditioned. The primary reason for the chequered achievement of regulatory law in this setting is the law's 'voluntarism'. This is a notion that has its roots in nuisance scholarship (McLaren 1983: 205–219; Pontin 2012: 1031–1035), but it applies also to regulatory law.

Environmental regulation is not commonly understood by scholars of regulation to function creatively in pushing the frontiers of innovation in pollution prevention technology. In specific relation to one form of regulation—the imposition of prescribed production process standards—many regulation scholars echo Anthony Ogus's early critique of 'specification standards' (Richardson, Ogus, and Burrows 1982). These constitute a 'direct interference with the manufacturer's behaviour', with the following adverse consequence:

[the manufacturer] thus has no incentive to reduce the harmful effects of his processes on the environment and, perhaps even more seriously, to research into new, more efficient, forms of abatement.

(Richardson, Ogus, and Burrows 1982: 39)

David Robinson in similar terms critically comments on the 'static nature' of 'traditional' pollution control standards (Robinson 1998: 44–45).

Both Ogus and Robinson draw heavily on the 'British experience' of environmental regulation. They refer to the classic example of a production process standard in the form of 'best practicable means' (BPM). BPM originated as a legal standard in the context of industrial pollution through the Alkali Acts 1874 and 1881, and the Rivers Pollution Prevention Act 1876. It has subsequently found favour throughout the world, for example in North America and Europe, under the slightly different terminology of 'best available techniques' (BAT). Though no one suggests that BPM/BAT is calculated to stifle innovation in clean technology—quite the contrary in principle—that is how critics perceive it to function in reality.

(p. 1255) The chapter is structured as follows. Section 2 provides a synthesis of the emerging literature in which it is argued that nuisance law facilitates prototypes in the field of clean technology that create the technological conditions for administrative standardization. Section 3 begins addressing the central issue of the contribution to pollution abatement technology of regulatory law, specifically the BPM criterion. It does so with refer-

ence to the regulatory practices of Dr Angus Smith and Dr Alfred Fletcher (the first and second Chief Inspectors of Her Majesty’s Alkali Inspectorate, the world’s first specialist, national pollution authority). Inspectors enjoyed a wide discretion under the Alkali Acts framework, through the statutorily undefined BPM standard. They chose to embrace the opportunities this provided of encouraging practical innovation in clean technology in the public interest. Section 4 examines the struggle to sustain this proactive, innovation-forcing role. The cement industry is used as a case study to demonstrate corporate and wider governmental resistance both to nuisance law and regulatory possibilities for progressive ‘clean-up’. It is proposed that cement and other areas examined support a generalized conception of ‘voluntarism’, expanding on McLaren’s analysis (specifically in terms of nuisance law) of ‘countervailing values’ that militate against ‘resolute action’ (McLaren 1983: 205).

2. Prototypical Clean Technology within the Framework of Nuisance Law

The theme of clean technology in relation to nuisance and regulation was largely peripheral to the well-populated debate in 1970s and 1980s about the merits of tort and statutory regulation as competing tools of environmental protection (Michelman 1971; Epstein 1982). The ‘comparative regulatory tools’ approach of that period, which was taken to an extreme in the ubiquitous law and economics literature, has come under challenge by tort scholars who focus on the autonomy of nuisance law and the ‘non-instrumental’ values (of being a good neighbour in an ethical sense) underlying the law (Weinrib 1988; Penner 2000; Beever 2013). That is why it is necessary to emphasize that the concern in this chapter with the social (and specifically technological) consequences of nuisance law for purposes of comparison with regulation is not intended to imply that common law and regulatory law are equally consequentialist in their normative foundations, for they are not. The comparison is between different forms of law with different normative foundations that converge around a common problem arising from polluting industrial processes.

(p. 1256) The emergence of the idea of a substantial common law contribution to clean technology has had to overcome formidable scholarly obstacles in the influential studies of Joel Brenner and John McLaren in particular (Brenner 1974; McLaren 1983), whose critiques of nuisance law have dominated the historical literature for decades. These offer generally unfavourable assessments of nuisance law relative to regulatory law during industrialization, including scepticism towards the prospect of nuisance litigation facilitating technological innovation. For example, drawing on Brenner and McLaren, the historian Noga Morag-Levine remarks on ‘a widespread failure on the part of industrial sources to undertake pollution control measures [in Victorian Britain]’ (2011: 11).

The most thought-provoking part of the critique is that nuisance law’s chief weakness relative to regulation was (and is) that it is permissive, or voluntary, in form (McLaren 1983 205–206; Pontin 2012: 1031). This means that it relies on the willingness and ability of in-

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dividuals with sufficient interest in freedom from pollution in their neighbourhood to spend time and money going to court to protect that interest. Such willingness and ability was clearly wanting in many urban districts in industrial or industrializing Britain, where working-class communities relied for their subsistence on polluting industry. The attraction of regulation, on this thinking, is that it operates outside of the voluntaristic constraints of private litigation. Standing in place of the private proprietor, who may or may not have the means and inclination to protect the property's environment, is an administrative body with responsibility for implementing 'strong, uniform measures to protect public health and the environment' (McLaren 1983: 219).

The revisionist thesis accepts that voluntarism is a real problem for nuisance law operating as an 'environmental sword' in many contexts, and it accepts that regulation is in principle advantageous. However, it differs in its emphasis on voluntarism's positive dimension. In the hands of a public-spirited proprietor with a deep pocket, or a 'little man' with the support of a big community, a typical nuisance remedy—an injunction—can have a powerful transformative effect on the technologies or techniques employed by polluting tortfeasors (Pontin 2013a: 191–197; Pontin 2013b: 20). Moreover, this chapter adds different facets to voluntarism by adopting the additional perspective of defendants to nuisance proceedings, and also looking beyond nuisance law to consider voluntarism as central to the scope and limits of environmental regulatory law.

The merit of this generalized application of voluntarism can be illustrated with reference to three main areas of nineteenth-century industrial nuisance litigation studied in the literature. The first area concerns the heavily polluting nineteenth-century copper smelting industry. The unreported case of *David v Vivian*, which is the subject of separate studies based on local archives by the historians Rees (1993) and Newell (1990), pitted a claimant tenant farmer with strong local support (Thomas David) against a paternalistic defendant industrialist (John Henry Vivian). When the complaint arising from acid gas emissions from his giant Hafod works in (p. 1257) South Wales first surfaced (in about 1810), alleging 'copper smoke' that was heavily destructive of neighbouring vegetation, Vivian took positive steps to abate the emissions. He contracted scientist-inventors, Michael Faraday and Richard Phillips, to design a flue gas treatment technology that could fix the problem. The fix, which was conceived and modified over about a decade, was not perfect, but it showed potential, and it improved Hafod's impact on air quality. Some historians account for the victory of the defendant in this case as evidence of a judicial bias in favour of mighty industry (Rees 1993: 42). However, the outcome is also to do with the powerful manufacturer taking seriously the responsibility of being a good neighbour.

Vivian and his son (the heir to the factory dynasty, Henry Hussey Vivian) were friends with Lord Alfred Henry Paget, the co-owner of St Helens Smelting Ltd—the copper smelting firm famously sued by William Tipping in a claim decided in the claimant's favour by the House of Lords (*Tipping v St Helens Smelting*). Almost certainly because of considerations of heavy costs (of installation as well as maintenance), but possibly also because the neighbouring estate subsequently acquired by Tipping was derelict, Paget's firm opened for trade in the late 1850s without installing Vivian's prototype for preventing

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acid gas emissions. When sued, its strategy was to defend its common law right to pollute on various principled bases (Pontin 2013b: 88–89). These were the defence of coming to the nuisance; compliance with the normal industry practices; and the choice of a reasonable location for a works of this kind (on the outskirts of St Helens, a manufacturing district). In other words, the parties to the dispute were in agreement that the operator of industrial works had a moral and legal responsibility to behave in a neighbourly manner, but what exactly that responsibility entailed in principle was for the court to determine.

In these circumstances, because the defendant in *Tipping* raised issues of neighbourly principle—of what it means to be a good neighbour—it is unclear that the defendant was acting any less differently—less 'responsibly'—than the defendant in *Vivian*. Besides, when the works relocated deep within the manufacturing centre in response to the enforcement of the injunction awarded to the claimant, Lord Paget's firm took positive steps to clean up their process. They employed a variation of Vivian's nascent clean technology, with ostensibly satisfactory results (Pontin 2013b: 90). This was a voluntary show of responsibility for mitigating neighbourhood pollution comparable to *Vivian*.

There are many further examples of copper works proprietors choosing to innovate in similar ways, to comply with nuisance law, in the absence of government regulation (Rees 1993: 42–43). The point to stress is that these cases are of interest at a deeper level than defendants' private law 'compliance activity', important though that is. The defendants demonstrated—not only to wider industry and wider residential proprietors but also to the legislature and to the executive—that serious industrial pollution of this kind could be ameliorated through investment in technological modernization. However, they did so in the context of the common law, and thus there is a prior 'lawmaking/declaring activity' to consider. As Raymond Cocks (p. 1258) (2004) points out in his short biography of Lord Westbury, the judgment in *Tipping* is a reflection of a brilliant legal professional at the height of their judicial powers, articulating rules of neighbourly propriety, which hold true today.

A second group of examples that highlights this dual function of nuisance law, in both articulating neighbourly legal norms and proofing technological fixes to neighbourhood pollution concerns alkali works. Knowing of the technical difficulty of manufacturing chemicals in compliance with nuisance law, in 1836, William Gossage patented the 'Gossage Tower'. This was a technique of condensing hydrochloric acid gases within a factory chimney that substantially mitigated the mischief of which neighbours had complained. That and other variations invented to comply with the common law gained the confidence of industry to the extent that, by 1860, many (and perhaps the majority) of works condensed emissions (again without any regulatory law requirement to do so) (Royal Commission on Noxious Vapours 1878).

While the industry was sufficiently profitable to bear the substantial costs of inventing, installing, and operating this clean technology (Pontin 2013a: 191), and indeed to derive some profit from recovered sulphur waste, this was not a case of technological change driven by market forces. Industry faced the 'Hobson's choice' of cleaning up or closing

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down operations in the neighbourhoods where they were sued. Their choice of the former was a submission to judicial principles of the good neighbour, with instrumental implications in terms of providing a gateway to statutory regulation in which the 'common law technology' was standardized through government inspection.

A third group of historic illustrations of common law clean technology concerns town drainage. Disposal of raw sewage was arguably the defining environmental and public health catastrophe of the nineteenth century, with London's 'Great Stink' replicated on a provincial scale throughout Britain (Wohl 1984). The Brenner/McLaren account depicts the scale of the sewage problem as too great for the common law of nuisance even to begin to resolve (Brenner 1974: 432). However, a dramatically different account has emerged in recent years, stemming initially from Leslie Rosenthal's contextual study of *Attorney General v Birmingham Corporation* (Rosenthal 2007). Claimant and defendant archives contain records, which demonstrate that the parties enforced this injunction over a period of 37 years of suspensions and stays of execution, and £500,000 worth of clean infrastructure investment on the part of the local corporation. It only ceased when the claimant was satisfied that the defendant had perfected a means of purification of urban effluent that had polluted the River Tame and the estate that it ran through. Equipped with this sewage treatment technology, the corporation was able discharge up to 40,000,000 gallons of largely purified water daily into the river (Pontin 2013b).

I have elsewhere argued that Adderley's litigation was the beginning of an orchestrated nationwide common law campaign to clean up sewage effluent discharged to inland waters through technological innovation (Pontin 2013b: 51–57). That is based, in part, on a Local Government Board inquiry, which reported in 1873 (Local Government Board 1873), and which listed over a hundred local authority sewage (p. 1259) undertakings that took out loans to pay for experiments into techniques for cleaning up their sewage so as to abate nuisance. Councils were borrowing collectively over £1 million (billions in today's currency values) to fund experiments with sewage purification involving three broad techniques for sewage treatment: sewage farms, sewage precipitation, and sewage filtration. The considerable engineering intelligence behind these technologies is discussed in detail in Rosenthal's important book on the impact of nuisance litigation on England's local sewage authorities (Rosenthal 2014).

Once again, this technological innovation occurred before Parliament regulated rivers pollution under the Rivers Pollution Prevention Act 1876 (albeit that Bills had been debated for some time). And, once again, there is more to this litigation for present purposes than 'just' the proofing of a technological fix, sufficient to persuade Parliament that pollution of this and other sorts was avoidable, and legislation apt. The litigation raised sophisticated doctrinal issues. Thus, the 'great Birmingham Corporation case' (as it is celebrated by Lord Carnwath (2014: 178)) was 'great' in terms not only of its social impact, but also Knight Bruce VC's crafting of an ingenious equitable approach to the terms of which injunctions would be awarded against polluting utilities that could not be closed down without huge mischief to the nation. It involved the use of suspended injunctions, so as to give the claimant an expectation that they would in reasonable time secure a practical

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remedy for pollution on the one hand, while allowing the defendant the time and space to invent that remedy on the other. The 'simple' principle here is that of neighbourly reciprocity.

The above pattern of common law clean technology has continued in the twentieth and twenty-first centuries. For example, the flue gas desulphurization technology that is increasingly used in one guise or another in fossil fuel power stations (and indeed other large combustion plant emitting acid gases of this kind) was initially piloted by Manchester Corporation Electricity Department in response to Arthur Farnworth's 1920s nuisance claim (upheld by the House of Lords in *Farnworth v Manchester Corporation*) (Pontin 2013b: 105). The Corporation chose not to permanently fit this prototype to its Barton works (preferring the cheaper option of buying off the claimant and building taller chimneys), but its chief engineer—Leonard Pearce—moved to London to take control of Battersea Power Station. He adopted the Manchester technology at this power station in 1930 (Pontin 2013b: 124–125).

More recently, noise nuisance has emerged as major societal concern comparable to sewage and smoke in Victorian and Edwardian times. The common law has once again been at the forefront of technological innovation. In *Halsey v Esso Petroleum*, the threat of an injunction in respect of noise from the engines of heavy goods vehicles elicited the following response from the defendant's research and development department: a fibreglass engine compartment noise insulation prototype (Pontin 2013b: 150). This technology in one form or another is now archetypical. Likewise, it is understood that noisy buildings have been redesigned in order to comply with nuisance law, such as the extraordinary high-rise Beetham Tower visible from Salford University (the roof of which has been retrospectively fitted with (p. 1260) a device aimed at mitigating the whistling of wind—the result of a noise nuisance complaint) (*Manchester Evening News* 2012).

This evidence is politically delicate, for the invention of clean technology within the framework of private property appears closely to support Hayek's theory of 'spontaneous order' (Ogus 1989), associated with neo-liberal political thought. However, Hayek's libertarian idea of order through the enforcement of common law property rights presupposes that these rights are easily alienable, with trade in them the basis of a pricing mechanism for allocating land use. These examples do not easily fit that paradigm. Elite landed claimants in the nineteenth century were tenants for life of settled land, on trust for their heirs, with limited means to sell that land in an open market. And in the twentieth century, in the cases noted above, the claimants were tenants whose interests in land were also not easily tradeable. Thus, while nuisance law does indeed constitute a form of private ordering, it is not as such, or largely, a market mechanism; sometimes it is the opposite—in the sense of being 'coercive' (Steele 1995).

In challenging the old orthodoxy regarding nuisance law's failures, it is not necessary to exaggerate the importance of tort in this field. It would be incorrect to suggest that nuisance law has ever been, or ever will be, a comprehensive remedy for pollution, or that anyone would wish it to be. Brenner and McLaren are right to highlight large sectors of

the population in the past—and to some extent the present—for whom the common law was (or is) institutionally speaking a dead letter. For this and other reasons, Ogus is surely correct in his general assessment of current nuisance law as ‘manifestly inadequate as a general instrument of pollution control in an industrial society’ (Richardson, Ogus, and Burrows 1982: 30). However, nuisance law has cleaned up polluting technology through unleashing the forces of invention in certain private and public enterprises, generating technological prototypes, and it has done so through a carefully honed application of the basic ethic of reciprocity. On the other hand, Ogus is also too quick to reject a comparable ‘dynamism’ within command-and-control regulation.

3. Prototype and Archetype in Pollution Abatement Technology: Smith and Fletcher’s ‘Elastic Band Theory’

This section examines the contribution of environmental regulation to the invention of progressively clean industrial production processes. It identifies a commitment (p. 1261) on the part of the nineteenth-century Alkali Inspectorate, operating within the framework of Alkali Acts 1863–1906, to push the frontiers of clean technology, independent of—and in addition to—that achieved by neighbours enforcing nuisance law. The earliest technology-based controls over industrial pollution are those contained in the Alkali Act 1863 (Vogel 1986). This required alkali works to condense hydrochloric acid gas under supervision of central government inspectors. An amendment to this Act in 1874 introduced a requirement for registered works to employ BPM to prevent pollution of air. This criterion was extended under further legislation in 1881 to the abatement of pollution of water and land. This is the world’s earliest example of integrated pollution control (Pontin 2007). These are quintessential ‘specification standards’, as noted at the outset of this chapter. BPM remained a core standard of UK pollution control until the Environmental Protection Act 1990, which replaced it with the European standard of ‘best available techniques not entailing excessive costs’ (BATNEEC) (and subsequently plain BAT). The pertinent criticism to which minimum standards of production processes have been widely subject is that they are a disincentive to technological innovation. This was reflected in the 1990s with the popular (in environmental law circles) quip that BATNEEC in practice meant CATNIP (cheapest available technology not incurring prosecution). If that criticism is fair, then in light of the analysis above, it would imply that society is rather reliant on nuisance law for creative improvements to clean technology archetypes.

Ogus and others advance the *prima facie* attractive argument that it would be perverse for a corporation to conduct time-consuming and costly experiments leading to a possible piloting of improved technology that could render the existing archetype obsolete (Richardson, Ogus, and Burrows 1982; Robinson 1998). That argument would have less force were regulated enterprises expressly required, or regulators mandated to, push the frontiers of what is technologically possible, but they are not (at least not explicitly). In the various statutory formulations of BPM–BAT, competent authorities must at most keep

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abreast of advances in technology. They are under no formal obligation to encourage or even facilitate them. Creativity thus appears to be lacking, at least on the face of the formal regulatory law framework. By contrast, commentators in other disciplines have argued that regulation of this kind can unwittingly inspire innovation. Mostly they have done so on the basis of business self-interest (Desrochers and Haight 2014). Self-interest here has many rationalizations, including the 'first mover advantage', according to which a business can profit by anticipating tightening in technology-based standards (and that it is consequently economically rational to innovate in such circumstances).

The remainder of the chapter centres on the scope for regulatory bodies to interpret their discretion as including a mandate for 'creative inspection', with a similar outcome to the clean technologies invented to comply with nuisance law. The focus is on the practice of the Alkali Inspectorate, throughout its incredibly long history (1864–1987). From the beginning, the Inspectorate interpreted BPM as imposing on the inspector a three-pronged duty:

(p. 1262)

1. to ensure adoption throughout prescribed industries of standardized abatement technologies and techniques;
2. to research progressively cleaner technologies; and
3. to ensure adoption of proven cleaner technologies.

In particular, the first Chief Inspector, Dr Angus Smith, wrote about the importance of prototype as much as archetype in academic papers, official reports and evidence to public inquiries in the nineteenth century (Smith 1876a, 1876b; Royal Commission on Noxious Vapours 1878). Smith and his fellow inspector Alfred Fletcher (Smith's successor as Chief Inspector) developed a concept of BPM being:

more binding than a definite [environmental quality] figure, even if that could be given, for it is an elastic band, and may be kept always tight as knowledge of the methods of suppressing the evils complained of increases.

(Royal Commission on Noxious Vapours 1878; Ashby and Anderson 1981: 40)

Never defined in the Alkali legislation, or litigated before the courts, the meaning of BPM throughout its history was that given to it by the Inspectorate (Frankel 1974: 46; Guruswamy and Tromans 1986: 646). Keith Hawkins's analysis of this kind of discretionary standard setting in a slightly different context (the discharge consent regime under rivers pollution legislation) is apposite: 'not only ... do the agencies possess power to enforce the law, they actually exercise real legislative authority' (1984: 23).

Early inspectors' norms guiding (and indeed emerging from) day-to-day 'executive legislation' are reported in the Chief Inspector's Annual Reports. They are particularly interesting, in how they convey a belief in the dynamism of regulation, pushing the frontiers of clean technology. Ashby and Anderson comment on Fletcher in particular having rejected binding emission limit figures provided for under the Alkali Act 1863 because 'fixed emis-

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sion limits deter manufacturers from improving their techniques for abating pollution and offer no spur to further research' (Ashby and Anderson 1981: 90). He preferred progressively tighter 'presumptive standards', set by regulators at their discretion, with reference to an expert—and privileged—understanding of ongoing improvements in the state of the art of production process standards. However, Smith arguably had the deepest commitment to the notion of ever-tightening standards of clean technology/techniques.

In an illuminating passage in Smith's evidence before the Royal Commission on Noxious Vapours 1878, the Chief Inspector reflected on a specific scenario where the current regulatory archetype was outdated, and capable of refinement. The following passage reflects the assumption of an inspectorate mandate to take the lead in technological innovation in such circumstances:

(p. 1263)

[I]t seemed to be that, so long as this imperfect apparatus was in operation, it was quite necessary that the responsibility for the difficulty of the condensation should be borne by the inspector ... If the time comes (and I believe it will come very soon) when a furnace can be made which is not subject to these weekly and almost hourly accidents, then I believe that the responsibility will be taken off the inspector to a large extent, and will be thrown onto the manufacturer.

(Royal Commission on Noxious Vapours 1878: Q.152)

On that reasoning, the Inspectorate's role was iterative. It was to prescribe and perfect a clean technology prototype, and to revisit the issue periodically. Industry was on this account a passive recipient of technological innovation for which the Inspectorate was responsible.

While it is evident that Smith saw basic science and technological research as fundamental to the regulatory 'job', and while industry appears to have seen it that way too (Warren 1980), the Treasury took a different view, at least initially. It is clear from Whitehall records that the Inspectorate's paymasters had initially understood inspection to be purely as a matter of policing rules, rather than anything more creative (in terms, say, of researching the scientific basis of a tightening of rules) (McLeod 1965: 99). That was evident in the modest remuneration government inspectors received in the early days. That changed as Smith persuaded the Treasury that the work of inspectors was exceptionally dynamic, involving expert research and development work, alongside policing. Smith received a considerable salary rise. On top of this, he was usually able to secure Treasury funds for laboratory space and equipment to advance test and prove clean technology (McLeod 1965: 99).

This was in addition to the increasingly liberal use that the Inspectorate made of growing numbers of scientists and laboratory facilities employed by industry, which at the very outset of regulation was minimal: 'When the Alkali Act was introduced, few of the alkali makers had good laboratories, still fewer had chemists' (Smith 1876a: 2). Through his

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role as Chief Inspector, Smith sought to create a culture of technological innovation within industry. This was built around a regulatory strategy of educating employees in the science of clean technology (now called a 'compliance strategy'). Thus, Smith likened the role of the inspector to the physician—someone who works with a patient so that their health may prosper. The physician, of course, has a most intimate role, built around expertise and strict confidence—qualities that have always been in tension with wider stakeholder expectation that regulation would be transparent and independent of industry (Frankel 1974; Garwood 2004).

Smith's reports express satisfaction at the practical fruits of his regulatory model in terms of facilitating technological innovation. Reflecting on the 'problem' of the lay character of the chemical industry at the beginning of the era of inspection, Smith commented with pride that 'now things are entirely changed' (1876a: 3). (p. 1264) Smith depicted a hive of innovation within the industry's newly equipped experimental laboratories, where in-house chemists and government inspectors worked together on cutting edge ideas: 'the frequent entrance of the Inspector has caused him to be watched, imitated, or criticised, and nothing is commoner than comparison of results with him' (Smith 1876a: 2). McLeod makes a telling point when he attaches significance to the fact that, on Smith's death the highest tributes came from the industrialists he regulated, who praised his co-operation, work ethic and the benefits they obtained from his astute scientific mind (1965: 111). The landlords whose 'lobby' led to the original Alkali Bill also praised Smith (Royal Commission on Noxious Vapours 1878).

Less is understood, or documented, of Smith's regulatory practice in the field of rivers pollution. This was different from his Alkali Act remit in that, first, it involved public sector regulated enterprise (local authorities were major polluters of rivers), and, second, it did not place as much emphasis on BPM.¹ Nevertheless, his report to the Local Government Board of 1881 is in the same style as his Alkali Act reports. It begins by asserting a mandate to undertake basic scientific research into the science of river pollution abatement technology (Smith 1881: 5).² Over 100 pages are spent summarizing the findings of personal scientific inquiry dating back to 1846. The findings are presented as original and ongoing, and indeed it is the avowed function of the report to provide a benchmark for a further 'ripening the mind', providing scientific and technological insight 'of use on the road of progress' (Smith 1881: 5). Sewage purification techniques are the main focus of Smith's pioneering research, with Smith presenting his findings on matters, for example, of 'aeration' and 'mechanical separation'.

The assumed mandate to innovate in these and other ways persisted to the last days of the Inspectorate, albeit with some modification. According to the Royal Commission on Environmental Pollution, the inspectors of the 1970s no longer carried out research themselves, 'although they occasionally sponsor it' (Royal Commission on Environmental Pollution 1974: [89]). Crucially, however, they continued to view their mandate as one of having input into research and development undertaken by industry: 'research is normally carried out by the industry concerned with the Inspectorate making suggestions and generally holding a watching brief' (Royal Commission on Environmental Pollution 1974:

[89]). This reflects the success of the early regulatory policy of nurturing in-house expertise (McLeod 1965: 107–108).

Interestingly, the justification offered for overseeing rather than initiating innovation was the emerging ‘“polluter pays” concept’ (Royal Commission on Environmental Pollution 1974: [89]). This is too simplistic. There were other important factors behind a withdrawal from Smith and Fletcher’s early ‘hands-on’ practice, as explored in the next section, within the framework of ‘generalized voluntarism’ applied to an industry of particular importance: cement.

(p. 1265) 4. Generalized Voluntarism in the Context of the Cement Industry

Between 1864 and 1900, the number of industrial processes regulated by the Alkali Inspectorate increased tenfold, with roughly a thousand large industrial facilities were under the Inspectorate’s supervision at the turn of the twentieth century. This growth in the number of enterprises within the body’s remit placed strain on Smith and his successor Chief Inspector (Fletcher) and their style of elastic and creative engagement with ever cleaner technology. However, there were other factors, which made it difficult to sustain the early regulatory style. This section identifies these factors with reference to a case study of cement industry regulation.

Unlike the chemical industry, this industry was ‘old’, which meant that it had established ways of doing things, including customary processes that operators were used to pursuing with freedom from inspection. Smith may or may not have known that the industry had proved resistant to the kind of technological fixes conceived in the fields of copper and chemicals, in response to nuisance complaints. Indeed, in an important slant on the problem of voluntarism, nuisance claimants in this field appear not to have been deterred by the costs of litigating, but by intimidation on the part of the industry. Prospective claimants gave evidence before the Royal Commission on Noxious Vapours of cement works of employees bullying them into desisting with their claims through physical threats (Royal Commission on Noxious Vapours 1878: Q 8637).³ Sometimes (as in an action against Messrs John Bazely White and Co, an enormous cement works with 25 chimneys) the parties ‘agreed’ an ex-post settlement in which the polluted land was acquired by the tortfeasor (Royal Commission on Noxious Vapours 1878: Q 8721)—very different from abating pollution through cleaner technology.

The scene, then, was set for the Inspectorate taking a unique opportunity to blaze a trail of clean technology. Smith approached the task with typical zeal and efficiency, in readily securing government support for bringing the industry within remit of the Inspectorate, under the 1881 Act. Smith sought, and obtained, a power of pure inspection only, rather than a power to inspect with reference to BPM. This was because BPM did not exist.

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Thus, the purpose of inspection was therefore fundamentally one of innovation. It was to assist in the development of BPM.

However, the Inspectorate greatly struggled to facilitate the next step, or steps, in the cycle of inventing a novel process that could be standardized across industry. Smith was surprised at how backward thinking the cement industry was, when compared to the chemical industry. In one of his final annual reports (published in 1883, the year before his death), he criticized the medieval design of cement works' furnaces and chimneys, taking the form of 'short cones with greater apertures vomiting smoke which flows over the ground in heavy streams' (Smith 1883: 20). (p. 1266) The problem was compounded by the thoughtless use of salt water and salty clay in the manufacturing process. This caused the emission of highly noxious hydrochloric acid gas. Smith 'the fixer' reported with as much a sense of weariness as pride that 'I originated a substantial improvement', by designing a fresh water process (Smith 1883: 20).

Smith's successor, Fletcher, initially embraced the challenge of the clean-up of cement processes with enthusiasm and acuity. He showed interest in the electrostatic precipitation of gas and dust as a potential BPM for this industry (and others), which academic physicist Oliver Lodge conducted in respect of a lead works in Chester (in 1886) (Ashby and Anderson 1981: 111; LeCain 2000). However, Fletcher does not appear to have prioritized the realization of this potential, and it was 50 years (and a succession of new chief inspectors) before the Inspectorate was satisfied that this technology was practicable. It became BPM for the cement industry in 1935 (Ashby and Anderson 1981: 101). The Inspectorate suffered in the eyes of the public as a consequence of the delay.

Ashby and Anderson commented in their retrospective on the Inspectorate on how the cement industry became a 'whipping post ... to which the public like to tie the Inspectorate' (Ashby and Anderson 1981: 134). The authors offer a sympathetic defence of the Inspectorate, in mentioning that: 'the inspectors have to strike a balance between the need for cement and the discomfort to people' (Ashby and Anderson 1981: 134). However, this is generous to Smith and Fletcher's successors, for they arguably substantially underestimated the extent and the legitimacy of public frustration with cement pollution at this time, and with its regulation.

With a small full-time staff (about ten)—and no administrative system for dealing with public complaints—the Inspectorate often experienced criticism being channelled through the political representatives of Parliamentary constituents struggling to survive in chronically polluted cement works localities. Consider, for example, the letter from two Kent 'housewives', read out in the House of Commons by Dartford MP Sydney Irvine:

The cement dust comes over in billowing grey clouds, descends like a fog, coating pavements and cars and smothering gardens and fields. We have heard the same story, not only from housewives, but also from the staff of four local hospitals, shopkeepers, café and public house proprietors, who all complain bitterly about the unceasing struggle to keep food and premises free from cement dust. It creeps into food and crockery cupboards, smothers vegetables, flowers and trees in the

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gardens, ruins paintwork and soft furnishings, fills gutters and clogs the drains, and spoils the housewives' family wash. It is accompanied by a vile sulphurous smell, and at night windows have to be kept closed—but still the dust and smell penetrate.

(House of Commons Debate 13 June 1962, col 342)

In terms of environmental pollution on a grand scale this reads like testimony of nineteenth-century witnesses of pollution, except that the complainants at this time are not of the landed gentry speaking through land agents, but urban and suburban people speaking through their MP. This was the very 'public' that the architects (p. 1267) of the Alkali Acts had in mind in enacting public interest controls on polluting industry.

Irvine drew to Parliament's attention a residents' petition calling for tougher regulation, with 13,500 signatures. The spokesman (F V Cofield) for the Housing and Local Government Ministry responded by calling for the local petitioners to maintain its trust in the Inspectorate (House of Commons Debates, 13 June 1962, col 344). Thanks to the Alkali Act regime, it was explained, Britain had 'pioneered' electrostatic precipitation, as 'a remarkably efficient device that traps a very high proportion of the dust in the flue gases' (ibid). The problem in the specific instance of the Kent cement industry at this time was 'technical'. It was that the works were using clay that had too much salt content for precipitation to work. Solving this problem would take time and require patience.

There are two aspects of the government's defence to consider here, first, concerning Britain's pioneering role in clean technology, and second, the 'technical' nature of the problem at the heart of public disquiet. Thus, regarding the Alkali Acts being credited with world-leading cement pollution abatement technology, this is only partly true. Fletcher had indeed (as above) witnessed what appears to have been the world's earliest experimental application of a prototype of this kind in the setting of a commercial industrial process, but he and subsequent chief inspectors were slow to appreciate its practicability, and slower still to secure its imposition as BPM in the face of resistance from the cement industry. This illustrates Frankel's contemporary criticism of industry calling the shots: '[i]ndustry has had little cause to engage in any serious conflict with the Inspectorate, for the system that has evolved serves it well. It can install pollution control equipment virtually at its convenience' (Frankel 1974: 46). The telling phrase here is 'evolved'—it started out very differently, with regulators in charge of the regulated, rather than vice versa.

Regarding the government's references to Kent folk being victims of a 'technical problem' in connection with acid gases, this again is only part of the full picture. The fundamental problem was more political than technical. Politics had not been a substantial factor in Smith's initial regulatory input in relation to cement pollution. He simply deduced from rudimentary chemical arguments regarding the effect on the atmosphere of the combustion of clay with a high salt content that cement works should use low salt clay. As there does not appear to have been any substantial difference in cost of high or low salt raw materials, there could be no possible objection on the part of industry to use of the cleaner raw material being, or becoming, normal practice. However, after decades of

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growth in the construction industry, low salt clay and fresh water had become increasingly scarce and the price differential between it and the 'dirtier' versions was growing ever greater. This is at the root of the local suffering of Kent residents living in the midst of the industry. Smith's formative question of 'how industry could avoid pollution purely technically speaking?', had through change in historical context become one of 'how could technically feasible clean technology be financed politically?' But the Inspectorate (p. 1268) was unwilling to acknowledge this to wider stakeholders, and perhaps even to itself. Instead, it perpetuated a convenient illusion that regulation was—as it was intended to be at its outset—a matter of implementing expertise of a technical nature.

Overall, the cement industry is a thought-provoking case study of limitations, affecting both nuisance law and regulation. Many of the various facets of voluntarism as a problem, or as a constraint, can be seen to be at play here. Regarding nuisance law, businesses intimidated private victims into desisting with threatened actions, and where that failed, they chose to pay to pollute (by acquiring the claimant's land) rather than clean up. Faced with the prospect of unrelenting neighbourhood pollution, wealthy residents moved out and were 'voluntarily' replaced by those with less prospect of cleaning up the industry through private remedies. Later, one can imagine a nuisance claim supported by legal aid being contemplated by one of the many thousands of Kent petitioners, rather like that which enabled Thomas Halsey to clean up his locality in London (*Halsey v Esso Petroleum*; Pontin 2013b). Instead, the community placed faith in its political representative.

In terms of the Alkali Inspectorate, this approached initial regulation of this difficult industry bullishly, and secured 'low fruit' clean-up where that was available at no additional cost (eg use of low salt clay). However, inspectors were surprised to encounter intransigence when being cleaner entailed substantial financial investment on the part of industry. In addition, as the industry became increasingly central to the post-war economy—vital for clearing slums and rebuilding bomb-damaged towns and cities—they enjoyed the support of many sectors of Whitehall. Inspectors were thus subject to the problem of 'countervailing values' (McLaren 1983: 205–206).

5. Conclusions

The chapter has compared the contribution of nuisance law and regulation to the invention of 'practicable' pollution abatement technology, taking a largely historical approach. The chief conclusion is that it is difficult to justify a general view as to whether nuisance law or regulation is 'good' or 'bad', or fast or slow, at forcing the pace and direction of technological innovation. On this evidence, practice appears to differ from process to process, industry to industry, and from time to time. This is despite substantial continuity in formal law, with little fundamental change from the mid-nineteenth century to the present (either in nuisance law or in regulation).

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More specifically, if the contribution of the law were to be periodized, it is noteworthy that the Alkali Inspectorate was most resolute in its commitment to forcing and facilitating the invention of cleaner production processes in its early decades. (p. 1269) That is a surprise, for according to the leading historians of this body, early inspectors battled against an inauspicious social and economic milieu:

It is not difficult to imagine the obstacles Smith had to overcome. An isolated government official based in Manchester, with very little backing or guidance from his employers in Whitehall, 180 miles away; empowered to control emissions from a great and flourishing industry.

(Ashby and Anderson: 25)

In contrast, the argument above is that inspectors' biggest contextual constraints emerged in the twentieth century, when industry became less 'great and flourishing', and/or Whitehall meddled at every opportunity to ensure the immediate needs of economic growth were put before progressive pollution abatement.

One could begin to devise from this historical experience an—at this stage inevitably crude—'checklist' of 'conditions' necessary for process standard regulation to progressively shape clean technology, in parallel with nuisance law. This would include the following:

- financially comfortable regulated enterprise;
- benevolent enterprise leaders;
- public-service regulators with a reputation for world-leading scientific expertise; and
- superiors within the executive who trust in regulators' judgement.

The occurrence of these conditions 'in parallel' with nuisance is critically important. This is because at no stage in the period covered by this study has regulation facilitated prototypical pollution abatement techniques to the extent that tort has. For all Dr Smith's dogged experimentation in the pursuit of technical improvement, the outstanding single individual contribution lies arguably within the judiciary. Lord Westbury's reformulation of ancient rules of the 'good neighbour' in *Tipping* was then, and remains today, critical to remedying pollution in neighbourhoods (as in *Coventry v Lawrence*).

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Notes:

(1.) Under Part II of the Act, a sewage undertaking was prohibited from discharging solid or liquid effluent into rivers, subject to the defence that it had used 'the best practicable and available means to render harmless the sewage matter so flowing into the stream'. The use of 'practicable' and 'available' is interesting, but neither term was defined.

(2.) Rivers Pollution Prevention Act 1876: Report to the Local Government Board by Dr R Angus Smith (1881, Cm 3080), 5 ('I have brought forward several investigations which I hope will be found of value'). For Smith's contribution to science in this area, see Hamlin (2008).

(3.) Evidence, George Vulliamy: 'there is a large and growing population of workers connected with the cement works, and they are not the most agreeable people to live amongst, because when you threaten proceedings they mob you, blackguard you, and throw stones at your carriage'.

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