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## In the year 2061: from law to technological management

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This paper predicts that, by 2061, (non-normative) ‘technological management’ will co-exist with legal, moral and social norms as a significant regulatory instrument. Sometimes, technological management will be adopted for reasons of crime control; at other times, it will be employed (in the design of products and places) for reasons of health and safety, and environmental protection and the like. In order to monitor the use of technological management, it is suggested that an expansive concept of the ‘regulatory environment’ – a concept allowing for both normative and non-normative dimensions – should be adopted; and that a focal point for inquiry should be the ‘complexion’ of the regulatory environment, putting the spotlight on the shift from normative prescription of what ought or ought not to be done to non-normative specification of what can and cannot be done. The cornerstone ideas of, first, the ‘regulatory environment’ and, then, the ‘complexion’ of the regulatory environment are elaborated before an indication is given of the questions (such as questions about the application of the Rule of Law and the continuing relevance of traditional bodies of law) that invite further juristic attention once technological management takes hold.

**Keywords:** technological management; techno-regulation; the regulatory environment; the complexion of the regulatory environment; the Rule of Law

### 1. Introduction

In the year 2061 – just 100 years after the publication of HLA Hart’s *The Concept of Law*<sup>1</sup> – I imagine that few, if any, hard copies of that landmark book will be in circulation. The digitization of texts has already transformed the way that many people read; and, as the older generation of hard copy book lovers dies, there is a real possibility that their reading preferences will pass away with them. Still, even if the way that *The Concept of Law* is read is different, should we at least assume that Hart’s text will remain an essential part of any legal education? Perhaps we should; perhaps the book will still be required reading. However, my guess is that the jurists and legal educators of 2061 will view Hart’s analysis as being of limited interest; the world will have moved on; and, just as Hart rejects

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<sup>1</sup>HLA Hart, *The Concept of Law* (Clarendon Press, 1961; 2nd edn 1994).

the Austinian command model of law as a poor representation of twentieth-century legal systems, so history will repeat itself. In 2061, I suggest that Hart's rule model will seem badly out of touch with the use of modern technologies as regulatory instruments and, in particular, with the pervasive use of 'technological management' in place of traditional legal rules.<sup>2</sup>

Already, we can see how some of the most well-worn passages of Hart's commentary are beginning to fray. Recall, for example, Hart's evocative contrast between the external and the internal point of view in relation to rules (whether these are rules of law or rules of a game). Although an observer, whose viewpoint is external, can detect some regularities and patterns in the conduct of those who are observed, such an (external) account misses out the distinctively (internal) rule-guided dimension of social life. Famously, Hart underlines the seriousness of this limitation of the external account in the following terms:

If ... the observer really keeps austerely to this extreme external point of view and does not give any account of the manner in which members of the group who accept the rules view their own regular behaviour, his description of their life cannot be in terms of rules at all, and so not in the terms of the rule-dependent notions of obligation or duty. Instead, it will be in terms of observable regularities of conduct, predictions, probabilities, and signs ... His view will be like the view of one who, having observed the working of a traffic signal in a busy street for some time, limits himself to saying that when the light turns red there is a high probability that the traffic will stop ... In so doing he will miss out a whole dimension of the social life of those whom he is watching, since for them the red light is not merely a sign that others will stop: they look upon it as a *signal* for them to stop, and so a reason for stopping in conformity to rules which make stopping when the light is red a standard of behaviour and an obligation.<sup>3</sup>

To be sure, even in 2061, the Hartian distinction between an external and an internal account will continue to hold good *where it relates to a rule-governed activity*. However, to the extent that rule-governed activities are overtaken by technological management, the distinction loses its relevance; for, where activities are so managed, the appropriate description will no longer be in terms of rules and rule-dependent notions.

Consider Hart's own example of the regulation of road traffic. In 1961, the idea that driverless cars might be developed was the stuff of futurology.<sup>4</sup> However, today, with

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<sup>2</sup>In Part 3 of the paper, I will specify precisely how I understand 'technological management', how it relates to 'techno-regulation' (a term that I have frequently used in the past) and what my particular interest is in this phenomenon. For the moment, it suffices to conceive of technological management as the use of a technological fix (applied to the design of products or places) so that it is not possible to do some act *x* which, in the absence of this strategy, might be subject only to rule regulation.

<sup>3</sup>Hart (n 1) 89–90.

<sup>4</sup>See Isaac Asimov, 'Visit to the World's Fair of 1964' *New York Times* (16 August 1964) (<http://www.nytimes.com/books/97/03/23/lifetimes/asi-v-fair.html>). According to Asimov:

vehicles such as Google's driverless car<sup>5</sup> at an advanced stage of development – and, apparently, perfectly capable of transporting passengers safely along Californian free-ways<sup>6</sup> – things look very different. Indeed, it seems entirely plausible to think that, before too long, rather than being seen as 'a beckoning rite of passage', learning to drive 'will start to feel anachronistic' – for the next generation, driving a car might be comparable to writing in longhand.<sup>7</sup> At all events, by 2061, in the 'ubiquitous cities'<sup>8</sup> of that time, if the movement of vehicles is controlled by anything resembling traffic lights, the external account will be the only account; the practical reason and actions of the humans inside the cars will no longer be material. By 2061, it will be the lights, in conjunction with each vehicle's on-board technologies, that control the movement of the traffic<sup>9</sup> – on the roads of 2061, traffic control will have overtaken traffic commands; vehicles will be, so to speak, designed and engineered for compliance; and technological management will have superseded legal rules.<sup>10</sup>

These remarks are not an ad hominem attack on Hart; they are of general application. What Hart says about the external and internal account in relation to the rules of the road will be seen as emblematic of a pervasive mistaken assumption made by twentieth-century jurists – by Hart and his supporters as much as by their critics. That mistake of twentieth-century jurists is to assume that rules and norms are the exclusive keys to social ordering. By 2061, rules and norms will surely still play some part in social ordering; and, it might still be appropriate to insist that all conceptions of law should start with the Fullerian premise that law is the enterprise of subjecting human conduct to the governance of rules.<sup>11</sup> But, by 2061, if we are to facilitate the pursuit of our cognitive interest in the exercise of power, in the channelling of human conduct,

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'Much effort will be put into the designing of vehicles with "Robot-brains" vehicles that can be set for particular destinations and that will then proceed there without interference by the slow reflexes of a human driver. I suspect one of the major attractions of the 2014 fair will be rides on small roboticized cars which will maneuver in crowds at the two-foot level, neatly and automatically avoiding each other.'

<sup>5</sup>See Eric Schmidt and Jared Cohen, *The New Digital Age* (Alfred A Knopf, 2013) at 25: 'Google's fleet of driverless cars, built by a team of Google and Stanford University engineers, has logged hundreds of thousands of miles without incident ...'

<sup>6</sup>See Erik Brynjolfsson and Andrew McAfee, *The Second Machine Age* (WW Norton & Co, 2014) Ch 2. It seems that, for the sake of 'safety', driverless cars will even have the capacity to exceed the legal speed limits by up to 10 mph: see James Dean, 'Driverless Cars are Hardwired to Speed', *The Times* (22 August 2014) 11.

<sup>7</sup>Jaron Lanier, *Who Owns the Future?* (Allen Lane, 2013) 349.

<sup>8</sup>See, eg, Jane Wakefield, 'Building Cities of the Future Now' BBC News Technology, 21 February 2013, <<http://www.bbc.co.uk/news/technology-20957953>> accessed 1 June 2014.

<sup>9</sup>Indeed, it seems more than likely that such technological features will be operating long before 2061: see Tom Whipple, 'Talking Traffic Lights Mean Drivers Won't See Red Again' *The Times* (4 April 2015) 35.

<sup>10</sup>Compare Pat O'Malley, 'The Politics of Mass Preventive Justice' in Andrew Ashworth, Lucia Zedner and Patrick Tomlin (eds), *Prevention and the Limits of the Criminal Law* (Oxford University Press, 2013) 273.

<sup>11</sup>Lon L Fuller, *The Morality of Law* (Yale University Press, 1969).

and in the ordering of social life, we will need to revise and renew our thinking about the field of jurisprudence as well as the rule-based understanding of the regulatory environment that currently prevails.

Given the present trajectory of modern technologies, it seems to me that technological management (whether with driverless cars, the Internet of Things or bio-management) is set to join law, morals and religion as one of the principal instruments of social control. To a considerable extent, technological infrastructures that support our various transactions and interactions will structure social order. Arguably, the rules that populate our law books will need to take less of the regulatory strain; indeed, some might predict that the domain of law is set to shrink. And this all has huge implications for a jurisprudence that is predicated on the use of rules and standards as regulatory tools or instruments. It has implications, for example, for the way that we understand the virtue of legality and the Rule of Law; it bears on the way that we understand (and value) regulatory coherence; and it calls for some re-focusing of those critiques of law that assume that power is exercised primarily through coercive rules. To bring these issues onto the jurisprudential agenda, we must enlarge the field of interest; and I suggest that we should do this by developing a concept of the regulatory environment that accommodates both rules and technological management – that is to say, that facilitates inquiry into both the normative and the non-normative dimensions of the environment. With the field so drawn, we can begin to assess the changing complexion of the regulatory environment, its significance for traditional legal values and the fate and future of those bodies of law that have served as the mainstays of traditional normative legal orders.

In this paper, I introduce the prospectus suggested by the development of technological management as a regulatory tool, highlighting two of the cornerstone ideas of this proposal: one is a broad understanding of the regulatory environment that will serve to frame our inquiries; and the other is the idea of the ‘complexion’ of the regulatory environment as a particular focus for our inquiries. The paper is in six principal sections. First, inspired by one of Ian Kerr’s examples of technological management,<sup>12</sup> I explain the direction of regulatory travel by considering how GPS technologies can immobilize golf carts in a way that frustrates joy-riding trespassers as well as protecting the greens and other parts of the golf course. Second, I specify how I understand ‘technological management’, how it relates to ‘techno-regulation’ (a term that I have frequently used in the past) and what my particular interest is in this phenomenon. Third, I draw out the way in which the adoption of a narrow concept of law can inhibit the elaboration of a jurisprudence that takes into account both a broad range of normative orders as well as (and, critically, for present purposes) non-normative technological control. In this part of the article, I suggest that we need to release our inquiries from these inhibitions, specifically

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<sup>12</sup>Ian Kerr, ‘Digital Locks and the Automation of Virtue’ in Michael Geist (ed), *From ‘Radical Extremism’ to ‘Balanced Copyright’: Canadian Copyright and the Digital Agenda* (Irwin Law, 2010) 247.

framing our inquiries in terms of a ‘regulatory environment’ that recognizes both normative ordering and non-normative technological management. Fourth, I sketch briefly what a regulatory environment of this kind might look like, before filling in some of the detail by mapping the salient features of regulatory environments that are purely normative and then extending the analysis to include environments that are technologically managed. In this part of the article, I endeavour to respond to a number of questions about tensions with these environments, about where exactly the boundaries of the environment are located and about whether technological management can be coherently regarded as a species of ‘regulation’. Fifth, as a particular focus for our inquiries, I outline the idea of the ‘complexion’ of the regulatory environment, highlighting the significance of changes that take place in the regulatory signals as technological management is employed. Finally, having argued that we (lawyers) need to adopt a broad notion of the regulatory environment to frame our inquiries in relation to the use of technological management, having elaborated on the idea of such an environment that operates with both normative and non-normative strategies and having introduced the idea of the complexion of the regulatory environment as a principal critical tool for engaging with technological management, I identify some of the further items on the agenda for those who accept the invitation to engage with the development and application of technological management in these transformative times.

## **2. Golf carts and the direction of regulatory travel**

At the Warwickshire Golf and Country Club, there are two championship 18-hole golf courses, together with many other facilities, all standing (as the club’s web site puts it) in ‘456 flowing acres of rolling Warwickshire countryside’.<sup>13</sup> The club also has a large fleet of golf carts. However, in 2011, this idyllic setting was disturbed when the club began to experience some problems with local ‘joy-riders’ who took the carts off the course. In response, the club used GPS technology so that ‘a virtual geo-fence [was created] around the whole of the property, meaning that tagged carts [could not] be taken off the property’.<sup>14</sup> With this technological fix, anyone who tries to drive a cart beyond the geo-fence will find that it is simply immobilized. In the same way, the technology enables the club to restrict carts to paths in areas which have become wet or are under repair and to zone off greens, green approaches, water hazards, bunkers and so on.

Let me highlight three points about the technological fix applied at the Warwickshire. These are points respectively about the practical redundancy of the criminal law, about the impact on the responsibility (and accountability) of agents for their actions and about the disruption of the regulatory signals.

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<sup>13</sup>See <[www.thewarwickshire.com](http://www.thewarwickshire.com)> accessed 27 April 2014.

<sup>14</sup>See <<http://www.hiseman.com/media/releases/dsg/dsg200412.htm>> accessed 27 April 2014.

First, to the extent that the activities of the joy-riders were already rendered 'illegal' by the (ineffective) criminal law, the use of technological management (effectively) rendered the illegal acts 'impossible'. Acts that previously were illegal but possible now continue to be illegal but they are impossible. The legal coding remains relevant to the legitimacy of the technological fix but, for all other practical purposes, the law is redundant.

Second, technological management at the Warwickshire guarantees that the carts are used responsibly by both members and prospective joy-riders. However, to the extent that the technological fix limits the use of the carts, they are no longer used in a way for which users are responsible.

Third, regulators – whether responsible for the public rules of the criminal law or the private rules of the Warwickshire – might employ various kinds of technologies that are designed to discourage breach of the rules. For example, the use of CCTV surveillance and DNA profiling signals that the chances of detecting breaches of the rules and identifying those who so breach the rules is increased. However, this leaves open the possibility of non-compliance and falls short of full-scale technological management. With technological management, the regulatory signals are radically disrupted; there is no option other than 'compliance'. In other words, the technological fix applied at the Warwickshire changed the 'complexion' of the regulatory environment. Prescription and prohibition were replaced with impossibility; and both prudential and moral signals were overtaken by a signal that said to regulatees, 'you cannot do this; you *really* cannot do this.'

At the Warwickshire, the GPS technology was applied as a measure of crime control; but it could also be applied for health and safety reasons (for instance, to prevent carts colliding with one another or injuring club members) as well as for 'environmental' purposes (such as protecting the greens). This suggests two tracks in which we might find technological management being employed; and my sense is that each will contribute to the overall direction of regulatory travel.

The first track is that of the mainstream criminal justice system. As the offences committed by the joy-riders remind us, those criminal laws that are intended to protect person and property are less than entirely effective. In an attempt to improve the effectiveness of these laws, 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?<sup>15</sup> For those who despair that 'nothing works', technological management seems to be the answer.

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<sup>15</sup>For a range of reflections on ex ante preventive (as opposed to ex post punitive) approaches, see Andrew Ashworth, Lucia Zedner and Patrick Tomlin (eds), *Prevention and the Limits of the Criminal Law* (Oxford University Press, 2013).

The other track is one that focuses on matters of health and safety, conservation of energy 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 which regulators tried to manage by introducing health and safety rules.<sup>16</sup> The main instrument of risk management was a body of ‘regulatory’ criminal laws, characteristically featuring absolute or strict liability. Quite how this body of law relates to the classical criminal code is a matter for debate.<sup>17</sup> At all events, 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.<sup>18</sup> In each case, technological management, rather than the rules of law, promises to bear the regulatory burden.

Driven by the imperatives of crime prevention and risk management, technological management promises to be the strategy of choice for public regulators of the present century.<sup>19</sup> For private regulators, too, technological management has its attractions – and nowhere more so, perhaps, than in those online environments that will increasingly provide the platform and the setting for our everyday interactions and transactions. Still, if technological management proves effective in preventing crime and, at the same time, contributes to human health and safety as well as protecting the environment, is there any cause for concern?

In fact, the rise of technological management in place of traditional legal rules might give rise to several concerns. For example, some might fear that, in our quest for greater safety and well-being, we will develop and embed ever more intelligent devices to the point that there is a risk of the extinction of humans – or, if not that, then a risk of humanity surviving ‘in some highly suboptimal

<sup>16</sup>Compare, eg, Susan W Brenner, *Law in an Era of ‘Smart’ Technology* (Oxford University Press, 2007) (for the early US regulation of bicycles).

<sup>17</sup>See, eg, Peter Ramsay, ‘The Responsible Subject as Citizen: Criminal Law, Democracy, and the Welfare State’ (2006) 69 *Modern Law Review* 29. However, the strictness of regulatory offences may be mitigated in practice by enforcement policies that restrict prosecutions to those cases where the offender is actually morally culpable. Classically, see W Carson, ‘White Collar Crime and the Enforcement of Factory Legislation’ (1970) 10 *British Journal of Criminology* 383.

<sup>18</sup>See, eg, Giuseppe Bellantuono, ‘Comparing Smart Grid Policies in the USA and EU’ (2014) 6 *Law, Innovation and Technology* 221.

<sup>19</sup>Compare Andrew Ashworth and Lucia Zedner, *Preventive Justice* (Oxford University Press, 2014). Although Ashworth and Zedner raise some important ‘Rule of Law’ concerns about the use of preventive criminal measures, they are not thinking about technological management. Accordingly, at p 20, they define a measure as preventive ‘if it is created in order to avert, or reduce the frequency or impact of, behaviour that is believed to represent an unacceptable risk of harm’.



state or in which a large portion of our potential for desirable development is irreversibly squandered'.<sup>20</sup> Even if we discount various kinds of catastrophe scenarios, and even if technological management is reliable and effective, as jurists, we should question the fate of the law, its practitioners, its institutions, its culture and its values. Moreover, for all agents, we should ask whether technological management, with its reduction of options, signifies a diminution of our legitimate interest in autonomy; and, to repeat a question that I have posed on many occasions, we should ask whether there is a risk that technological management might compromise the conditions for *any kind of* moral community.<sup>21</sup>

As the paper proceeds, and particularly in Part 6, I will revisit some of these questions. However, the next step is to specify more precisely what I mean by 'technological management', how it relates to 'techno-regulation' and why these regulatory phenomena are of interest.

### 3. Technological management, techno-regulation and some causes for concern

The focus of this paper is 'technological management', as exemplified by driverless cars and the GPS fix applied to golf carts at the Warwickshire. 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. Yet, in many other papers, I have used the term 'techno-regulation' to flag up my interest in the use of technological fixes.<sup>22</sup> Is 'technological management' to be distinguished from 'techno-regulation'? If so, how and why?

When I have previously written about what I have called 'techno-regulation', my interest has been in the use of a technological fix to exclude an option that would otherwise be available to an agent. Where the regulatory purpose is morally questionable, it must follow that the use of the fix is also questionable. For example, where the Mosquito anti-loitering device is used,<sup>23</sup> or when IP proprietors overreach in their use of digital rights management – in both

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<sup>20</sup>See Nick Bostrom, *Superintelligence* (Oxford University Press, 2014) 281 (n 1).

<sup>21</sup>See, eg, Roger Brownsword, 'Regulating Patient Safety: Is it Time for a Technological Response?' (2014) 6 *Law, Innovation and Technology* 1.

<sup>22</sup>Starting with Roger Brownsword, 'What the World Needs Now: Techno-Regulation, Human Rights and Human Dignity' in Roger Brownsword (ed) *Human Rights* (Hart, 2004) 203, and 'Code, Control, and Choice: Why East is East and West is West' (2005) 25 *Legal Studies* 1.

<sup>23</sup><[en.wikipedia.org/wiki/The\\_Mosquito](http://en.wikipedia.org/wiki/The_Mosquito)> accessed 24 February 2015. For discussion of this and other technological devices used by regulators, see Ben Bowling, Amber Marks and Cian Murphy, 'Crime Control Technologies: Toward an Analytical Framework and Research Agenda' in Roger Brownsword and Karen Yeung (eds), *Regulating Technologies* (Hart, 2008) 51.

cases, let us assume, impinging on the legitimate freedoms of others – ‘techno-regulation’ is problematic. My central point in these papers, however, has been to argue that, even if the regulatory purpose is morally unimpeachable, there is still a question about the use of ‘techno-regulation’. The point is that, even if the regulators are seeking to exclude illegitimate acts, this interferes with the possibility of agents doing the right thing for the right reason; and, concomitantly, it interferes with the ascription and assumption of responsibility. This, as I have already intimated, is one of the questions raised when GPS is applied to the golf carts at the Warwickshire in order to exclude the illegitimate acts of joy-riding.

Although the use of GPS at the Warwickshire is an example of technology being employed to exclude the possibility of a particular crime being committed, many of the technological interventions in modern criminal justice systems are not so effective. For example, the use of CCTV or DNA profiling might reduce the volume of crime but they fall well short of total control. This is not to say that technologies of this kind are not a cause for concern. To the contrary, there are many concerns about the adoption of these technologies – particularly about their implications for privacy, data protection and profiling, and about the proportionality of their use;<sup>24</sup> but, because they do not altogether exclude the criminal ‘option’, they do not give rise to concern on that particular score.

Now, we come to ‘technological management’. Once again, I am particularly interested in the use of a technological fix that has the effect of excluding an option that would otherwise be available to an agent; and, once again, the hard question is whether we have any cause for concern where the fix is applied for an apparently benign purpose, such as improving health and safety, doing things more reliably and efficiently, saving energy, protecting and conserving the environment and so on. To this extent, my point of departure is more the Google driverless car than the GPS-enabled golf carts.

What is striking about the driverless car, of course, is that it is driverless. It is not just a car that can be driven more safely because it is technologically enabled in various ways; this is a car that agents no longer drive. It is an extension of the process of taking humans out of the production process; robots not only manufacture the cars, they drive them too. But, why should we have any concern about taking human operatives out of dangerous workplaces or making the roads safer? Is this not a sophisticated way of managing risk? Is it not an unqualified good?

As I have already said, there might be many concerns about the adoption of technological management – about the transparency of its adoption, about the accountability of those who adopt such a regulatory strategy, about the diminution

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<sup>24</sup>Highlighted by the *Case of S. and Marper v The United Kingdom* (2009) 48 EHRR 50. For the domestic UK proceedings, see [2002] EWCA Civ 1275 (Court of Appeal), and [2004] UKHL 39 (House of Lords).

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. There is certainly no reason to be complacent about the adoption of, and trajectory towards, technological management and I will return to some of these concerns in Part 6 of the paper.

At this stage, suffice it to say that, if I am correct in thinking that the direction of regulatory travel is towards technological management, then we need to appreciate that this is a pervasive development, going way beyond writing code for DRM purposes or hardening targets in the criminal justice system. Distinctively, technological management responds to a perceived risk by either removing humans from the activity in question or by designing products, places and even people in ways that exclude the risky act. I am not firmly wedded to calling this phenomenon ‘technological management’ rather than ‘techno-regulation’, or vice versa. In this paper, I will continue to talk about technological management. But, the choice of terms is unimportant; what matters is the technology not the terminology. More particularly, what matters is, first, that we grasp the breadth and depth of this phenomenon; and, second, that we (lawyers) bring it onto our jurisprudential agenda. In the next part of the paper, I turn to the obstacles that stand in the way of treating technological management as a matter for jurisprudential inquiry and I suggest how the domain of jurisprudence needs to be redrawn in a relevantly inclusive way.

#### **4. Redrawing the domain of jurisprudence**

For jurists, it is the ‘law’ that is the object of their inquiry; and, the standard assumption is that, however one fine-tunes one’s conception of law, the aim of the legal enterprise is to subject human conduct to the governance of *rules*. It follows that, whether one argues for a legal positivist or a legal idealist conception of law, whether one’s conception of law is narrowly restricted to the operations of the high institutions of nation states (as in the ‘Westphalian’ view of law) or ranges more broadly and pluralistically across the ordering of social life, it is agreed that law is about rules, about prescription, about normativity; in all conceptions, law is a normative enterprise, the rules prescribing what ought and ought not to be done.

From the fact that law is conceived of as a normative phenomenon, it does not follow that the ambit of jurisprudence should be limited to legal norms. Nevertheless, once law is conceived of in this way, and given that law is the object of jurisprudential inquiry, it is understandable that the domain of jurisprudence should be drawn in a way that stays pretty close to legal norms and normative legal orders. However, while this might seem to facilitate an efficient and clear division of labour between, on the one hand, jurists and, on the other, philosophers, sociologists, political theorists, economists and so on, and while this specification of the domain of jurisprudence gives inquirers a clear and apparently coherent focus, it suffers from two major limiting tendencies.

The first limitation applies most obviously where a Westphalian conception of law is adopted. On this view, a limited set of norms (constitutional rules, legislation, precedents and the like) is isolated from a larger context of (as the Westphalians would have it, non-legal) normative regulation. To be sure, this isolation does not preclude juristic inquiry beyond the boundaries of Westphalian law, but it hardly encourages it. By contrast, where a more pluralistic conception of law is adopted, the inhibition against broader juristic inquiry is eased – albeit at the risk of some loss of conceptual focus.<sup>25</sup> The second limitation applies to all rule-based conceptions of law, including the most inclusive kind of normative pluralism. Again, the isolation of normative regulatory approaches does not preclude juristic inquiry into non-normative regulatory strategies; but, equally, it hardly encourages it.<sup>26</sup> We can say a little more about each of these limiting tendencies, each of which creates a barrier to seeing the bigger regulatory picture.

#### 4.1 *The first limitation: the isolation of legal norms*

Hart's conceptualization of law invites jurists to focus their inquiries on high-level national rules of the kind that we find in legislation, codes and the case-law. To be sure, this licenses a broad range of juristic inquiries; but, the fact of the matter is that 'law' in this sense is by no means the only kind of normative order that we find in societies. Religious and (secular) moral codes are normative as are the relatively formal codes of conduct that guide the practice of professional people (including lawyers themselves) and the less formal codes that are observed in a myriad of social settings. From Eugen Ehrlich's 'living law'<sup>27</sup> found in the customs and practices of provincial Bukowina (then part of the Austro-Hungarian empire) to Robert Ellickson's study of the informal norms of 'neighbourliness' and 'live and let live' recognized by the close-knit group of ranchers and farmers of Shasta County, California,<sup>28</sup> there is a literature that charts the extent of the norms that actually guide human conduct. Yet, in this ocean of normativity, Hartian-inspired jurisprudence invites inquiry directed at just one island of norms (the island that it characterizes as 'law'). Where the domain of inquiry is restricted in this way, jurisprudence has nothing to say about the way that the many other islands of normativity might

<sup>25</sup>See the caveats in Simon Roberts, 'After Government? On Representing Law Without the State' (2005) 68 *Modern Law Review* 1.

<sup>26</sup>Compare Roger Brownsword, 'Comparatively Speaking: "Law in its Regulatory Environment"' in Maurice Adams and Dirk Heirbaut (eds), *The Method and Culture of Comparative Law* (Festschrift for Mark van Hoecke) (Hart, 2014) 189.

<sup>27</sup>Eugen Ehrlich, *Fundamental Principles of the Sociology of Law* (Transaction, 2001 [1913]). For a useful introductory overview, see Neil O Littlefield, 'Eugen Ehrlich's Fundamental Principles of the Sociology of Law' (1967) 19 *Maine Law Review* 1.

<sup>28</sup>Robert C Ellickson, *Order Without Law* (Harvard University Press, 1991). Although the rural group is close-knit, there are significant sub-groups – eg, there is a contrast between the 'traditionalists' who let their cattle roam, and the 'modernists' who 'keep their livestock behind fences at all times in order to increase their control over their herds' (24).

function to maintain a particular kind of social order nor about the way in which they might interact with or disrupt the operation of (Westphalian) legal norms.<sup>29</sup>

If it were the case that non-legal norms were of marginal significance, this might not be too serious a restriction. However, if (as there is ample reason to believe) these other norms are at least as important as legal norms in the daily lives of people, then this is a serious limitation on our ability to understand not only what makes things tick in the social world but, more particularly, how legal norms fit into the full array of normative signals. To understand our legal and social world, we need a wide-lens approach. Exemplifying such an approach, Orly Lobel, in her excellent discussion of the optimal regulatory conditions for innovation, takes into account not only several relevant strands of law (especially intellectual property law, competition law and contract law), but also a range of social norms that operate alongside (and interact with) the law.<sup>30</sup> In many spheres of competition and innovation, Lobel points out, it is the foreground social norms which impose informal restraints that are more important than the formal restraints (if any) found in the background laws. Thus:

Competitive environments from fashion to magic, comedy to cuisine have managed to protect the process of innovation without resorting to the most restrictive controls. The distinction between control and freedom does not have to be a binary one, that is, one of negative spaces free of controls contrasted with formal legal systems saturated with the big sticks of protections and restrictions ... In every industry, we find practices of self-imposed confidentiality alongside practices of openness and sharing; we find places where norms substitute for law. Reputation replaces litigation. Carrots alternate with sticks.<sup>31</sup>

It follows that we are likely to go badly wrong – whether we are trying (as regulators) to channel conduct or simply seeking to understand compliance or non-compliance by regulates – if we focus on a narrow class of legal norms.

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<sup>29</sup>Again, note the caveat in Roberts (n 25). As Roberts puts it at 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. Beyond that, consensus is more difficult ... Will all the normative orders that the legal pluralists wish to embrace necessarily be comfortable with their rescue as “legal” orders?’

<sup>30</sup>Orly Lobel, *Talent Wants to Be Free* (Yale University Press, 2013). One of the critical variables here is whether regulators take a ‘Californian’ view of restraint of trade clauses or a ‘Massachusetts’ view, the former signalling a reluctance to keep employees out of the market, the latter being more supportive of the employer’s interest in restraining ex-employees.

<sup>31</sup>*Ibid.*, 239. For an illuminating analysis of the relationship between copying and innovation (with, in some contexts, imitation encouraging and supporting innovation to the advantage of both those who copy and those who are copied), see Kal Raustiala and Christopher Sprigman, *The Knockoff Economy* (Oxford University Press, 2012).

In this context, we can recall the frequent references that are made in public life to the importance of getting the ‘regulatory environment’ right – right for banking and financial services, right for innovation, right for health care and patient safety, right for the European single market, right for small businesses, right for privacy and press freedom and so on. Typically, these references are a common starting point for a public ‘post-mortem’ following a crisis, collapse or catastrophe of some kind. While this might be a good place to start, the remarks made above indicate that we will go badly wrong if we try to reduce the regulatory environment to just *one* area of law, or indeed to several areas of (Hartian) *law*. The regulatory environment is more complex than that and it is layered. Accordingly, if we think that the regulatory environment is ‘broken’, our attempts at repair and renewal are unlikely to come to much if they are limited to replacing one set of legal norms with another. Or, to put this another way, it is one thing to grasp that the law is relatively ineffective in channelling conduct but unless we open our inquiry to the full range of norms in play, we will not understand why law suffers from this shortcoming.<sup>32</sup> As Ellickson concludes, ‘lawmakers who are unappreciative of the social conditions that foster informal cooperation are likely to create a world in which there is both more law and less order’.<sup>33</sup>

#### 4.2 *The second limitation: the exclusivity of the normative*

Even if the domain of jurisprudence is expanded to include the full set of normative instruments, it is still limited so long as it treats norms, *and only norms*, as within its field of inquiry. So limited, jurists are disabled from assessing the significance of non-normative instruments such as technological management. Back in 1961, this was not a significant limitation. However, once regulators adopt strategies of technological management (such as golf carts that are immobilized or motor vehicle ignition systems that lock unless a seatbelt is engaged), the ocean of normativity contains potentially significant new currents.<sup>34</sup> To restrict the field of inquiry to the exclusively normative is to miss a sea-change in social ordering. To give ourselves the chance of understanding and assessing a radical transformation in the way that the State channels human conduct, we need to work with a notion of the regulatory environment that includes both normative and non-normative instruments.

There is no denying that, by including non-normative instruments in the domain of jurisprudence, we are locating legal inquiry in a much larger and less

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<sup>32</sup>It is also important, of course, to be aware of the full range of strategies available to regulators in trying to tweak the ‘choice architecture’ within which agents act: see, eg, Cass R Sunstein, *Simpler: The Future of Government* (Simon & Schuster, 2013) 38–39, for an indicative list of possible ‘nudges’.

<sup>33</sup>Ellickson (n 28) 286.

<sup>34</sup>Compare Lee Tien, ‘Architectural Regulation and the Evolution of Social Norms’ (2004) 9 *International Journal of Communications Law and Policy* 1.

familiar ball-park. To advocate a shift in focus from 'law' to 'regulation' might meet with resistance; but, at least, mainstream regulatory theorists conceive of regulation as starting with the setting of standards and, thus, as normative. If the 'regulatory environment' adopted this conception of 'regulation, it would still be limited to normative signals; and many jurists might be comfortable with this. However, the comfort of jurists is not our concern. Our cognitive interest is in a perceived shift to technological management and, with that, the development of a pervasive risk management mentality. This is quite different to the traditional legal approach and legal mentality but the function of channelling human conduct (one of the principal 'law jobs' as Karl Llewellyn puts it)<sup>35</sup> is one of the threads of connection. To understand what is happening with regard to the channelling of conduct within their own narrowly circumscribed domain, jurists have to broaden their horizons, uncomfortable though this might be. When, at the Warwickshire, technological management is used to respond to a failure of normative governance, the lesson is not simply one to be taken by golf clubs; the lesson is a general one: namely, that law is not the only way of managing risks and, in some cases, a technological fix will be far more effective.<sup>36</sup>

If the prognosis of this article is accepted, in future, normative regulatory environments will co-exist and co-evolve with technologically managed environments – but not always in a tidy way.<sup>37</sup> For jurists to turn away from the use of technological instruments for regulatory purposes is to diminish the significance of their inquiries and to ignore important questions about the way that power is exercised and social order maintained.<sup>38</sup>

## 5. Reimagining the regulatory environment

If technologically managed environments are to be a significant part of our regulatory future, then the argument so far is that the domain of jurisprudence needs

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<sup>35</sup> See Karl N Llewellyn, 'The Normative, the Legal, and the Law-Jobs: The Problem of Juristic Method' (1940) 49 *Yale Law Journal* 1355.

<sup>36</sup> A similar lesson might be drawn in relation to dispute-resolution, one of the other principal law-jobs: see, eg, David Allen Larson, 'Artificial Intelligence: Robots, Avatars, and the Demise of the Human Mediator' (2010) 25 *Ohio State Journal on Dispute Resolution* 105 <<http://ssrn.com/abstract=1461712>>.

<sup>37</sup> See, eg, Ronald Leenes and Federica Lucivero, 'Laws on Robots, Laws by Robots, Laws in Robots: Regulating Robots' Behaviour by Design' (2014) 6 *Law, Innovation and Technology* 193.

<sup>38</sup> Conversely, of course, it would be a mistake to neglect the continuing significance of normative instruments. See, eg, Jacqueline Lipton, *Rethinking Cyberlaw* (Elgar, 2015) 157–158: 'While agreeing with the view of the power of code ... it is nevertheless important not to lose focus on law as an important form of regulation of online conduct. As all of the different regulatory modalities overlap and intersect in complex ways, it is important to study all of them to ensure a full regulatory picture. Thus, law must not be demoted from the mix.'

to be extended in a way that facilitates inquiry into both law as a normative regulatory strategy and the use of non-normative technological instruments. Law, that is to say, needs to be set in a broader context: first, in a context that takes full account of the variety of norms that impact on, and influence, human behaviour; and, second, in a context that recognizes the channelling and constraining effect of technological management. In order to do this, the suggestion is that we should broaden the field for juristic inquiry by operating with a notion of the regulatory environment that accommodates both normative and non-normative approaches.

What would such a regulatory environment look like? In one sense, the answer is quite simple: just look around and we will soon see that there are already regulatory environments like this in many everyday settings, where along with familiar laws, rules and regulations, there are the signs of technological management – for example, we find mixed environments of this kind in homes and offices where air-conditioning and lighting operate automatically, in hotels where the accommodation levels can only be reached by using an elevator (and where the elevators cannot be used and the rooms cannot be accessed without the use of security key cards), and perhaps par excellence at airports. On arrival at a modern terminal building, while there are many airport rules to be observed – for example, regulations concerning parking vehicles, smoking in the building, or leaving bags unattended and so on – there is also a distinctive architecture that creates a physical track leading from check-in to boarding. Along this track, there is nowadays an ‘immigration and security zone’, dense with identifying and surveillance technologies, through which passengers have little choice other than to pass. In this conjunction of architecture and surveillance technologies, we have the non-normative dimensions of the airport’s regulatory environment – the fact of the matter is that, if we wish to board our plane, we have no practical option other than to follow the technologically managed track.

If we treat the regulatory environment as essentially a signalling environment, then each such environment operates with a distinctive set of regulatory signals that are designed to channel the conduct of regulatees within, so to speak, a regulated sphere of possibility. Of course, one of the benefits of technologies is that they can expand our possibilities; without aircraft, we could not fly. Characteristically, though, the kind of technological management that we are contemplating is one that restricts or reduces existing human possibilities (albeit, in some cases, by way of a trade-off for new possibilities). In other words, while normative regulation is directed at actions that are possible – and that remain possible – technological management engages with spheres of possibility but in ways that restructure those regulatory spaces and redefine what is and is not possible.

This brief introduction to an extended conception of the regulatory environment needs more detail. To fill in some of the detail, we can start by mapping the salient features of regulatory environments that are purely normative and then we can extend this to include environments that are technologically managed.



### 5.1 *Law in context: normative regulatory environments*

Conceiving of a regulatory environment as a kind of signalling environment, much in the way that we think about the setting for road traffic or for the railways, then regulators may signal (normatively) that certain conduct is prohibited (red light) or permitted, or required (green light always indicating at least permitted and, in some contexts, required). These signals may be legal or ethical, formal or informal; and, in the world that Hart and others contemplated, these signals were normative in character, speaking to regulatees in terms of what ought or ought not to be done.

In modern regulatory settings, the legal signals might be supported by various kinds of technologies. For example, on the roads, technologies might be employed to advise drivers that they are either non-compliant or at risk of non-compliance – as when roadside signs might flash a warning that the vehicle is exceeding the speed limit, or an overhead motorway gantry might advise that it is time to take a break; or a vehicle equipped with the appropriate sensors might caution the driver against proceeding when affected by drink or drugs; and various kinds of roadside or on-board surveillance technologies might signal that non-compliance will be detected. In all these cases, although technological instruments are used, the technological signals are normative (various acts ought or ought not to be done) and, of course, they complement or supplement normative legal signals.

There is much more to be said, however, about this relatively straightforward picture of a normative signalling environment (whether with or without technological support). In particular, there are questions about the identity of the regulators, about what counts as regulation, about the extent of the regulatory repertoire, about the identity of the regulatees, about conflicting signals and about the boundaries of any particular regulatory environment. However, before we respond to each of these questions, we need to note a broad distinction between two types of normative regulatory environment.

#### 5.1.1 *Two types of regulatory environment*

On the roads, motorists are notorious for developing their own unofficial rules, the drivers of each country being caricatured for respecting the official traffic signals more than the lives of fellow humans or vice versa, as well as employing their own local signalling systems based on hand gestures or the use of their car headlights. The co-existence of these unofficial codes with the official traffic laws can be a source of confusion as well as, potentially, an accident waiting to happen. In some cases, motorists go one step further, taking the law into their own hands. For example, Jonathan Zittrain reminds his readers about the experiment in the Dutch city of Drachten when traffic signs, parking meters and parking spaces were removed.<sup>39</sup> The sign-free (*‘verkeersbordvrij’*) environment, far from inducing dangerous and disorderly driving, generated responsible and communicative

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<sup>39</sup>Jonathan Zittrain, *The Future of the Internet* (Penguin Books, 2008).

conduct on the part of motorists, cyclists and pedestrians. As Zittrain reflects, the Drachten experience suggests that when

people can come to take the welfare of one another seriously and possess the tools to readily assist and limit each other, even the most precise and well-enforced rule from a traditional public source may be less effective than that uncompelled goodwill.<sup>40</sup>

In Drachten, as in Shasta County, there can be order without law.

These remarks invite the drawing of a crude distinction between ‘top-down regulator-initiated’ and ‘bottom-up’ (Drachten-type) regulation. Whereas, in top-down regulatory environments, there is likely to be a significant formal legal presence, along with a clear distinction between regulators who initiate the norms and regulatees to whom the norms are addressed, in bottom-up self-regulatory environments, on both scores, this is less likely to be the case – there will be a much less clear-cut distinction between regulators and regulatees as well as a certain amount of informality. For convenience, we can mark this distinction by referring to ‘Type 1’ (top-down with significant hard law elements) and ‘Type 2’ (bottom-up with fewer hard law elements) regulatory environments.

### 5.1.2 *Who counts as a ‘regulator’?*

In principle, who counts as a ‘regulator’? How broad is this concept? Is the class of regulators restricted to public functionaries – or might we also find private ‘regulators’ contributing to the normative signals of the regulatory environment?

To some extent, the distinction between public and private initiators of regulation correlates with the distinction between the two types of regulatory environment. In ‘Type 1’ environments, the sources of top-down regulation will often be governments or other public agencies; by contrast, in ‘Type 2’ environments – for example, in the Drachten case or at the Warwickshire Golf and Country Club – the sources of bottom-up regulation will often be private bodies. The mapping, however, is not neat and tidy: private bodies might resort to command and control strategies and public bodies might encourage bottom-up governance as well as entering into co-regulatory alliances with stakeholders in the private sector. It follows that the category of regulators is not self-selecting.

This being so, we can say that, for some purposes, it might be convenient to limit ‘regulators’ to public functionaries, so that ‘regulation’ is an activity that the State or its delegates carry out. However, where (as in this article) the purpose is to examine technological management, and when so many of the relevant initiatives emanate from the private sector (for example, Monsanto’s ‘terminator gene’ and the technologies of digital rights management), it makes no

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<sup>40</sup>*Ibid*, 129.

sense to confine the class of regulators to those who act in a public capacity. Moreover, if one of the core objectives of jurisprudence is to track, explain and evaluate the exercise of power, we should allow for the concept of a ‘regulator’ to be interpreted broadly as covering parties in both public and private positions.

### 5.1.3 *What counts as ‘regulation’?*

A common starting point is that the concept of ‘regulation’ signifies

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.<sup>41</sup>

Nevertheless, regulation is an unwieldy and a contested concept.<sup>42</sup> In an earlier work, Morag Goodwin and I took a broad approach, treating regulation as ‘encompassing any instrument (legal or non-legal in its character, governmental or non-governmental in its source, direct or indirect in its operation, and so on) that is designed to channel group behaviour’;<sup>43</sup> and we emphasized that it should not be assumed that ‘regulation’ is co-extensive with ‘law’ any more than it should be assumed that ‘regulators’ are restricted to those who are authorized to issue legal directives.

There is a problem, however, with interpreting regulation in a broad way. As Karen Yeung has pointed out, such a broad approach

seems to encompass a plethora of varied activities and relationships which would not typically be regarded as regulatory, either by scholars of regulatory governance or in ordinary usage, such as attempts by parents to encourage their children to eat more fruit and vegetables, or the marketing and sales techniques of commercial firms to encourage consumers to purchase their products in greater quantities. While both these examples involve the use of power by one party to control or influence the behaviour of others, and thus provoke concerns about the use and abuse of power and have been the focus of considerable academic examination, they are not issues which regulatory scholars would regard as typically falling within the scope of their inquiry or expertise.<sup>44</sup>

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<sup>41</sup>Julia Black, ‘What is Regulatory Innovation?’ in Julia Black, Martin Lodge, and Mark Thatcher (eds), *Regulatory Innovation* (Edward Elgar, 2005) 1, at 11. For two background visions of regulation (one as an infringement of private autonomy justified only by considerations of economic efficiency, the other as a much broader collaborative enterprise), see Tony Prosser, *The Regulatory Enterprise* (Oxford University Press, 2010) Ch 1.

<sup>42</sup>See, eg, Julia Black, ‘De-centring Regulation: Understanding the Role of Regulation and Self-Regulation in a “Post-Regulatory” World’ (2001) 54 *Current Legal Problems* 103.

<sup>43</sup>Roger Brownsword and Morag Goodwin, *Law and the Technologies of the Twenty-First Century* (Cambridge University Press, 2012) Ch 2.

<sup>44</sup>Karen Yeung, ‘Are Design-Based Regulatory Instruments Legitimate?’ (ECPR Conference, Barcelona, 25–27 June 2014) p 10 <[reggov2014.ibei.org/bcn-14-papers/71-64.pdf](http://reggov2014.ibei.org/bcn-14-papers/71-64.pdf)>.

Yeung's response is to propose a narrower approach, restricting 'our understanding of regulation to intentional attempts to alter the behaviour of others in order to address a collective issue or problem'.<sup>45</sup> If we adopt this proposal, we will continue to treat government-initiated regulation as paradigmatic and this will serve as a benchmark for our willingness to extend the range of regulation.

So, at what point should we treat standard-setting and channelling as beyond the zone of regulation? For present purposes, we do not need to resolve this conundrum. What matters is not that our usage of the term 'regulation' fits with the usage of a particular group of scholars or common convention, nor that we can be precise about the point at which we leave the realm of regulation and enter some other normative zone; rather the priority is that jurists should find a way of giving themselves the room to be able to engage with *non-normative* channelling strategies that compete with, or complement, or simply supersede Hartian legal norms.

#### 5.1.4 *The regulatory repertoire*

For regulators, whether operating in Type 1 or Type 2 regulatory environments, the choice is not simply between enacting a law (or an analogue of law) or doing nothing, or between enacting one kind of law rather than another. The regulatory repertoire extends well beyond legal norms. Famously, Lawrence Lessig identifies four regulatory modalities (or modes of regulation) that are available: namely, the law, social norms, the market and architecture (or, code).<sup>46</sup> Already, though, we can see how this repertoire is tending towards technological management; but that is not the present point. At this stage, it suffices to note that much of this repertoire involves the use of a variety of normative strategies. The law is one such strategy; but so, too, is the use of social norms and, in many cases, the use of market signals. Even smart cars might be equipped with technologies that operate in a normative way (for example, by advising against driving when under the influence of drink or drugs, or against not wearing a seat belt, and so on).

Smart regulators should seek out the optimal mix of the various instruments that they have in this extended repertoire.<sup>47</sup> Moreover, this 'smartness' includes being aware of the full range of normative signals in play, including the norms that already are foregrounded in the regulatee community. Chiming in with this thought, in his inaugural lecture,<sup>48</sup> Colin Scott has suggested that

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<sup>45</sup>*Ibid.*

<sup>46</sup>Lawrence Lessig, *Code and Other Laws of Cyberspace* (Basic Books, 1999) Ch 7; Lessig, 'The Law of the Horse: What Cyberlaw Might Teach' (1999) 113 *Harvard Law Review* 501, 507–514.

<sup>47</sup>Generally, see Neil Gunningham and Peter Grabosky, *Smart Regulation* (Oxford: Clarendon Press, 1998); Ian Ayres and John Braithwaite, *Responsive Regulation* (Oxford University Press, 1992).

<sup>48</sup>Colin Scott, 'Regulating Everything' UCD Geary Institute Discussion Paper Series (Dublin, inaugural lecture, 26 February 2008).

wherever governments are considering a policy problem – be it unsafe food, passive smoking or poor quality university research – what they are considering is an existing regime which cannot be swept away and replaced by a regulatory agency. A more fruitful approach would be to seek to understand where the capacities lie within the existing regimes, and perhaps to strengthen those which appear to pull in the right direction and seek to inhibit those that pull the wrong way. In this way the regulatory reform agenda has the potential to address issues of regulatory fragmentation in a manner that recognizes both the limits of governmental capacity and the potential of reconceptualizing regulation in other ways, for example that invoke non-state actors and alternative mechanisms to hierarchy.<sup>49</sup>

Scott argues that the core idea of this proposed ‘meta-regulatory’ approach is that ‘all social and economic spheres in which governments or others might have an interest in controlling already have within them mechanisms of steering – whether through hierarchy, competition, community, design or some combination thereof’; and he sees the principal challenges for regulators as being, first, ‘to observe and identify, to some approximation, the variety of mechanisms of regulation at play’ and, second, ‘to work out ways to key into those mechanisms to steer them, to the extent they are not already securing desired outcomes’.<sup>50</sup> Even without the possible utilization of technological management, then, it is apparent that the regulatory repertoire is extensive and that making a successful regulatory intervention represents a sophisticated challenge.

#### 5.1.5 *The regulators’ perspective: tensions within the regulators’ own sphere*

In principle, we might find three sets of tensions in a normative field – most conspicuously so in a Type 1 regulatory environment. First, there are the often high profile ‘vertical’ tensions between the ‘official’ norms signalled by regulators and the ‘unofficial’ norms followed by regulatees. Second, there can be less visible ‘horizontal’ tensions between different sections of the regulatory body. Third, there might be further ‘horizontal’ tensions between different sections of the regulatee community. While some sections of the community might support the ‘official’ norms, others might oppose them; and, of course, it might be that both sections reject the official norms and yet find themselves at odds in supporting rival norms.

Sometimes, more than one set of tensions can be in play. For example, as Brian Simpson explains in his retelling of the great Victorian case of *R v Dudley and Stephens*,<sup>51</sup> the shipwrecked sailors’ killing of young Richard Parker, the cabin boy, highlighted more than a conflict between domestic criminal law and the customs of the sea (a tension of the first kind), there was also a cultural clash between

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<sup>49</sup>*Ibid.*, 25.

<sup>50</sup>*Ibid.*, 27.

<sup>51</sup>14 QBD 273 (1884).

government departments (a tension of the second kind).<sup>52</sup> While the Home Office strongly favoured a prosecution in order to demonstrate public condemnation of the customs of the seas, the Board of Trade took a different view. Moreover, within the regulators' own domain, it is not only differences of this kind that can create tensions, there might also be tensions between the 'official' formal norms and the norms that guide the working practices of inspectorates and regulatory agencies. Sometimes, these tensions arise from a lack of resources but there might also be resistance in the agencies. In the criminal justice system, for example, there is a notorious tension between the norms that lay jurors bring into the courtroom and the formal rules of the law<sup>53</sup> – indeed, this was precisely the situation in *Dudley and Stephens* where the rescued seamen were welcomed home, not as 'murderers', but as heroes.

Clearly, we should not assume that the regulatory environment is populated by a coherent and consistent set of normative signals. Indeed, if we are to understand the regulation of some action or activity, we need to look at the whole of the criminal process (including the norms that guide prosecution policy),<sup>54</sup> and we need to take into account the potential tensions that may exist on the regulators' side even before we consider the perspective of regulatees.

#### 5.1.6 *The regulatees' perspective*

Not surprisingly, the perspectives and attitudes of regulatees might be different to those of the regulators. This can account for individual acts of defiance, or non-compliance, or technical compliance – currently, in the news, we have one story after another where the rights and wrongs of particular actions hinge not only on the distinction between 'avoidance' and 'evasion' but also on whether compliance with the rules suffices.<sup>55</sup> In some cases, the story is about an isolated individual act; but, in many cases, the acts that come to light reflect much deeper and wider cultures expressing rival normative orders.

Such systematic differences are particularly prevalent in Type 1 regulatory environments: here, while regulators resort to a range of normative interventions, regulatees act on and respond to these norms in a context that itself can be rich

<sup>52</sup>AW Brian Simpson, *Cannibalism and the Common Law* (University of Chicago Press, 1984).

<sup>53</sup>For a revealing account, see Ely Devons, 'Serving as a Juror in Britain' (1965) 28 *Modern Law Review* 561; and, for a striking example of 'jury equity', see Clive Ponting, 'R v Ponting' (1987) 14 *Journal of Law and Society* 366.

<sup>54</sup>Following judicial criticism of prosecution policy in *Chambers v DPP* [2012] EWHC 2157 (Admin), see the *Guidelines on prosecuting cases involving communications sent via social media* <[http://www.cps.gov.uk/legal/a\\_to\\_c/communications\\_sent\\_via\\_social\\_media/](http://www.cps.gov.uk/legal/a_to_c/communications_sent_via_social_media/)> accessed 25 February 2015.

<sup>55</sup>See, eg, Patrick Wintour, 'HSBC Boss: I'm Ashamed But Not Culpable' *The Guardian* (26 February 2015) 1.

with non-legal normative elements – as when the context reflects a particular professional, business or working culture.<sup>56</sup> As Lobel, Ellickson and others have pointed out, in many cases, these elements will be the ones that are in the forefront of regulatees' minds or will be the ones with which regulatees habitually comply. When these norms are in tension with the legal norms, the latter will have limited effect and, indeed, they might be counter-productive. Examples of such ineffectiveness are legion, ranging from laws that try to control the supply and consumption of alcohol or recreational drugs through to legal attempts to control serial infringements of copyright by millions of file-sharers.<sup>57</sup> Even when the official norms are offered as options or defaults, it is notorious that the target regulatees might systematically ignore these offerings and act on their own norms.<sup>58</sup>

By contrast, in Type 2 regulatory environments – at any rate, where there is a commonality between regulators and regulatees – we might expect the tensions to be less serious. Even here, however, there will be majority and minority views as well as 'insiders' and 'outsiders'. Particularly for those who are 'outsiders', Type 2 regulatory environments might present themselves as imposed, their norms being seen as unacceptable. In these circumstances, a counter-culture might develop in opposition to the insiders' normative regime; and, this process of differentiation might repeat itself as the regulatory environment becomes increasingly fractured and complex. Without doubt, there is an interesting analysis to be undertaken, charting the circumstances in which regulatee norms complement or supplement formal top-down norms and in which circumstances the incompatibility of norms creates practical problems. However, this is not a task to be undertaken here.<sup>59</sup>

### 5.1.7 *The boundaries of a particular regulatory environment*

One of the many (and more obvious) questions that we might ask about our embryonic concept of the regulatory environment is: how do we draw the limits or boundaries of any particular regulatory environment? Should we draw them from the perspective of would-be regulators or from the perspective of regulatees?<sup>60</sup> Or, is there some external vantage point from which we can draw them?

<sup>56</sup>See, eg, John C Coffee Jr, "'No Soul to Damn, No Body to Kick": An Unscandalized Inquiry into the Problem of Corporate Punishment' (1981) 79 *Michigan Law Review* 386.

<sup>57</sup>See Roger Brownsword and Morag Goodwin, *Law and the Technologies of the Twenty-First Century* (Cambridge University Press, 2012) Ch 13.

<sup>58</sup>Famously, see Stewart Macaulay, 'Non-Contractual Relations in Business' (1963) 28 *American Sociological Review* 55.

<sup>59</sup>For a range of interesting remarks about the theoretical questions presented by informal systems of social control, see Ellickson (n 28) esp Ch 7.

<sup>60</sup>Compare Chris Reed, *Making Laws for Cyberspace* (Oxford University Press, 2012). One of the principal themes of Reed's critique of current (failed) attempts to legislate for cyberspace is that lawmakers need to put themselves in the position of regulatees in order to assess which interventions will gain the respect of the latter. Although Reed focuses on

To start with the regulators' view, their standpoint will be that they want (i) a class of regulatees (it could be a broad class or quite a narrow one) (ii) to act (or to desist from acting) in a certain way (iii) in some defined zone (which again could be broad or narrow). For example, while regulators want their regulatees, whoever they are and wherever they are, to respect the physical well-being of one another, they will have more focused schemes for safety on the roads, for health and welfare at work, and for the safety of patients in hospitals and so on. Accordingly, in many cases, the regulatory environment will be multi-level: in the normative dimension, there will be background standards of general application but, in many cases, the foreground standards will be specific to particular persons or particular places, or both. On this account, the limits of the regulatory environment are set by the sum of the signals given by the regulators.

If, however, we construct this same regulatory environment from the standpoint of regulatees, which of the regulators' signals are to count? Do regulatees need to be aware of the signals that the regulators have given? Do they need to regard the regulators as 'authorized' to give signals? Do regulatees need to act on the signals? Different criteria of knowledge, legitimacy and effectiveness will generate differently constituted regulatory environments, each with its own limits.<sup>61</sup> Moreover, regulatees might have their own rules and regulations, such as those represented by the unofficial rules of the road. This can present some drivers with a dilemma: do they follow the official rules and their signals or do they follow the unofficial code and its signals? What we have here is not a competition between two top-down regulators but an exercise in bottom-up self-regulation coming into tension with the background top-down standards and signals. This is a phenomenon that is far from uncommon: we see it, for example, whenever a regulatee community sets up its own rival code or culture (whether this is drivers, file-sharers, bankers, doctors or sports people).<sup>62</sup> In these cases, the limits of the regulatory environment are unclear and, depending on the balance of power and influence, there is likely to be a degree of top-down regulatory ineffectiveness.

How, then, might a detached observer capture the essence of a 'regulatory environment' (if, indeed, this is a meaningful question)? Although we can say that we are conceiving of a signalling environment that is designed to channel group conduct, it needs to be recognized that there is a great deal of variety in

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law rather than the larger regulatory environment, his discussion invites constructing the regulatory environment from the standpoint of regulatees.

<sup>61</sup>Exactly in the way that Reed (n 60) appreciates for cyberspace.

<sup>62</sup>On the last-mentioned, see Roger Brownsword, 'A Simple Regulatory Principle for Performance-Enhancing Technologies: Too Good to be True?' in Jan Tolleneer, Pieter Bonte and Sigird Sterckx (eds) *Athletic Enhancement, Human Nature and Ethics: Threats and Opportunities of Doping Technologies* (Springer, 2012) 291. And, for a rare insight into the world of professional cycling, see Tyler Hamilton and Daniel Coyle, *The Secret Race* (Bantam Books, 2012).



particular instantiations. Whilst some regulatory environments are reasonably stable and well-formed, others are unstable, overlapping, conflictual and so on. In the latter cases, the way in which we draw the boundaries of any particular regulatory environment will depend on whether we adopt the perspective of the regulators or that of the regulatees. Which perspective should prevail?

Perhaps the best way to address the current question is to relate it to our particular cognitive interest. For example, if our cognitive interest is in the relative effectiveness of the exercise of top-down regulatory power, we will start with a notion of the regulatory environment that reflects the regulators' view; but, to account for a lack of effectiveness, we will almost certainly construct an account of the regulatory environment that reflects the practice of regulatees. However, if our interest is in the *legitimate* exercise of regulatory power, we might consider the issue from the standpoints of both regulators and regulatees before trying to develop a detached view that then offers an ideal-typical construct of the regulatory environment. This takes us deep into issues of conceptual methodology. The approach that I am proposing for my present purposes is 'instrumental' and 'pragmatic'; it makes no claim to specifying the concept of the regulatory environment in some rationally compelling form. This is not to say that the methodological issues are unimportant.<sup>63</sup> However, in the present context, they takes us away from the central task of sketching a working concept of the regulatory environment that will recognize the full set of normative signals as well as the non-normative signals given by technological management.

## 5.2 *Law in context: non-normative regulatory environments*

In its hard form, a technologically managed environment will simply design out what otherwise would be an option. However, we should not assume that all technological instruments function in a non-normative way; it bears repetition that some such instruments remain normative. This point is very clearly drawn out in Mireille Hildebrandt's distinction between 'regulative' (normative) and 'constitutive' (non-normative) technological features.<sup>64</sup> By way of an illustrative example, Hildebrandt invites readers to imagine a home that is enabled with a smart energy meter:

One could imagine a smart home that automatically reduces the consumption of energy after a certain threshold has been reached, switching off lights in empty rooms and/or blocking the use of the washing machine for the rest of the day. This intervention [which is a case of a 'constitutive' technological intervention] may have been designed by the national or municipal legislator or by government

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<sup>63</sup>Compare section 5.2.4 below and Roger Brownsword, 'Field, Frame and Focus: Methodological Issues in the New Legal World' in Rob van Gestel, Hans Micklitz and Ed Rubin (eds), *Rethinking Legal Scholarship* (Cambridge University Press, 2015) (forthcoming).

<sup>64</sup>Mireille Hildebrandt, 'Legal and Technological Normativity: More (and Less) than Twin Sisters' (2008) 12(3) *Techné* 169.

agencies involved in environmental protection and implemented by the company that supplies the electricity. Alternatively [this being a case of a 'regulative' technological intervention], the user may be empowered to program her smart house in such a way. Another possibility [again, a case of a 'regulative' technological intervention] would be to have a smart home that is infested with real-time displays that inform the occupants about the amount of energy they are consuming while cooking, reading, having a shower, heating the house, keeping the fridge in function or mowing the lawn. This will allow the inhabitants to become aware of their energy consumption in a very practical way, giving them a chance to change their habits while having real-time access to the increasing eco-efficiency of their behaviour.<sup>65</sup>

Similarly, 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 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 considered 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.<sup>66</sup>

Accordingly, whether we are considering smart cars, smart homes or smart regulatory styles, we need to be sensitive to the way in which the regulatory environment engages with regulatees, whether it directs normative signals at regulatees enjoining them to act in particular ways, or whether the technology of regulation simply imposes (non-normatively) a pattern of conduct upon regulatees irrespective of whether they would otherwise choose to act in the way that the technology now dictates.

### 5.2.1 *Technological management as part of the regulatory environment*

When we turn to technological management, we are thinking about technologies that are (in Hildebrandt's terminology) 'constitutive', that prevent, or disable, or compel certain actions.<sup>67</sup> On modern railway trains, for example, it is not possible for passengers to open the carriage doors until the guard has released the central locking system.<sup>68</sup> Similarly, smart cars might be disabled on sensing alcohol or

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<sup>65</sup>*Ibid.*, 174.

<sup>66</sup>O'Malley (n 10) 280.

<sup>67</sup>See, eg, Hildebrandt (n 64); and Roger Brownsword, *Rights, Regulation and the Technological Revolution* (Oxford University Press, 2008).

<sup>68</sup>See Jonathan Wolff, 'Five Types of Risky Situation' (2010) 2 *Law, Innovation and Technology* 151.

drugs in the driver; and they will be designed so that they always comply with what are safe speed limits.<sup>69</sup> Where environments are technologically controlled in this way, the regulatory signal is no longer normative. In other words, in place of (normative) prescription, we have only (non-normative) possibility and impossibility.<sup>70</sup> As O'Malley puts it, in the context of criminal justice, the adoption of technological management signals the move from 'perfect detection to perfect prevention'.<sup>71</sup>

Nevertheless, the technologically managed environment is still recognizably a regulatory environment. There are still regulators (employing technological management) and regulatees (at whom measures of technological management are directed). In any regulatory environment, we can say that, in principle, so many actions ( $x$  actions) are available to regulatees. Where a normative strategy is employed, regulators will seek to channel the behaviour of their regulatees by steering them towards one or more (required or desired) actions or away from one or more (prohibited or undesired) actions. In the former case, the steer is positive, in the latter it is negative. Where a non-normative strategy is employed, the steering follows a similar pattern: in order to steer regulatees towards a desired action, other options might be closed off or the regulatee is somehow 'locked in' to the required action; and, in order to steer regulatees away from an undesired action, that action is simply closed off (instead of  $x$  actions being available, it is now  $x-1$  actions that are available). Quite possibly, in a non-normative managed environment, the use of positive and negative steering techniques is more complex than in a normative regulatory environment; and, because technological management leaves regulatees with no choice in relation to the regulated matter itself, there is an important sense in which regulatees will always be less free in managed environments. Emphatically, this is not to suggest that technologically managed environments should be equated with total control; the range of actions ( $x$  actions) actually available in a particular managed environment might leave regulatees with significant choice – albeit a necessarily narrower range of options, other things being equal, than in a normative regulatory environment where regulatees retain the option of non-compliance with the rules. All that said, in both normative and non-normative environments – most obviously where the purpose is that of crime control – the starting point is that regulators seek to direct, shape or structure some aspects of their regulatees' conduct and they do this by employing various positive and negative channelling instruments.

These similarities notwithstanding, some instances of technological management might seem to fall beyond the concept of regulation as an intervention

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<sup>69</sup>See Eric Schmidt and Jared Cohen, *The New Digital Age* (Alfred A Knopf, 2013) 25: 'Google's fleet of driverless cars, built by a team of Google and Stanford University engineers, has logged hundreds of thousands of miles without incident ...'

<sup>70</sup>Roger Brownsword, 'Whither the Law and the Law Books: From Prescription to Possibility' (2012) 39 *Journal of Law and Society* 296.

<sup>71</sup>O'Malley (n 10) 280.

that is (1) intended to (2) channel the behaviour of regulatees (3) either positively or negatively (4) relative to some regulatory purpose. While there is no doubt that technological management is designed to serve some regulatory purpose (whether it is crime control, protecting human health and safety, protection of the environment, simply cutting costs or protecting values such as privacy, and so on), is it so clear that technological management is always aimed at channelling behaviour? Further, can we assume that, when regulators introduce technological management, they always intend to influence human behaviour – perhaps they are simply thinking about improving safety?

### 5.2.2 *The channelling question*

To pick up on the first of these questions, Karen Yeung<sup>72</sup> makes the excellent point that some ‘regulatory interventions’

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 air-bags 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.

To accommodate such interventions, Yeung proposes that the definition of ‘regulation’ should be constructed around the desired social outcomes which the regulator intentionally seeks to bring about. Regulation would then be defined as ‘sustained and focused attempts intended to produce a broadly defined outcome or outcomes directed at a sphere of social activity according to defined standards or purposes that affect others’.<sup>73</sup> If we accept this accommodation, we will accept that, in some cases, regulators may achieve their objectives without in any way seeking to modify the behaviour of their regulatees.

Now, those who are reluctant to make any concession to the idea that ‘regulation’ necessarily involves an attempt to steer conduct might argue that, in the examples given by Yeung, there is actually an attempt to steer the conduct of motor car manufacturers, builders and water companies – these being, in Yeung’s scenarios, the relevant regulatees. However, even if the facts support this analysis, why should we be reluctant to accept that ‘regulatory’ interventions and the regulatory environment can include measures of the kind represented by technological management where there is sometimes no attempt to steer or to rechannel behaviour? The fact of the matter is that, in the kind of cases suggested by Yeung, the purpose of regulators is to improve health and safety and their strategy for doing this (let us suppose) is by setting standards that are intended to

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<sup>72</sup>Karen Yeung (n 44) 5.

<sup>73</sup>*Ibid*, 5.

channel the conduct of motor car manufacturers, builders and water companies. Why should we exclude from our regulatory scrutiny the impact that this has on the options available to the end users? Their conduct might not be the direct object of the channelling but the channels in which they move are the targets for regulators. Moreover, if (contrary to our assumption) the motor car manufacturers, builders and water companies, rather than complying with norms set by a public regulator, took it upon themselves to improve health and safety in this way, why should their use of technological management be treated as somehow less regulatory?

Applying this analysis, we can treat any particular regulatory environment as having (in principle) two dimensions. First, there is the normative dimension: here, regulators seek to guide the conduct of regulatees; standards are set; prohibitions, permissions and requirements are signalled; regulators employ prudential or moral or combined prudential-moral registers to engage the practical reason of regulatees; and various kinds of technology might be used to reinforce the normative standards and the signals – in our times, such reinforcement typically involves surveillance, tracking and identifying technologies that increase the likelihood of detection in the event of non-compliance. Second, there is the non-normative dimension: here, regulators target a certain pattern of behaviour, sometimes intentional conduct, at other times unintentional acts; various kinds of technology (product design, architecture and the like) are used to channel regulatees in the desired way or to place regulatees in channels that are more desired; and the only register employed is that of practicability/possibility. As this dimension becomes more sophisticated, the technologies that are employed are embedded in our physical surroundings (in the way, for example, that sensors detect a human presence in a room and switch on the lights) or possibly in our bodies and our genetic coding. Although in the technologically managed environments of the future, a regulatee might explore what can and cannot be done, in many respects this will no longer seem like a signalling environment: for regulatees who are habituated to this kind of environment, it will just seem to be the way things are. In such environments, the regulatory ‘ought’ will be embedded in the regulatory ‘is’.

### 5.2.3 *Regulatory intent*

This leaves the question of regulatory intent. When regulators employ technological management, their intention is to serve some purpose. The fact that they might not intend to re-channel conduct, as we have said, is significant; but it does not speak against the ‘regulatory’ character of the intervention. However, what if, contrary to the regulatory intention, an intervention that is intended merely to restructure the channel in which regulatees act does have some unintended re-channelling effects?

As expressed, this is not a question about the case for extending the notion of the regulatory environment to include measures of technological management.

Rather, it is a question about the accountability of regulators who employ such measures. Perhaps the best-known example that raises such a question is the long-running debate about whether the design of Robert Moses' bridges on the New York parkways was intended to have the (racially discriminatory) effect of making it more difficult for the poor, mainly black, population to reach the beaches on Long Island.<sup>74</sup> From the point of view of prospective beach-users, it made little difference whether the bridges had been designed with this intent – in practice, the bridges had the regulative effect of making the beaches more difficult to access. Nevertheless, if we are to hold regulators (designers) to account, is it not the case that their intentions remain important?

The paradigm, as we have said, is one in which regulators have certain purposes (whether for crime control or health and safety and so on), and they put in place a rule framework or a design that is intended to have a particular effect. In such a case, it is perfectly fair to ask regulators to justify both their purposes and the instruments (the rules or the designs) that they have adopted. However, even the best-laid regulatory plans can go awry and, indeed, a common problem with regulatory interventions is that they generate unintended effects. Clearly, when regulators are held to account, they must answer for both the intended and the unintended effects of the regulatory environments that they have put in place.

Having said this, the case of the New York parkway bridges might seem rather different. In defence of the bridge designers, it might be argued that there was no regulatory plan as such, simply an attempt to strengthen the bridges. To be sure, in practice, the newly constructed bridges might have had a regulative impact, but this was an unintended effect of the design. Once upon a time, such a defence might have been adequate; but, nowadays, regulators will not get off the hook quite so easily. For, as it becomes increasingly clear that design can matter (potentially, having both negative and positive effects), so it is no longer acceptable for regulators to plead a lack of intent, or attention, with regard to such technical details. While inattention may lead to regulatory environments that are detrimental to, say, the health or the privacy of regulatees, smart regulatory action can have the opposite impact (for example, by requiring or encouraging architects and technologists to default to health-promoting or privacy-enhancing designs).<sup>75</sup> In short, although the paradigmatic regulatory environment is the product of intentional design, regulators need to answer for both the intended and the unintended channelling effects of their actions as well as for their omissions.<sup>76</sup>

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<sup>74</sup>See Noëmi Manders-Huits and Jeroen van den Hoven, 'The Need for a Value-Sensitive Design of Communication Infrastructures' in Paul Sollie and Marcus Düwell (eds), *Evaluating New Technologies* (Springer, 2009) 51, 54.

<sup>75</sup>See, eg, Manders-Huits and van den Hoven (n 74); and Peter-Paul Verbeek, 'The Moral Relevance of Technological Artifacts', in Paul Sollie and Marcus Düwell (eds), *Evaluating New Technologies* (Springer, 2009) 63.

<sup>76</sup>Compare Bibi van den Berg, 'Robots as Tools for Techno-Regulation' (2011) 3 *Law, Innovation and Technology* 319.

#### 5.2.4 *Field, frame and focus*

If, in the preceding remarks, I seem to be taking a fairly ‘cavalier’ approach to what counts as regulation, how we understand channelling, and so on, forcing the phenomena in which I have declared a cognitive interest to fit into the frame of the regulatory environment, let me try briefly to be as explicit and self-reflective as I can about the nature of the exercise.

First, I am saying that the field in which lawyers and jurists currently pursue their inquiries is too limited. The field needs to be extended so that technological management falls within the scope of legal inquiry. All lawyers and jurists are interested in laws; and some lawyers and jurists are interested in regulation and governance. However, the field tends to be restricted to normative phenomena. Where the norms are complemented, opposed or replaced by technological management, we should be interested in what is going on; and the field of inquiry needs to be adjusted. After all, what sense does it make to say that normative attempts to influence the conduct of car drivers, such as rules requiring the wearing of seat belts, or rules requiring manufacturers to fit seat belts or informal industry codes that require seat belts to be fitted, and the like, fall within the field of inquiry but technological management applied to seat belts (immobilizing the vehicle unless the seat belt is engaged) falls outside that field?

Second, as a mechanism to frame inquiries within the field, I have suggested that we employ the concept of the regulatory environment. To cover the field, this framing has to allow for both normative and non-normative dimensions in the regulatory environment. Because the concept of regulation has been developed in normative settings, we sense some strain when we stretch the concept to include non-normative strategies. However, the alternative to doing this is to risk diverting inquiry back to normative strategies rather than taking seriously the non-normative elements that are of acute interest.

Third, by presenting the complexion of the regulatory environment as a focus for our inquiries, we do put the spotlight on the relevant differences between normative and non-normative regulatory strategies. Indeed, the object of the exercise is not at all to suppress these differences, by covering them over in a broadly defined field and framing of our inquiries. To the contrary, the object of the exercise is precisely to interrogate these differences and to assess their significance for both regulators and regulatees.<sup>77</sup>

### 5.3 *Three generations of regulatory environment*

Gathering up these strands, we might construct a typology highlighting three ideal-typical generations of regulatory environment. In a first-generation regulatory environment, regulators would rely exclusively on normative signals. This is not

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<sup>77</sup>See further Brownsword (n 63).

necessarily a technology-free environment; but the technology would signal in a normative register – for example, in the way that surveillance technologies signal that the likelihood of detection is increased and, hence, regulatees ought (if only for prudential reasons) to comply. In a second-generation regulatory environment, regulators would rely on the design of products and places (architecture). Where regulators rely on such a design strategy, the signal is no longer normative; instead, the design features signal what is practicable or possible. Moreover, at this stage, the line between infrastructural hard-wiring (that has regulatory effects) and actions to be regulated starts to shift dramatically. Finally, in a third-generation regulatory environment, regulators would go beyond traditional normative signals and design of products and places by incorporating the regulatory design within regulatees themselves (for example, by controlling their genetic coding). Where design is embedded in regulatees in such a way that it channels their behaviour, it is likely to be much less apparent to regulatees that they are being regulated – if the design is reliable, regulatees will simply behave (like products) in accordance with their specification. In these three generations, we see our regulatory past, present and future.

It should be emphasized that these are ideal-types, possibly capturing the general direction of regulatory travel, but not at any time perfectly instantiated. So, in the year 2061, we might find that the regulatory environment is still predominantly first-generation. However, if technological management increases in the way that this article anticipates, by that time there will be significant second-generation elements in the regulatory environment. Indeed, in some contexts – for example, the regulation of road traffic<sup>78</sup> – the co-existence of first and second generation dimensions will require some imaginative articulation. While in the year 2061, third-generation regulation might still be experimental, it is possible that by the year 2161, it too will make a more general contribution. At that point in the evolution of the regulatory environment, all strands of normative ordering and technological management will be on the radar.

## 6. The complexion of the regulatory environment

In my introductory remarks, I said that one of the purposes of this paper is to highlight the idea of the complexion of the regulatory environment as a particular focus for juristic inquiries into technological management. In this part of the article, we can begin with another story about golf carts – this time, entirely fictitious – which enables us to observe the material changes that take place in the regulatory signals. In other words, our fictitious story enables us to observe the changing complexion of a particular regulatory environment (namely, the regulatory environment at ‘Westways’, our fictitious golf club). This invites consideration of four matters: the regulatory registers (which are the keys to the complexion of the regulatory environment) and their relevance;

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<sup>78</sup>Compare Leenes and Lucivero (n 37).



the moral significance of technological management; the legitimate application of technological management; and the arguably special status of infrastructural regulation.

### **6.1 *Golf carts at Westways: the changing complexion of a regulatory environment***

In place of the Warwickshire Golf and Country Club that we met earlier in the article, imagine a fictitious golf club, 'Westways'. The story at Westways begins when some of the older members propose that a couple of carts should be acquired for use by members who otherwise have problems in getting from tee to green. There are sufficient funds to make the purchase but the green-keeper expresses a concern that the carts might cause damage to Westways' carefully manicured greens. The proposers share the green-keeper's concerns and everyone is anxious to avoid causing such damage. Happily, this is easily solved. The proposers, who include most of the potential users of the carts, act in a way that is respectful of the interests of all club members; they try to do the right thing; and this includes using the carts in a responsible fashion, keeping them well clear of the greens.

For a time, the carts are used without any problem. However, as the membership of Westways changes – and, particularly, as the older members leave – there are some 'incidents' of irresponsible cart use. The green-keeper of the day suggests that the club needs to take a firmer stance. In due course, the club adopts a rule that prohibits taking carts onto the greens and that penalizes members who break the rule. Unfortunately, this intervention does not help; indeed, if anything, the new rule aggravates the situation. While the rule is not intended to license irresponsible use of the carts (on payment of a fine), this is how some members perceive it; and the effect is to weaken the original 'moral' pressure to respect the greens. Moreover, members know that, in some of the more remote parts of the course, there is little chance of rule-breakers being detected.

Taking a further step to discourage breaches of the rule, it is decided to install a few CCTV cameras around the course at Westways. However, not only is the coverage patchy (so that it is still relatively easy to break the rule without being seen in some parts of the course), the man who is employed to watch the monitors at the surveillance control centre is easily distracted and members soon learn that he can be persuaded to turn a blind eye in return for the price of a couple of beers. Once again, the club fails to find an effective way of channelling the conduct of members so that the carts are used in a responsible fashion.

It is at this juncture that the club turns to a technological fix. The carts are modified so that, if a member tries to take the cart too close to one of the greens, they are warned and, if the warnings are ignored, the cart is

immobilized.<sup>79</sup> At last, thanks to technological management, the club succeeds in realizing the benefits of the carts while also protecting its greens.

As we trace the particular history at our fictitious club, Westways, we see that the story starts with an informal ‘moral’ understanding. In effect, just as in the early days of eBay, regulation rests on the so-called Golden Rule:<sup>80</sup> that is to say, the rule is that members should use the carts (or the auction site) in the way that they would wish others to use them. It then tries to reinforce the moral signal with a rule (akin to a law) that sends a prudential signal (namely, that it is in the interests of members to comply with the rule lest they incur the penalty). However, the combination of a prudential signal with a moral signal is not altogether a happy one because the former interferes with the latter.<sup>81</sup> When CCTV cameras are installed, the prudential signals are amplified to the point that they are probably the dominant (but still not fully effective) signals. Finally, with technological management, the signals change into a completely different mode: once the carts are redesigned, it is no longer for members to decide on either moral or prudential grounds to use the carts responsibly; at the end of the story, the carts cannot be driven onto the greens and the signals are entirely to do with what is possible and impossible.

What the story at Westways illustrates is the significant changes that take place in the ‘complexion’ of the regulatory environment; with each regulatory initiative, the ‘signalling register’ changes from moral, to prudential, to what is possible (and what is impossible). With each move, the moral register is pushed further into the background.

## 6.2 The regulatory registers and their relevance

The complexion of the regulatory environment is found in the particular ‘registers’ represented by the regulatory signals. The registers are the ways in which regulators communicate with regulatees. There are three such registers, each of which represents a particular way in which regulators attempt to engage the practical reason (in the broad and inclusive sense of an agent’s reasons for action)<sup>82</sup> of regulatees. Thus:

- (1) in the first register (the moral register), the coding signals that some act, x, categorically ought or ought not to be done relative to standards of right action – regulators thus signal to regulatees that x is, or is not, the right thing to do;

<sup>79</sup> Compare, too, the next generation carts introduced to the Celtic Manor golf course in Wales: see <[www.ispygolf.com/courses/news/article/Next\\_Generation\\_Golf\\_Carts\\_Arrive.html](http://www.ispygolf.com/courses/news/article/Next_Generation_Golf_Carts_Arrive.html)> accessed 26 April 2014.

<sup>80</sup> As recounted by Jack Goldsmith and Tim Wu, *Who Controls the Internet?* (Oxford University Press, 2006).

<sup>81</sup> Compare the findings in U Gneezy and A Rustichini, ‘A Fine is a Price’ (2000) 29 *Journal of Legal Studies* 1.

<sup>82</sup> In this broad sense, ‘practical reason’ encompasses both moral and non-moral reasons for action.

- (2) in the second register (the prudential register), the coding signals that some act, *x*, ought or ought not to be done relative to the prudential interests of regulatees – regulators thus signal to regulatees that *x* is, or is not, in their (regulatees') self-interest; and,
- (3) in the third register (the register of practicability or possibility), the environment is designed in such a way that it is not reasonably practicable (or even possible) to do some act, *x* – in which case, regulatees reason, not that *x* ought not to be done, but that *x* cannot be done.

In an exclusively moral environment, the primary normative signal (in the sense of the reason for the norm) is always moral; but the secondary signal, depending upon the nature of the sanction, might be more prudential. In traditional criminal law environments, the signals are more complex. Whilst the primary normative signal to regulatees can be either moral (the particular act should not be done because this would be immoral) or paternalistically prudential (the act should not be done because it is contrary to the interests of the regulatee), the secondary signal represented by the deterrent threat of punishment is prudential.<sup>83</sup> As regulators reinforce the criminal law with technological tools (leading to technological management), the strength and significance of the moral signal fades. Instead, the signals sent to regulatees by the technologies tend to accentuate that the doing of a particular act is contrary to the interests of regulatees (because non-compliance will be detected and it will be penalized), or that it is not reasonably practicable, or even that it is simply not possible.<sup>84</sup>

### 6.3 *The moral significance of technological management*

Where technological management is introduced in, so to speak, the criminal justice track – that is to say, where it is introduced to protect the person or property of agents against the intentionally wrongful acts of others – the resulting pattern of 'respectful' conduct is not explained by the prudential choices of regulatees, even

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<sup>83</sup> Compare Alan Norrie, 'Citizenship, Authoritarianism and the Changing Shape of the Criminal Law' in Bernadette McSherry, Alan Norrie and Simon Bronitt (eds), *Regulating Deviance* (Hart, 2009) 13. *Ibid.*, at 15, Norrie highlights three broad developments in recent British criminal law and justice, namely: (i) an increasing emphasis on notions of moral right and wrong and, concomitantly, on individual responsibility ('responsibilisation'); (ii) an increasing emphasis on dangerousness and, concomitantly, on the need for exceptional forms of punishment or control ('dangerousness'); and (iii) an increasing reliance on preventative orders and new forms of control ('regulation'). While the first of these developments is in line with the aspirations of moral community, it is the second and the third that such a community needs to monitor with care. In this light, see, in particular, Lucia Zedner, 'Fixing the Future? The Pre-emptive Turn in Criminal Justice' in McSherry, Norrie, and Bronitt (eds) (n 83) 35.

<sup>84</sup> Compare Bert-Jaap Koops, 'Technology and the Crime Society: Rethinking Legal Protection' (2009) 1 *Law, Innovation and Technology* 93.

less by their moral judgments. In an aspirant moral community, it is when code and design leave regulatees with no option other than compliance that the legitimacy of the means employed by regulators needs urgent consideration. The problem here is that, even if we concede that the technology channels regulatees towards right action, the technologically secured pattern of right action is not at all the same as freely opting to do the right thing.<sup>85</sup> Moral virtue, as Ian Kerr protests, cannot be automated.<sup>86</sup> The point is that the shift from law (or ethics) to technological instruments changes the ‘complexion’ of the regulatory environment in a way that threatens to compromise the possibility of authentic moral action.<sup>87</sup>

The precise pathology of precluding an agent from doing the right thing for the right reason is, I confess, a matter for further debate. Arguably, 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); or 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, it is the denial of the agent’s responsibility for the act; or perhaps that it frustrates the drive for recognition and interferes with the complex relationship between respect and esteem.<sup>88</sup> At all events, it will be for each community with moral aspirations to determine how far it matters that (as

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<sup>85</sup>Compare Evgeny Morozov, *To Save Everything, Click Here: Technology, Solutionism, and the Urge to Fix Problems that Don’t Exist* (Allen Lane, 2013) 190–193 (‘Why You Should Ride the Metro in Berlin’).

<sup>86</sup>Ian Kerr, ‘Digital Locks and the Automation of Virtue’ in Michael Geist (ed), *From ‘Radical Extremism’ to ‘Balanced Copyright’: Canadian Copyright and the Digital Agenda* (Irwin Law, 2010) 247.

<sup>87</sup>See, further, Roger Brownsword, ‘Lost in Translation: Legality, Regulatory Margins, and Technological Management’ (2011) 26 *Berkeley Technology Law Journal* 1321–1365. Compare Charles Taylor, *The Ethics of Authenticity* (Cambridge MA: Harvard University Press, 1991), for a thoughtful critique of various strands of ‘modernity’ in relation to a supposed loss of ‘authenticity’. Taylor argues persuasively that the real issue is not whether we are for or against authenticity, but ‘about it, defining its proper meaning’ (73); and, for Taylor, authenticity is to be understood as a moral ideal that accords importance to agents fulfilling themselves by being true to themselves – but without this ‘excluding unconditional relationships and moral demands beyond the self’ (72–73).

<sup>88</sup>I am grateful for this point to Marcus Düwell and others who participated in a symposium on ‘Human Dignity: A Major Concept in Ethics?’ held at the University of Tübingen on 24 October 2014. I am also grateful to Patrick Capps for drawing my attention to Frederick Neuhausser, *Rousseau’s Theodicy of Self-Love: Evil, Rationality, and the Drive for Self-Recognition* (Oxford University Press, 2008). The precise bearing of the latter on my concerns about technological management merits further reflection. However, we should certainly note: (i) Neuhausser’s important observation that ‘since respect alone can never wholly satisfy the human need for recognition, a complete solution to the problem of *amour-propre* will require a set of social – not merely political – institutions that, beyond insuring equal respect for all citizens, creates a space within which individuals can pursue their many and diverse needs for esteem without producing a world of enslavement, conflict, vice, misery, and alienation’ (116); and (ii) his insightful discussion (in Ch 7) of the ways in

Kantians might put it) agents should act ‘out of duty’ rather than merely ‘in accordance with duty’ and how important it is that agents are able to ‘express’ their moral virtue, and so on. Having clarified such matters, the community will then be in a position to consider whether, and in which particular way, technological management might compromise the possibility of moral agency.

Let me put this fundamental issue to one side and flag up a way in which technological management might compromise the possibility of engaging in responsible moral citizenship. Evgeny Morozov<sup>89</sup> identifies the particular problem with technological management when he considers how this regulatory strategy might restrict the opportunities for responsible acts of conscientious objection and civil disobedience. Recalling the famous case of Rosa Parks, who refused to move from the ‘white-only’ section of the bus, Morozov points out that this important act of civil disobedience was possible only because

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’.<sup>90</sup>

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. Morozov continues:

Will this new transportation system be convenient? Sure. Will it give us Rosa Parks? Probably not, because she would never have gotten to the front of the bus to begin with. The odds are that a perfectly efficient seat-distribution system – abetted by ubiquitous technology, sensors, and facial recognition – would have robbed us of one of the proudest moments in American history. Laws that are enforced by appealing to our moral or prudential registers leave just enough space for friction; friction breeds tension, tension creates conflict, and conflict produces change. In contrast, when laws are enforced through the technological register, there’s little space for friction and tension – and quite likely for change.<sup>91</sup>

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.

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which the drive for recognition from others might motivate the adoption of an impartial view that is characteristic of moral reason.

<sup>89</sup>Morozov (n 85).

<sup>90</sup>*Ibid*, 204.

<sup>91</sup>*Ibid*, 205.

Now, some might try to nip the point in the bud by insisting that technological management, because it is not a rule (or does not present in a normative way), is simply not a candidate for recognition as a law; whatever we make of technological management as a regulatory strategy, it falls beyond the scope of the debate about conscientious objection (to rules of law) or similarly acts of civil disobedience. However, suppose that the use of technological management is authorized by legislation; indeed, suppose that legislation specifically authorizes the use of a suite of smart technologies on and around buses in order to maintain a system of racial segregation on public transport. Is the authorizing provision 'law'? There is no dodging this question on the ground that it does not concern a rule or norm; the authorizing rule is clearly eligible as a 'law' provided that it meets the particular qualifying conditions. Crucially, as Morozov points out, one way in which criticisms of the 'law' might have been articulated has been closed off: it is not just the morally objectionable particular purpose of this provision that is at issue but its mandate for technological management, a mandate that is potentially corrosive of active and responsible moral citizenship.

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).<sup>92</sup> 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 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 traditional acts of 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.

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<sup>92</sup>Directive 2001/29/EC on the harmonization of certain aspects of copyright and related rights in the information society, OJ L 167, 22 June 2001, 0010-0019.

Taking stock, it seems to me that some precaution is in order. If we knew just how much space a moral community needs to safeguard against the automation of virtue, and if we had some kind of barometer to measure for this, we might be able to draw some regulatory red lines. However, without knowing these things, a precautionary approach (according and protecting a generous margin of operational space for moral reflection, for moral reason and for moral objection) looks prudent. Without knowing these things, the cumulative effect of adopting technological management needs to be a standing item on the regulatory agenda.<sup>93</sup>

#### 6.4 *The legitimate application of technological management*

It is one thing to be concerned about technological management where it targets *intentional* wrongdoing. Of course, some might argue that this is exactly where crime control most urgently needs to adopt (rather than to eschew) technological management;<sup>94</sup> but, as I have said, this is where questions about compromising the conditions for moral community are most clearly engaged. That said, it surely cannot be right to condemn all applications of technological management as illegitimate. For example, 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)?<sup>95</sup> 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?<sup>96</sup>

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. Perhaps a prudential rule of thumb would be that technological management should be adopted only where it is designed for cheap and feasible discontinuity. The present question, however, is not about prudence; the question is whether there are 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

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<sup>93</sup>Karen Yeung, 'Can We Employ Design-Based Regulation While Avoiding Brave New World?' (2011) 3 *Law, Innovation and Technology* 1.

<sup>94</sup>Compare Roger Brownsword, 'Neither East Nor West, Is Mid-West Best?' (2006) 3 *Scripted* 3.

<sup>95</sup>For a vivid example (slam-doors on trains), see Jonathan Wolff, 'Five Types of Risky Situation' (2010) 2 *Law, Innovation and Technology* 151.

<sup>96</sup>See Brownsword (n 21); and for a recent example of an apparently significant life-saving use of robots, achieved precisely by 'taking humans out of the equation', see 'Norway Hospital's "Cure" for Human Error' BBC News (9 May 2015) <[www.bbc.co.uk/news/health-32671111](http://www.bbc.co.uk/news/health-32671111)>.

can be held to account for taking the relevant measures, the legitimacy issue centres on the reduction of the 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:

- (1) A's own interests;
- (2) the interests of some specific other, B; or
- (3) the general interest of some group of agents.

We can consider whether the reduction of 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, if A's adoption of technological management impacts on others, there will be questions about whose interests should be recognized as legitimate; and, in the event of conflict, there will be a question about which interest should prevail. For example, if A (like the Warwickshire golf club) adopts technological management as a measure of self-defence, the legitimacy of this measure will depend on the legitimacy of the interests that A seeks to defend and the legitimacy of the interests (in this example, the interests of prospective joy-riders) that are reduced by this measure.

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 which people with dementia or young children can wander, this is arguably a legitimate enforcement of paternalism. However, if B is a competent agent, A's paternalism is problematic. Quite simply, even if A correctly judges that exercising some option is not in B's best interest, or that the risks of exercising the option outweigh its benefit, how is A to justify this kind of interference with B's freedom?<sup>97</sup> 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 it where the paternalistic limits are imposed by technological management

In the third case, the use of technological management (in a generalized paternalistic way) might impinge on the legitimate preferences of more than one agent. Once again, in the absence of consent, this is a cause for concern. However, in many contexts, it should be possible for regulators to accommodate the legitimate preferences of their regulatees – for example, for some time at least, it should be

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<sup>97</sup>Compare the discussion in Roger Brownsword, 'Public Health Interventions: Liberal Limits and Stewardship Responsibilities' (2013) *Public Health Ethics* (special issue) doi: 10.1093/phe/pht030.



possible to accommodate the preferences of those who wish to drive their cars (rather than be transported in driverless vehicles) 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 responsibilities).

### 6.5 *The special status of infrastructural regulation?*

The concerns that have been expressed with regard to the complexion of the regulatory environment assume that the regulatory interventions in question are directed at human interactions rather than at the generic infrastructure presupposed by such interactions. Although the drawing of the line between such interactions and the infrastructure itself is subject to debate, there is a view that regulators may legitimately use a technological fix where their intention is to protect the generic infrastructure.<sup>98</sup> Stated bluntly, the underlying thought is that, even if technological management can interfere with moral community, unless the basic infrastructure is in place, there is no prospect of any kind of human community.<sup>99</sup>

So long as our understanding of the generic infrastructure is restricted to the *essential* conditions for human existence (particularly to such vital matters as the availability of food and water, and the preservation of the environment), there will remain a great deal of regulatory space in which to debate the legitimacy of the use of technological management. However, if each community adjusts its understanding of the infrastructural threshold in a way that reflects the stage of its technological development, this might involve characterizing many safety features that are designed into, say, everyday transport and healthcare facilities, as ‘infrastructural’. A corollary of this is that, where infrastructural conditions are heavily engineered, there is a temptation simply to define away concerns about the legitimacy of technological management and its impact on the complexion of the regulatory environment.

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<sup>98</sup>See, eg, David A Wirth, ‘Engineering the Climate: Geoengineering as a Challenge to International Governance’ (2013) 40 *Boston College Environmental Affairs Law Review* 413, 437: ‘Lawmakers, both domestic and international would be remiss not to seriously consider geoengineering proposals to mitigate the harm of global warming.’ This view is also implicit in Gareth Davies, ‘Law and Policy Issues of Unilateral Geoengineering: Moving to a Managed World’ <[http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1334625](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1334625)> accessed 10 May 2015. See, too, Roger Brownsword, ‘Crimes Against Humanity, Simple Crime, and Human Dignity’ in Britta van Beers, Luigi Corrias and Wouter Werner (eds), *Humanity across International Law and Biolaw* (Cambridge University Press, 2013) 87, 106–109.

<sup>99</sup>See, further, Roger Brownsword, ‘Responsible Regulation: Prudence, Precaution and Stewardship’ (2011) 62 *Northern Ireland Legal Quarterly* 573; and ‘Criminal Law, Regulatory Frameworks and Public Health’ in AM Viens, John Coggon and Anthony S Kessel (eds) *Criminal Law, Philosophy and Public Health Practice* (Cambridge University Press, 2013) 19.

In an attempt to develop these primitive ideas, we can ask a number of questions; in particular: what might be the candidate ingredients or conditions for the generic infrastructure in this most fundamental sense? Where do we draw the line between the generic infrastructure and more specific infrastructures? And, where do we draw the line between the generic infrastructural conditions and activities on the infrastructures? Having sketched some responses to these questions, we can outline the features of the special regulatory jurisdiction that goes with the defence of the generic infrastructure.

### 6.5.1 *The generic infrastructural conditions*

What are the conditions that make up the generic infrastructure? According to Brett Frischmann, one of the characteristics of infrastructural resources – and these resources, Frischmann argues, tend to be undervalued – is that they are ‘generic’ rather than ‘special purpose’.<sup>100</sup> So, for example, an electricity grid

delivers power to the public, supporting an incredibly wide range of uses, users, markets, and technologies. It is not specially designed or optimized for any particular use, user, market, technology, or appliance; it provides non-discriminatory service for a toaster and a computer, for Staples and a pizzeria, and so on.<sup>101</sup>

Continuing in this vein, Frischmann suggests:

Genericness implies a range of capabilities, options, opportunities, choices, freedoms. Subject to standardized compatibility requirements, users decide what to plug in, run, use, work with, play with. Users decide which roads to travel, where to go, what to do, who to visit. Users choose their activities; they can choose to experiment, to innovate, to roam freely. Users decide whether and what to build. Users decide how to use their time and other complementary resources. Infrastructure (providers) enable, support, and shape such opportunities.<sup>102</sup>

In these evocative remarks, Frischmann assumes that infrastructure ‘users’ are already in the position of a potentially functioning agent. His ‘users’ are already in a position to decide how to use the infrastructural resources; they are already in a position to be able to choose their activities – whether to be innovators or free spirits, and so on. For my purposes, ‘genericness’ is to be understood more restrictively; it signifies those infrastructural resources and capabilities that are already possessed by Frischmann’s users.

The obvious place to start is with life itself. Quite simply, the one thing that humans must have before they are capable of acting, transacting or interacting in the purposive (goal-directed) way that we associate with human agency is

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<sup>100</sup>Brett M Frischmann, *Infrastructure* (Oxford University Press, 2012).

<sup>101</sup>*Ibid.*, 65.

<sup>102</sup>*Ibid.*

life itself.<sup>103</sup> However, to be alive, although necessary, is not sufficient for agency; there must also be conditions that are conducive to the enjoyment of a minimal level of health and well-being. For humans whose basic health and well-being is under threat, there is little prospect of actualizing their agency. But, what are the conditions that bear on basic human health and well-being?

Rather than asking what factors are conducive to such a condition, we can readily identify the kind of factors that are antithetical to such a condition. For example, we can point to problems with food security and clean water, to environmental pollution and to the prevalence of disease. Sadly, chronic conditions of this kind can be found in many parts of the world and, following a natural disaster, we will often see some of these conditions in an acute form. In these cases, we can say that the infrastructure is deficient or, in the case of an emergency, that it has collapsed.

Arguably, this quest to identify the essential conditions of a human agent's well-being is analogous to Martha Nussbaum's specification of the threshold conditions for human dignity.<sup>104</sup> As is well known, Nussbaum lists 10 capabilities, a threshold level of each of which must be secured as a necessary condition of any decent political order. The 10 capabilities are: life; bodily health; bodily integrity; senses, imagination and thought; emotions; practical reason; affiliation; [concern for] other species; play; and control over one's environment. While the capabilities at the top of the list must be within the essential infrastructural set (because they pertain to the possibility of any kind of agency), they are less clearly so as we move down the list. In the event that it were agreed that all the capabilities listed were within the essential infrastructure, it would remain to determine the applicable threshold level of each capability. As these matters are debated, the one restriction to be observed is that the conditions must not be tied to *particular* projects that agents might have. What we are after is the infrastructure for purposive activity in a generic sense, not for particular purposes or projects.

One other point should be made. In a world that is populated by humans but that is more or less free of technologies, we might treat the generic infrastructural conditions as naturally occurring. Some natural habitats might support human life better than others, and resourceful humans will seek out the best infrastructural conditions that they can find. However, as technologies are developed, the necessary conditions will be constructed and we will find humans living in some places that are, by nature, inhospitable and unsupportive. Moreover, as globalization intensifies, the essential support for many humans will be supplied remotely. The point, therefore, is that the essential infrastructure might involve various combinations of naturally occurring and man-made elements.

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<sup>103</sup>For the difference between goal-achieving, goal-seeking and goal-directed behaviour, see David McFarland, *Guilty Robots, Happy Dogs: The Question of Alien Minds* (Oxford University Press, 2008) 10–12.

<sup>104</sup>Martha C Nussbaum, *Creating Capabilities* (The Belknap Press of Harvard University Press, 2011).

### 6.5.2 *Generic and specific infrastructures*

How do we draw the line between the generic infrastructure and more particular, specific, infrastructures? In the light of what we have already said, I suggest that it is not too difficult to distinguish between generic and specific infrastructures. Stated shortly, the critical question is whether, if the infrastructure were to be compromised, this would affect the possibility of any kind of human activity or whether it would have more limited impact, affecting only a particular range of activities. To take Frischmann's example of the roads, these are important and they are enabling of many different uses and projects; they enhance agency but they are not essential to it. Human agency does not presuppose railway tracks, roads or any other kind of transport infrastructure. In Frischmann's terminology, and for the purposes of his economic analysis these resources are 'generic'; but for my regulatory purposes, and particularly with a view to the application of technological management, these resources are not part of the *generic* infrastructure. Indeed, without the generic infrastructure, the construction of more specific infrastructures (such as the infrastructure for railways or road transport) would not be possible. It is not simply that some infrastructural conditions are more specific than others; it is that the human construction of specific infrastructures itself presupposes the generic infrastructure.

Even in our 'information societies', we might say much the same about the infrastructural technological elements.<sup>105</sup> Granted, cybercrime is particularly serious when it strikes at these infrastructural elements; and, for those communities that increasingly transact and interact online, this is an extremely serious matter.<sup>106</sup> Nevertheless, this is not part of the *generic* infrastructure – at any rate, not just yet.<sup>107</sup> We could also say much the same about the banking system, both offline and online. Without the banks, the conditions for modern commerce would be compromised. However, the crisis in the financial sector, although extremely serious for a certain class of human activities does not come close to threatening the generic infrastructure itself. Although many thought that the collapse of key financial institutions would be 'the end of the world', they were some way off the mark.

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<sup>105</sup>For discussion by Frischmann (n 100), see Ch 13.

<sup>106</sup>Following the devastating DDoS attacks on Estonia in 2007, the question of the vulnerability of critical information infrastructures in Europe rapidly moved up the political agenda: see House of Lords European Union Committee, *Protecting Europe Against Large-Scale Cyber-Attacks* (Fifth Report, Session 2009–2010); and *The UK Cyber Security Strategy* (Protecting and promoting the UK in a digital world) (London: Cabinet Office, November 2011).

<sup>107</sup>But, see Roger Brownsword, 'The Shaping of Our On-Line Worlds: Getting the Regulatory Environment Right' (2012) 20 *International Journal of Law and Information Technology* 249.

### 6.5.3 *The generic infrastructure and activities*

How should we distinguish between the generic infrastructural conditions and those human activities that they support and facilitate? This is perhaps the most tricky of the line-drawing exercises. If, for example, we focus on an agent's basic health and well-being, it is obvious that it can be harmed in more than one way – for example, it can be harmed by the isolated act of another human, by some inhibiting situational threat (such as that of terrorism), or by deficient living conditions. What makes a feature generically infrastructural is that it speaks to the general possibility of agency, irrespective of the identity of a particular agent and of an agent's particular purposes, rather than the particular occurrent prospects of the agent. Or, to put this another way, if harm is occasioned to the generic infrastructure, this will also harm the particular occurrent prospects of agents; but, if harm is occasioned to a particular agent, while it will harm that agent's particular occurrent prospects, it does not follow that it will also harm the generic infrastructure. To labour the point: there first has to be a generic infrastructure and then there can be activity: while there can be infrastructure without activity, there can be no activity without infrastructure.

If we think about the regulatory environment in this kind of way, we can begin to distinguish between those parts of the environment that are designed to secure the infrastructural conditions and those parts that are intended to direct the conduct of regulatees as they act, transact and interact on the infrastructure. Inevitably, there will be cases that are clearer than others: for example, it is clear that, while deficient living conditions are infrastructural, an isolated assault is not; and, depending on the scale, intensity and systematic nature of the threat, we might find it more difficult to classify terrorism, or genocide and so on.

### 6.5.4 *A special regulatory jurisdiction*

Arguably, four major regulatory implications follow from the analysis of the generic infrastructure that I am proposing.

First, while the deepest layer of the regulatory environment should be concerned with securing the generic infrastructure for agency itself, the remainder should set the ground rules for agents' on-stage interactions and transactions. While the former is foundational and universal, the latter can be more tuned to local cultural commitments and preferences. To put this in cosmopolitan terms, while all regulators share a responsibility for securing the essential infrastructural conditions, within each community there is room for some (legitimate) variation in the regulation of local (on-stage) activities.<sup>108</sup>

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<sup>108</sup>For further discussion, see Roger Brownsword, 'Regulatory Cosmopolitanism: Clubs, Commons, and Questions of Coherence' (TILT Working Paper series, University of Tilburg, 2010).

Second, if the infrastructure is to be secured, this implies – even if this is against the grain of current experience – a considerable degree of international co-ordination and shared responsibility.<sup>109</sup> Moreover, because politics tends to operate with short-term horizons, it also implies that the regulatory stewards should have some independence from the political branch, but not of course that they should be exempt from the Rule of Law's culture of accountability and justification.<sup>110</sup>

Third, although (after its initial honeymoon period) the precautionary principle has been severely criticized – for example, it has been accused of being ‘an overly-simplistic and under-defined concept that seeks to circumvent the hard choices that must be faced in making any risk management decision’<sup>111</sup> – a form of precautionary reasoning might well be acceptable in defence of the infrastructure.<sup>112</sup> According to such reasoning, where regulators cannot rule out the possibility that some activity threatens the infrastructure (which, on any view, is potentially ‘catastrophic’), then they should certainly engage a precautionary approach.<sup>113</sup> This reasoning, it should be emphasized, assumes an active employment of precaution. It is not simply that a lack of full scientific certainty is no reason (or excuse) for inaction – which puts one reason for inaction out of play but still has no tilt towards action; rather, where the harm concerns the infrastructure, there is a need to initiate preventive and protective action.<sup>114</sup>

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<sup>109</sup>See Wirth (n 98) esp. 430–436.

<sup>110</sup>See, too, Roger Brownsword, ‘Responsible Regulation: Prudence, Precaution and Stewardship’ (2011) 62 *Northern Ireland Legal Quarterly* 573; and Davies (n 98).

<sup>111</sup>Gary E Marchant and Douglas J Sylvester, ‘Transnational Models for Regulation of Nanotechnology’ (2006) 34 *Journal of Law, Medicine and Ethics* 714, at 722. For an extended critique, see Cass R Sunstein, *Laws of Fear* (Cambridge University Press, 2005).

<sup>112</sup>Compare Deryck Beylveled and Roger Brownsword, ‘Complex Technology, Complex Calculations: Uses and Abuses of Precautionary Reasoning in Law’ in Marcus Duwell and Paul Sollie (eds), *Evaluating New Technologies: Methodological Problems for the Ethical Assessment of Technological Developments* (Springer, 2009) 175; and ‘Emerging Technologies, Extreme Uncertainty, and the Principle of Rational Precautionary Reasoning’ (2012) 4 *Law Innovation and Technology* 35.

<sup>113</sup>Even Sunstein changes tack when catastrophic harms are in contemplation. See Cass R Sunstein, *Worst-Case Scenarios* (Harvard University Press, 2007) esp Ch 3. At 167–168, Sunstein develops the following precautionary approach: ‘In deciding whether to eliminate the worst-case scenario under circumstances of uncertainty, regulators should consider the losses imposed by eliminating that scenario, and the size of the difference between the worst-case scenario under one course of action and the worst-case scenario under alternative courses of action. If the worst-case scenario under one course of action is much worse than the worst-case scenario under another course of action, and if it is not extraordinarily burdensome to take the course of action that eliminates the worst-case scenario, regulators should take that course of action. But if the worst-case scenario under one course of action is not much worse than the worst-case scenario under another course of action, and if it is extraordinarily burdensome to take the course of action that eliminates the worst-case scenario, regulators should not take that course of action.’

<sup>114</sup>Compare Elizabeth Fisher, Judith Jones and René von Schomberg, ‘Implementing the Precautionary Principle: Perspectives and Prospects’ in Elizabeth Fisher, Judith Jones

The range of precautionary measures is quite broad. At minimum, regulators should consider withdrawing any IP encouragement (notably patents) for the relevant technology<sup>115</sup> and they may in good faith apply protective measures or prohibitions even though such measures involve some sacrifice of a valued activity (actual or anticipated).<sup>116</sup> It is true that, in conditions of uncertainty, a precautionary sacrifice might prove unnecessary. However, the alternative is to decline to make the sacrifice even when this was necessary to defend the generic conditions. If regulators gamble with the generic infrastructure, and if they get it wrong, it is not just the particular valued activity, but all human activities, that will be affected adversely.

Fourth, we come to the key feature for present purposes. I have made much of the point that, for communities that have moral aspirations or that value their individual autonomy, it is important that the regulatory environment does not design out (non-normatively) the opportunities for acting freely or doing the right thing. In other words, we need to be concerned about the impact of technological management on the conditions for moral community. Nevertheless, where the regulatory stewards are acting to protect the generic infrastructural resources, a resort to designed-in solutions may be more readily justified. For example, if humans will not comply with normative regulatory requirements that are designed to tackle global warming, a non-normative geo-engineering technical fix might be a legitimate way of dealing with the problem.<sup>117</sup> Of course, the conditions on which technological management is licensed for the purpose of protecting the generic infrastructure need to be qualified. It makes no sense to trade one catastrophe for another. So, bilateral precaution needs to be applied: if interventions that are containable and reversible are available, they should be preferred. As Gareth Davies rightly puts it, the rational approach is to balance 'the costs and risks of geoengineering against the costs and risks of global warming'.<sup>118</sup>

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and René von Schomberg (eds), *Implementing the Precautionary Principle: Perspectives and Prospects* (Edward Elgar, 2006) 1; and Elizabeth Fisher, *Risk Regulation and Administrative Constitutionalism* (Hart, 2007).

<sup>115</sup>Compare Estelle Derclaye, 'Should Patent Law Help Cool the Plant? An Inquiry from the Point of View of Environmental Law – Part I' (2009) 31 *European Intellectual Property Review* 168, and 'Part II' (2009) 31 *European Intellectual Property Review* 227.

<sup>116</sup>For some insightful remarks on the difference between dealing with technologies that are already in use and newly emerging technologies, see Alan Randall, *Risk and Precaution* (Cambridge University Press, 2011).

<sup>117</sup>For an overview of such possible fixes, see Jesse Reynolds, 'The Regulation of Climate Engineering' (2011) 3 *Law, Innovation and Technology* 113; and, for an indication of the burgeoning literature as well as possible responses to transboundary liability issues, see Barbara Saxler, Jule Siegfried and Alexander Proelss, 'International Liability for Transboundary Damage Arising from Stratospheric Aerosol Injections' (2015) 7 *Law Innovation and Technology* (this issue).

<sup>118</sup>Davies (n 98) 5.



This leaves one other point. Although I have taken a restrictive approach to what counts as a generic infrastructural condition, I would not want to lose the benefits of Frischmann's insights into the productive value of infrastructural resources that are generic in his sense. Political communities might well decide that modern infrastructures, such as the Internet, are so valuable that they need to be protected by measures of technological management. Provided that these communities have a clear understanding of not only the value of such infrastructural resources but also of any downsides to technological management, then they should be entitled to regulate the resource in this way.

## 7. The new domain and the questions to be addressed

If we adopt the idea of 'the regulatory environment' as setting the frame for jurisprudential inquiry, and if we embrace the notion that, in this environment, there will be both normative and non-normative dimensions, we facilitate an understanding of how legal norms relate to technological management. However, this is just the beginning: with this new domain for juristic inquiry, new questions abound as we reflect on the significance of technological management in the regulatory environment.

Broadly speaking, we can divide the new questions into three classes. First, there are questions about the organizing ideas that have taken centre-stage in this paper. These are questions about the concept of the regulatory environment itself and the idea of the 'complexion' of the regulatory signals that constitute that environment.

Second, there are questions about a number of 'ideals' that we assume to be, if not intrinsic to the legal enterprise, at least associated with best practice. At the head of this list is the Rule of Law; but we should also examine the ideal of coherence (which is highly valued by private lawyers)<sup>119</sup> and the Millian harm principle (which is regularly relied on to test the legitimacy of particular uses of the criminal law).<sup>120</sup> In each case, the adoption of technological management seems to be disruptive of these ideals and the question is whether we can re-engineer them for a regulatory environment that employs both normative and non-normative signals. To illustrate one of the issues, consider the well-known Fullerian principles of legality and, concomitantly, the notion of the Rule of Law as the publication

<sup>119</sup>For a discussion of this ideal in the context of patenting new technologies, see Roger Brownsword, 'Regulatory Coherence: A European Challenge' in Kai Purnhagen and Peter Rott (eds), *Varieties of European Economic Law and Regulation: Essays in Honour of Hans Micklitz* (Springer, 2014) 235.

<sup>120</sup>See John Stuart Mill, 'On Liberty', in JS Mill, *Utilitarianism* (Mary Warnock ed, Collins/Fontana 1962 [1859]); and, for a sketch of the necessary re-working of Millian liberalism, see Roger Brownsword, 'Criminal Law, Regulatory Frameworks and Public Health' in AM Viens, J Coggon and A Kessel (eds), *Criminal Law, Regulatory Frameworks and Public Health* (Cambridge University Press, 2013) 19.



(promulgation) of rules and then the congruent administration of those rules. Can these principles be stretched across to non-normative strategies or do they again presuppose rules (and a normative dimension)? On the face of it, the Fullerian principles do presuppose rules (that the rules should be published, that the rules should be prospective, that the rules should be clear and relatively constant, that the rules should not be contradictory and so on) and, indeed, they seem to be particularly focused on the rules of the criminal law (or other duty-imposing rules). If this is correct, perhaps the ideal of legality remains relevant but its focus shifts to (i) the processual public law values of transparency, accountability, inclusive participation, reason-giving and the like together with (ii) the controls exerted by background fundamental values (such as compatibility with respect for human rights and human dignity).<sup>121</sup> In this way, while the zone regulated *directly* by legal norms might shrink, the significance of law and legality (as a check on technological management) remains. More generally, the question is this: if we make some generous assumptions about the effectiveness of technological management, what should we treat as the criteria for its legitimate use and how do traditional ideals of legality and coherence bear on this matter?

Third, on the assumption that there will be a major technological impingement on the way in which we transact and interact in the future, there are questions about the fate of those bodies of law – contract law, tort law and criminal law in particular – that have hitherto regulated such activities. For example, if smart cars make much of road traffic laws redundant, if technological management in hospitals and workplaces ensures that patients and employees are safe, how much of both the criminal law and the law of negligence is side-lined? Where we are relying on technological management for health and safety purposes, it will be largely ‘regulatory’ criminal law that is displaced; and, given that this is a body of law that features strict and absolute liability offences, and about which we do not feel entirely comfortable, perhaps this is no bad thing. Arguably, our moral concerns are most urgently engaged where it is the classical crimes of intent that are rendered redundant by technological measures. Again, if the technological infrastructure for transactions – imagine, as James Gleick does, an ‘economy of the world [that] is transacted in the cloud’<sup>122</sup> – manages much of the process, what does this mean for the leading principles of contract law and a jurisprudence that is heavy with case-law from earlier centuries? Does contract law have a future when, thanks to ‘RFID tags and smart payment cards, together with a reader able to link the information together and some biometric security, [customers can] merrily wheel [their] trolley[s] out of the supermarket without

<sup>121</sup>In the context of preventive measures involving a deprivation of liberty, see further David Dyzenhaus, ‘Preventive Justice and the Rule-of-Law Project’ in Ashworth, Zedner and Tomlin (n 10) 91.

<sup>122</sup>James Gleick, *The Information* (Fourth Estate, 2012) 396.

either queuing or being arrested'<sup>123</sup>? Similarly, when so many of our future transactions and interactions will take place in environments that are both data-gathering and data-giving, what does this signify for the laws of privacy and data protection? Is privacy really dead? Must data flow? Are our informational interests to be reduced to a balance of acceptable risk and desired benefits?

Looking much further ahead, there are questions about the possible bio-management of human conduct. Thus far, although advances in biotechnologies have received at least as much attention as developments in information and communication technologies, their penetration into daily life has been much more modest and their utility as regulatory instruments much less obvious. Genetics and genomics are extremely complex. To be sure, there is a major investment in big bio-banking projects that seek to unravel these complexities in a way that improves healthcare; but, even if major strides are made in biobank and in genetic research, by 2061, the chances are that *behavioural* genetics will be extremely primitive.<sup>124</sup> However, given another one hundred years of research and development, by let us say 2161, it might be a different story. If so, and if bio-management operates through internal signalling mechanisms which we (humans) know to be operative but of which we are individually not conscious, there is a new internal dimension to the regulatory environment. In 2161, that environment might still feature signals that are 'external' to regulatees and to which regulatees respond but it will also feature signals that are 'internal' to regulatees. In other words, if we move towards such a scenario, we will need to frame our inquiries by reference to a regulatory environment that has not only normative and non-normative dimensions but also external and (third-generational) internal dimensions.

## 8. Conclusion

After this long haul, where does all this lead? What is the message of the article? In practice, technologies are often introduced to save money but, in principle, technological management can be employed for many different purposes: to improve human health and safety, to protect the natural environment, to produce goods and services more cheaply and reliably and to respect values such as privacy, as well as to control crime. In itself, technological management does not point to either dystopian or utopian futures. There is no reason to become a technophobe, categorically rejecting the development and use of new technologies.<sup>125</sup> Nevertheless,

<sup>123</sup>Kieron O'Hara and Nigel Shadbolt, *The Spy in the Coffee Machine* (Oneworld, 2008) 193.

<sup>124</sup>See, eg, Nuffield Council on Bioethics, *Genetics and Human Behaviour: The Ethical Context* (London, 2002).

<sup>125</sup>For example, at the new South Glasgow University Hospital, a fleet of 26 robots does the work of 40 people in delivering food, linen and medical supplies to wards and then taking away waste for disposal. This frees up the clinical staff; none of the existing staff were laid off; new staff were hired to operate and control the robots; and because humans have been

what becomes of the law and the ideal of legality in the regulatory environment of 2061 – let alone in 2161 – is a matter of concern not just to legal practitioners but to the community as a whole. Accordingly, before technological management has already become an unquestionable and irreversible part of the infrastructure and a pervasive part of the regulatory environment, it is important to think through the implications of this prospective transformation in social ordering.<sup>126</sup>

It is trite but true that technologies tend to be disruptive. To this, technological management is no exception, representing a serious disruption to the regulatory order. We need to be aware that technological management is happening; we need to try to understand why it is happening; and, above all, we need to debate (and respond to) the prudential and moral risks that it presents. But, how are these things to be done and by whom? To do these things, I have suggested, we do not need to provoke objections by insisting that ‘code’ is ‘law’; to bring technological management onto our radar, we need only frame our inquiries by employing an expansive notion of the ‘regulatory environment’ and our focus on the complexion of the regulatory environment will assist in drawing out the distinction between the normative and non-normative elements. As for the ‘we’ who will take the lead in doing these things, no doubt, some of the work will be done by politicians and their publics but, unless jurists are to stick their heads in the sand, they have a vanguard role to play. Quite rightly, in her recent book, Mireille Hildebrandt remarks:

If we do not learn how to uphold and extend the legality that protects individual persons against arbitrary or unfair state interventions, the law will lose its hold on our imagination. It may fold back into a tool to train, discipline or influence people whose behaviours are measured and calculated to be nudged into compliance, or, the law will be replaced by techno-regulation, whether or not that is labelled as law.<sup>127</sup>

Echoing Hildebrandt, the message of this article is that, for today’s jurists, some of the issues can be glimpsed and put on the agenda; but it will fall to tomorrow’s jurists to rise to the challenge by helping their communities to grapple with the many questions raised by the accelerating transition from law to technological management.

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removed from work that leads to many injuries, there are major health and safety gains. See Georgie Keate, ‘Robot Hospital Porters Get The Heavy Lifting Done’ *The Times* (25 April 2015) 19.

<sup>126</sup>Compare the urgency of the discussion in Mireille Hildebrandt, *Smart Technologies and the End(s) of Law* (Edward Elgar, 2015) 17, identifying the ‘challenge facing modern law’ as being to reinvent itself ‘in an environment of pre-emptive computing without giving up on the core achievements of the Rule of Law’.

<sup>127</sup>Hildebrandt (n 126) xiii; at 226, Hildebrandt concludes by emphasizing that it is for lawyers to involve themselves with such matters as ‘legal protection by design’.

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