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Title	E-regulation and the rule of law: smart government, institutional information infrastructures, and fundamental values
Author(s)	Kennedy, Rónán
Publication Date	2016-02-15
Publication Information	Kennedy, R (2016) 'E-regulation and the rule of law: Smart government, institutional information infrastructures, and fundamental values'. Information Polity, 21 (1):77-98.
Publisher	IOS Press
Link to publisher's version	<a href="http://content.iospress.com/articles/information-polity/ip368">http://content.iospress.com/articles/information-polity/ip368</a>
Item record	<a href="http://hdl.handle.net/10379/5642">http://hdl.handle.net/10379/5642</a>
DOI	<a href="http://dx.doi.org/10.3233/IP-150368">http://dx.doi.org/10.3233/IP-150368</a>

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# E-Regulation and the Rule of Law: Smart Government, Institutional Information Infrastructures, and Fundamental Values

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June 26, 2015

## **Abstract**

Information and communications technology (ICT) is increasingly used in bureaucratic and regulatory processes. With the development of the ‘Internet of Things’, some researchers speak enthusiastically of the birth of the ‘Smart State’. However, there are few theoretical or critical perspectives on the role of ICT in these routine decision-making processes and the mundane work of government regulation of economic and social activity. This article therefore makes an important contribution by putting forward a theoretical perspective on smartness in government and developing a values-based framework for the use of ICT as a tool in the internal machinery of government.

It critically reviews the protection of the rule of law in digitized government. As an addition to work on e-government, a new field of study, ‘*e-regulation*’ is proposed, defined, and critiqued, with particular attention

to the difficulties raised by the use of models and simulation. The increasing development of e-regulation could compromise fundamental values by embedding biases, software errors, and mistaken assumptions deeply into government procedures. The article therefore discusses the connections between the ‘Internet of Things’, the development of ‘Ambient Law’, and how the use of ICT in e-regulation can be a support for or an impediment to the operation of the rule of law. It concludes that e-government research should give more attention to the processes of regulation, and that law should be a more central discipline for those engaged in this activity.

### **Keywords**

e-government, e-regulation, information and communications technology, information infrastructures, regulation, rule of law, smart government

### **1 Smart Government and the Rule of Law: The Need for Interdisciplinarity**

The practice of regulation—government efforts to identify and intervene in social, environmental, and economic issues in an iterative and ongoing fashion—is becoming an increasingly important feature of the present day [5, pp. 1–2]. In a similar fashion to many other organizations (both public and private), regulators are adopting information and communications technology (ICT) on a wide scale [64, 35, 84], and while this brings benefits, it can have unexpected and unforeseen consequences. In an early, but brief, case study of the Parking Adjudicators tribunal in London, Sheppard and Raine highlight the importance of the role of ICT in administrative procedures, stating ‘the IT systems in place at [the Tribunal] have a significant impact upon the shape and style of the adjudication process and on the supporting administration.’ [122, p. 330] This article expands on that insight and considers how the ‘shape and style’ of government may change as it becomes more ‘smart’, relying on software, databases, and distributed devices. Its focus is chiefly on the routine but rarely-examined internal processes of regulation, rather than on how external actors engage with regulatory initiatives. It uses a legal perspective, founded on the fundamental value of the rule of law, to highlight the benefits and issues that arise from these new developments and considers how the application of ICT may impact on adherence to the rule of law in this

particular context. It concludes that e-government research should give more attention to the processes of regulation, and that law should be a more central discipline for researchers in this field.

Although the term ‘smart government’ does not yet have a clear definition, it incorporates elements of reflection, information-gathering and processing, and a reliance on ICT [47, p. 12]. It is related to, but not identical to, the idea of ‘smart governance’ [136] and relies on principles of openness, participation, and improvement of public sector services [117, p. 166]. ‘Smart regulation’ refers to pluralist and innovative approaches to social control that involve commercial and civil society entities as well as state bodies, including self-regulation and co-regulation. It develops Braithwaite’s ‘enforcement pyramid’ (in which increasingly severe sanctions are applied to a progressively smaller number of more egregious violators) to include the possibility of different ‘faces’ of the pyramid (types of enforcement) from which a regulator can shift as part of an overall strategy. The gathering and release of information can be an important element in this [54, pp. 131–3]. ICT is a key enabler for these developments.

Despite the resulting need for cross-disciplinary conversations and studies, lawyers, e-government scholars, and practitioners do not seem to work together that often. For example, Scholl does not include law in his list of ‘core disciplines’ in the field of electronic government [116, p. 3]. Although ‘[i]nformation is the foundation of all governing’ [86] and numbers are a fundamental technology of government [108], there is very little academic discussion of the interactions between ICT and the fundamentals of legal theory [31, p. 255]. This is despite claims that the informatization of society may be a significant transformation with important consequences for basic notions [16]. It is vital to look beyond the undeniable advantages of ICT in the regulatory process, and the enthusiastic claims made by those who seek to bring forward reforms built around these new tools, and to look at the broader context, including the value and ethical choices to be made [9, p. 16].

This article responds to this lack of trans-disciplinary debate by taking a legal perspective on the development of e-government, exploring how the rule of technology could replace the rule of law [19, p. 6]. The objectives of this article are threefold: to propose a new field of study, the application of ICT for schemes of government regulation, here defined as ‘e-regulation’; to critique this development; and to highlight the connections between so-called ‘smartness’, the Internet of Things, and the rule of law, through an awareness of ‘Ambient Law’.

The next section defines some basic terms. It also puts forward a new concept of ‘e-regulation’, which it then contextualises and critiques. The following section explores the social aspects of this development, exploring in some detail the problems that can arise from

an unreflective implementation of computer technology in regulatory processes, particularly models and simulation. The penultimate section connects this thread to basic legal values through an overview of the rule of law and how it may come under pressure in a technological government. The concluding section argues for a greater focus on regulation in e-government research, and the inclusion of law within the disciplines upon which this relies.

## **2 Defining Basic Terms: The Is and Es of a Smart State**

Despite its importance in practice, what is considerably less studied than e-government and has little associated theory is the use of ICT *within* the operations of regulators and those who deal with them, such as non-governmental organisations (NGOs), as an integral part of the process of measurement, assessment, and feedback which is central to regulation, something which I label ‘*e-regulation*’. However, before exploring this, four other terms must be defined at this point: *regulation*, *information systems* (IS), *information infrastructures* (II), and *e-government*.

### **2.1 Narrow and Broad Conceptions of Regulation**

Regulation, broadly defined, is any mechanism to control human behaviour. Scholars have put forward a number of different definitions of regulation, highlighting different aspects of a multi-faceted topic [57, p. 295]. One of the fundamental and often-cited definitions takes a broad perspective on what constitutes a regulatory system:

*“... [A]ny control system in art or nature must by definition contain a minimum of ... three components ... There must be some capacity for standard-setting, to allow a distinction to be made between more or less preferred states of the system. There must also be some capacity for information-gathering or monitoring to produce knowledge about current or changing states of the system. On top of that must be some capacity for behaviour-modification to change the state of the system.”* [65, p. 23 (emphasis in original)]

Within this wide ambit, there are different points of view, moving from a narrow to a broad understanding:

*“[There are] three broad types of definitions which have been identified in some of the main ‘textbooks’ on regulation. In the first, regulation is the promulgation of rules accompanied by mechanisms for monitoring and enforcement. The usual assumption is that government is the rule-maker, monitor, and enforcer, usually operating through a public agency. The second definition keeps to the government as the ‘regulator’ but broadens the techniques that may be described as ‘regulation’ to include any form of direct state intervention in the economy, whatever form that intervention might take. In the third definition, regulation includes all mechanisms of social control or influence affecting behaviour from whatever source, whether intentional or not.”* [15, p. 129 (citations omitted)]

At one end of the continuum, writing from the perspective of the regulator, Connery and

Hodnett rely on Stone's definition of regulation as 'a state imposed limitation on the discretion that may be exercised by individuals or organizations, which is supported by the threat of sanction' [126, p. 10] and put forward the view that

*"[r]egulation is the use of [the power to coerce] ... for the purpose of restricting the decisions of economic agents. Economic regulation typically refers to State-imposed restrictions on individuals' and firms' decisions on price, quantity, and entry and exit."* [27, p. 25]

This is the traditional 'centred' perspective on regulation as 'regulation by the state, which is often assumed to take a particular form, that is the use of legal rules backed by criminal sanctions: "command and control" (CAC) regulation' [15, p. 105].

Other authors have taken a standpoint beyond the positivist and economic. Selznick, for example, sees regulation as 'sustained and focused control exercised by a public agency over activities that are valued by a community' [120, p. 363] . Similarly, according to Ogus, regulation is the implementation mechanism for

*"... the collectivist system ... [in which] the state seeks to direct or encourage behaviour which (it is assumed) would not occur ... to correct perceived deficiencies in the market system in meeting collective or public interest goals ..."* [92, pp. 1–2]

Such regulation has three characteristics: 'the ideal of control by a superior'; being a part of public rather than private law (Ogus sees regulation as having no role in what he calls the 'market system'); and 'typically *centralized*.' [92, p. 1–2 (emphasis in original)]

It is important to note that these various understandings or perspectives on regulation see the state as central. In contrast, Baldwin and others put forward a more nuanced understanding, which recognises that attempts to control behaviour may emanate from different loci of power, and claims that regulation consists of:

*"... a specific set of commands ... [that] involves the promulgation of a binding set of rules to be applied by a body devoted to this purpose ... deliberate state influence ... [that] has a more broad sense ...[which] covers all state actions designed to influence industrial or social behaviour ... all forms of social control or influence ... [including] all mechanisms affecting behaviour—whether these be state-derived or from other sources (e.g. markets) ... [with] no requirement that the regulatory effects of a mechanism are deliberate or designed rather than merely incidental to other objectives."* [5, p. 3 (emphasis in original)]

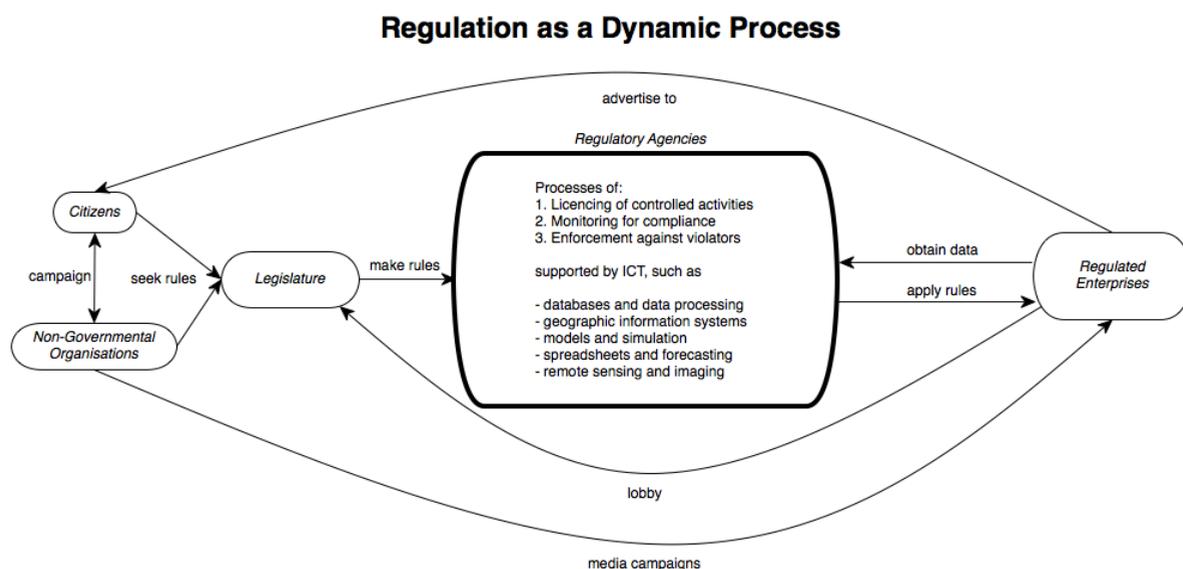
Given the particular focus of this research on the bureaucratic internals of the regulatory system, it is also appropriate to highlight a definition which draws attention to duality:

*"... a [regulatory] system [is] composed of two types of rules:*  
*1. A set of rules of conduct by which a state seeks to control the manner in which certain activities—usually economic activities—are carried out (hereinafter referred to as a regulatory regime); and*

2. A set of rules or practices governing the manner in which these rules of conduct that constitute the regulatory regime are established (the regulatory process).” [110, p. 169]

Building on this, the definition of regulation used in this article is any means of social control and behaviour modification, whether coming directly or indirectly from the state or through pressure imposed by private parties (particularly NGOs), which is known as ‘smart regulation’ [55]. Further research is required in order to establish which definition is best suited to e-government research, or if a variety of approaches must be developed.

Nonetheless, this definition is further explained in Figure 1, which shows the regulatory process in diagrammatic form, highlighting information flows and the use of ICT within regulatory agencies. It illustrates the focus of this article on the internal processes of government rather than on the relationship between the citizen and the state.



**Figure 1**

## 2.2 Information Systems and Infrastructures

An IS is not simply technology but the result of ‘the mutually transformational interactions’[76, p. 11] between tools and people. Heeks provides a definition of information systems that highlights the overall human and social context, something which is very important for the remainder of this discussion:

*“Information systems ... can be defined as systems of human and technical components that accept, store, process, output and transmit information. They may be based on any combination of human endeavours, paper-based methods and IT [(information technology)]. ...*

*Thus:*

- *IT on its own does not do anything useful: in order to do anything, it must become part of an information system;*
- *information systems do not necessarily involve computers and telecommunications equipment;*
- *even when they do, information systems are much more than just IT because they involve people and their actions.”* [58, p. 15]

Hanseth and Monteiro underline that *information systems* are being replaced by ‘*information infrastructures*’ [56, p. 4 (emphasis in original)]. These have six key aspects: they are designed to support a wide range of activities [56, p. 41], shared by a wide community in an undivisible fashion [56, p. 41], open for new connections (whether from humans or technology) [56, p. 42], are socio-technical networks ‘encompass[ing] technological components, humans, organizations, and institutions,’ [56, p. 43], ‘connected and interrelated, constituting *ecologies of networks*’ [56, p. 44 (emphasis in original)], and do not develop from scratch but ‘through extending and improving the *installed base*.’ [56, p. 47 (emphasis in original)] They argue that ‘[u]nderstanding information infrastructures requires a holistic perspective—an infrastructure is more than the individual components.’ [56, p. 4] I would also argue that in understanding ICT in regulation requires an awareness that these new systems have institutional consequences: they become ‘institutional information infrastructures’.

### **2.3 E-Government**

The focus of this article is on the use of ICT within the processes of regulation. This can be understood as a sub-set of the broader topic of e-government, sometimes known as ‘digital government’ [115, p. 11]. Defining these terms completely is not possible [105], but one possible interpretation is

*“... the use of modern information and communication technologies, especially Internet and web technology, by a public organization to support or redefine the existing and/or future (information, communication and transaction) relations with ‘stakeholders’ in the internal and external environment in order to create added value.”* [10, p. 6]

According to Bekkers and Homburg, e-government is a policy tool that came to prominence in the early years of this century as the result of the confluence of a number of contextual factors: the crisis of representative democracy; demands for more responsive public service delivery; the spread of ‘business process design’ approaches from the private to the public sector; the shift from government to governance; calls for greater responsibility and accountability in the public sector; and the development of connectivity through network technology [10, pp. 1–4]. More recently, some scholars have claimed that e-government is

more about information flow than storage and a new phenomenon of ‘iGovernment’ is developing [102, p. 278].

It is important to note that this article focuses on specific aspects of e-government, not on the whole. E-government comprises a number of different facets, some of which get more attention than others. Lenk lists four perspectives—the interface with the citizen, the re-organization of processes, cooperation and collaboration, and information and knowledge assets [78, p. 10]—while LaVigne writes about e-services, e-commerce, e-democracy, and e-management [75, pp. 1245–6]. My focus is on processes and knowledge. While the other elements are also obviously important, their focus is on the external relationship between the organization and the public at large and on the behaviour of bureaucratic organizations in relationships with individual citizens. While these evolving dynamics are not completely understood, they are comparatively well-studied and theorised. This article instead examines internal, technical, and under-explored topics.

#### ***2.4 A New Field of Study: E-Regulation***

E-government research has tended to focus on the public face of government and on service delivery [7], not on the use of ICT within the regulatory process. For example, Hernon and Cullen put forward what they call a ‘generalized model of e-government’ [60, p. 5] which mentions ‘e-compliance’, [60, p. 8] although this is only one aspect of regulation. Henman adopts Perri 6’s model of e-government [1, pp. 15–7], enumerating as the elements of government activity e-democracy, e-service provision, e-management (which is solely about allocating internal government resources), and e-governance [59, p. 8], omitting any mention of regulatory activity. One definition of e-regulation used in the literature is ‘the use and application of [ICT] to supervising—or rather regulating—the [outsourced or] autonomised services’ [40, p. 5], but this takes a very narrow view of the purpose and application of regulation.

I put forward a more encompassing definition, which is *the use of ICT by regulators and those who deal with them, such as regulated entities, NGOs, and ordinary citizens, as an integral part of the process of measurement, assessment, and feedback which is central to regulation*. It has a number of significant features: its focus is on internal government processes; it relies on the wide availability inside and outside government to be economically and legally feasible; its fundamental ideological perspective is modernising; and it has important consequences for government operations and structures, but also for citizens and for basic constitutional values. E-regulation can include ‘smart regulation’; the latter incorporates ideas of innovation, reflection, and the protection of values which the article

argues for.

### ***2.5 Cheaper, More, Quicker, Better, New: The Benefits of E-Regulation***

There is much that is positive about the development of e-regulation. In broad terms, the five main advantages of ICT for the reform of public administration have been outlined by Heeks as:

- *Cheaper*: producing the same outputs at lower total cost.
- *More*: producing more outputs at the same total cost.
- *Quicker*: producing the same outputs of the same total cost in less time.
- *Better*: produce the same outputs at the same total cost in the same time, but to a higher quality standard.
- *For the first time*: producing new outputs. [58, p. 18]

Drawing on these, e-government advocates claim significant benefits: a radical transformation in the openness and accessibility of bureaucratic processes; reduced transaction costs; integration of ordinary citizens into public decision-making; and greater protection of individual rights through stronger privacy protections [99, pp. 2–3]. In the context of an increasingly dynamic and globalised economic environment (itself partly the product of the development of ICT), these can bring significant practical advantages. Markets are not static; the individual actors adapt and evolve. Policy must change in response [135, pp. 489–05]. Information can come to the regulator more rapidly, and in turn be made available to the public more quickly, in a form that is more easily processed, understood, and acted upon.

ICT allows more detailed tracking and detection of human activity, particularly regulatory breaches through, for example, speed cameras. Regulation can be smarter through greater knowledge, and therefore targeted more closely at particular segments of the population. Enforcement can be improved and made more efficient through, for example, remote sensing [85]. Digital technology may ‘de-centre’ government but also permits the more precise observation of the populace and more focused interventions [64, pp. 185–203].

Associated with this is the possibility of a smarter regulatory process. ICT can more quickly highlight the occurrence of harms, particularly those caused by small-scale activity which only becomes damaging when aggregated. Regulatory innovations can be tried for short periods of time, in particular markets, or in specific geographic areas. The results of these ‘experiments’ can be analysed and used as the basis for revisions in the future, allowing

for a more rapid evolution of best practice [38, pp. 162–64].

There is, therefore, a new phenomenon of ‘e-regulation’, which builds on and is a part of e-government reforms. It offers significant advantages for the state and the citizen, but the next section explores the difficulties and problems that may arise in practice.

### **3 Querying the ‘March of Progress’**

E-regulation can be the opposite of smart. ICT can remove discretion from individual decision-makers and place it with systems analysts, developers, and senior management [17]. The role of frontline staff changes from that of ‘street-level bureaucrat’ to a much more limited ‘screen-level bureaucrat’ [130, p. 183]. Even if individuals retain discretion, the increasing monitoring, accountability, and transparency which ICT can provide may motivate them to follow rules strictly rather than flexibly, in a way that is detrimental to the rights of particular citizens [28, pp. 362–3]. ICT can accentuate existing imbalances of power and distort the political and regulatory processes. The important differences between the public and private sector must be borne in mind in order to avoid the inappropriate application of models that are successful in other, different domains [4, p. 323]. In the public sector, many of the potential savings (such as disintermediation or reduced transaction costs) and potential new income streams (such as commissions and fees, advertising) do not apply [138]. The processes of public administration are not linear, manufacturing operations [78, p. 13]. In addition, it is difficult to identify a direct relationship between investment in ICT and prosperity; just-in-time methods are not always appropriate; and clearly identifying the customer is difficult [99, pp. 10–11]. It is therefore important to study the limitations of e-government and e-regulation.

ICT-based innovation does not automatically bring with it democratization [81]. The legal decision-making process is not a simple system, easily amenable to modelling through computerized logic and expert systems [3]. In addition, administrative, bureaucratic, and regulatory skills depend on knowledge which is held in individual minds and is difficult to extract and store in a structured retrieval system. Administration is therefore not easily re-structured or made ‘efficient’ in a Taylorian fashion, and building a good ‘institutional memory’ requires more than a static database [78, pp. 17–18]. However, if ICT does take hold as part of the institutional framework of an organization, it can become a rigid element in that architecture [96, p. 409].

As ICT becomes an increasingly significant component in the regulatory process, the practical challenges involved in re-developing installed infrastructural systems can significantly slow down internal institutional, organizational, and procedural change [83, p.

93] while further disempowering those external actors who were already excluded from the process by educational or financial disadvantage [66]. ICT-based reform efforts can fail because individuals fear losing their jobs, are unwilling to change their work cultures, lack clear leadership, are tired of failure, or simply do not have access to adequate infrastructure [44, p. 192].

Those who operate and develop the technology may also be reluctant to embrace change that threatens their pre-eminence. In a Foucauldian ethnographic study, Davies and Mitchell examine a government department, explaining how the discourses that regulate the adoption of ICT solutions in that organization prevent the technology from becoming a significant element in organizational change. In the case presented, that of a minerals industry regulator, the IT section prevents the progress of potentially destabilising proposals for change by ruling out more easy-to-learn options as ‘not technically feasible’ and controlling the institutional mechanisms that could see control of technology decision-making slipping from it [33].

In particularly unhealthy situations, ICT can be a tool of central control which is even more rigid in its application than the previous paper-based system. It may become an unsurmountable barrier to change, as it overly constrains options and imposes too high costs on reform efforts [73, p. 19]. Despite the hype regarding the re-configurability of ICT,

*“... ministers cannot ‘join-up’ information at the flick of a switch. New IS systems still have to be hardwired, often at considerable financial cost. Datasets have to be reformatted, and administrative codes have to be reconfigured to allow this to occur.”* [11, p. 95]

Decisions about the implementation and operation of ICT systems are ultimately political issues, and as ICT becomes more and more central to the operation of the modern organization, the political challenges in the successful execution of ICT strategies become more significant [107, pp. 22-23]. The sharing of information, internally and externally, can become an intensely political issue. It can be difficult to find individuals or departments who are willing to take responsibility for errors in data entry. If sharing is mandated from higher-up in the hierarchy, it can be resisted by, for example, the provision of poor quality information. Failures will be attributed to quite different factors, depending on the perspective of the individual or the unit speaking [107, pp. 31–32].

### ***3.1 Models in the Regulatory Process***

In order to properly understand the role and application of information in the regulatory process, it is necessary to pay some attention to the uses of models and simulations. These play three significant roles: as a catalyst for policy where no regime exists; as a structure for regulatory decision-making; and as a mechanism for collaborative policy and strategy [41, pp.

254–6]. Despite this, policy-makers and lawyers rarely inquire into the substance or internals of models. This happens because lawyers prefer not to enquire into ‘science’ or into the internal details of regulatory decision-making [41, pp. 263–4].

Dutton and Kraemer categorise political perspectives on models along two dimensions: the locus of control over the model, and the dominant interest served by the model. From this matrix, they highlight four viewpoints on the modelling process: the *rational perspective*, which sees models as ‘scientific aids to policy-making and analysis’; the *technocratic perspective*, which sees models as ‘a complex technology controlled by the new priests of the information society and poorly understood by politicians, bureaucrats, or the public’; the *partisan perspective*, which sees models as ‘tools of propaganda and persuasion of special interests in the policy process’; and the *consensual perspective*, which sees models as ‘primarily tools for negotiation, bargaining, and interactive decision making among the representatives of conflicting interests and opinions in the policy process.’ [36, pp. 5–9]

### 3.2 Misuse of Models

The first two perspectives can lead to misplaced reliance on models as infallible oracles or an excessive scepticism about their validity can have significant negative impact on the policy-formation process. As Corrigan points out,

“... [m]odels have inherent limitations because they are simplified representations of some aspect of reality, constructed for a particular purpose, usually by an expert with a particular perspective of the situation. The models therefore have the modeller’s assumptions built into them. Sometimes the simplification and assumptions do not make a big difference to the value of the model but in many cases they can be critical.” [29, p. 196 (emphasis in original)]

The creation and choice of models can have important social, political, and legal consequences, as they ‘limit and direct regulatory power ... [and] ... the quality of models directly affects the quality of law and policy’ [41, pp. 269–70]. The scientific models used in legislation may not be accurate or can often lag behind the state of the art. Indeed, the models themselves are only that: an attempt to understand a system rather than the system itself [41, p. 265].

While it is claimed that ‘it is well understood that models of complicated systems are not “truth machines,” but primarily tools to generate insights relevant to decisions’ [61, p. 426], the reality is different. Because natural systems are never closed, models are unverifiable [95] and attempts to make them more realistic by adding more parameters may (paradoxically) make them less accurate [94]. This is something which lawyers and policy-makers need to understand [41, p. 272], but

*“... the new models come replete with the enormous prestige of the scientific enterprise, so that there is a built-in tendency for policy-makers to accept the results of simulations as gospel truth, in spite of the fact that the underlying societal models are highly imperfect.”* [89, pp. 220–1]

Models are also inherently malleable, which means that ‘the characterization of models as being purely “scientific” and “objective” is naive.’ [41, pp. 272–3] Nonetheless, models are an essential part of environmental regulation, a tool for filling in gaps in imperfect data, and ‘a means of assessing, measuring, and/or predicting exposure or harm.’ [134, pp. 297–9] However, although they are sometimes perceived as ‘answer machines’ [134, p. 295], the reality is that models are limited by the initial question which they seek to answer, what data is already available or will be measured in future, and the difficulty in validating or verifying an output which is largely a product of internal (and not immediately obvious) assumptions [134, pp. 308–12].

Policymakers will often have an overly optimistic view of how reliably models can answer the questions that arise in the policy-making process, which can lead to one of two negative outcomes:

*“In some and likely most cases the analyst will tend to place too much confidence in the model, viewing it as empirically determinative, and thus will fail to evaluate or qualify it in a rigorous way. In other cases, the policymaker will inquire further into the workings of the model and become disillusioned with the uncertainties and multiple sources for judgment and reject it in total. In both cases, models are misused and their true contributions—about relationships, dynamic qualities, and even uncertainties in the system—are passed over.”* [134, pp. 316–17]

This weakness is accentuated by the widespread misunderstanding of the values embedded in computational technologies [132, pp. 75–6]. This misunderstanding and misuse can lead to a number of unrealistic expectations for policy-makers: that there is a single, perfect model which will produce an objective truth; that they can remain detached from the consideration and construction of the model; that the model, and the answer which it gives, will remain static and unchanging in the future; and that decisions are best delayed until the model is perfected [134, pp. 326–30]. This perspective is fundamentally mistaken:

*“In most areas of human endeavor—from performing a symphony to orchestrating a society—the processes and rules that constitute the enterprise and define the roles of its participants matter quite apart from any identifiable ‘end state’ that is ultimately produced. Indeed, in many cases it is the process itself that matters most to those who take part in it.”* [132, p. 83]

In fact, choices with regards to ‘“privileging” of different data, different models, different animating assumptions, and different analytical frameworks’ can lead to different conclusions [61, p. 424]. This undermines efforts to include and explore diverse understandings of a social problem [103]. In addition, there is a constant temptation to exclude factors which cannot be

neatly measured and thus included in a computational model, even when they are very important [132, p. 627]. However, models and simulations often have a role in the policy process in spite of, rather than because of, their success as an objective decision-making tool, and are often used as weapons in debate. They can, however, play some constructive roles: defining the common ground for debate, enforcing a consistent approach to problem, and highlighting solutions that are certain to fail [69].

It is not always the case that legislators, policy-makers and the general public are sufficiently scientifically literate to understand the basis of a regulatory scheme. Bad science can displace good science. In addition, the general public and policy-makers do not always properly understand the scientific process of ‘(1) repeatability, (2) open communication, (3) objective interpretation, and (4) peer review’ [53, p. 342], meaning that they are not able to properly appreciate and engage with a debate that involves scientific detail. As a result, science is sometimes idealized by policy-makers and lawyers, although this can be ‘subtle or implicit’ [23, p. 275].

Scott makes the point that

*“... [c]ertain forms of knowledge and control require a narrowing of vision. The great advantage of such tunnel vision is that it brings into sharp focus certain limited aspects of an otherwise far more complex and unwieldy reality. This very simplification, in turn, makes the phenomenon at the centre of the field of vision more legible and hence more susceptible to careful measurement and calculation. Combined with similar observations, an overall, aggregate, synoptic view of a selective reality is achieved, making possible a high degree of schematic knowledge, control, and manipulation.”* [118, p. 11]

In this technical construction of a ‘selective reality’, seemingly small differences in scientific or technological processes can make quite significant differences in the political, policy, and decision-making process. An excessive focus on the ‘reality’ seen by science risks the creation of a picture, based on incomplete and inaccurate data and excluding elements which are not susceptible to simple, quantifiable measurement, or whose interaction is not properly understood or calculable. ICT is not ideologically neutral but can have a significant impact on power relationships [139]. We must therefore be careful to critically evaluate the results of applying ICT for regulation: in practice, the results do not always match the promises. If we rely too much on an elite cadre of expert scientists, ICT, and numerical analysis, we may lose sight of the human element that should exist in all systems of government and the core values which should underlie the regulatory process. We should instead subject any ‘normative technology’ to rigorous analysis [71].

This section has highlighted the development of e-regulation, offered a preliminary definition, and provided a critique of its possible development. While positive about its

potential, it has drawn attention to the political and social aspects of the deployment of ICT and the need to think in a non-deterministic way, and to the problems that can result from an unreflective reliance on sophisticated and technologically-based models of the world. The next section builds on this contextualisation of technology to highlight how these issues can damage fundamental legal values.

#### **4 ICT and the Rule of Law**

Having defined the topic of interest—the use of ICT within regulatory processes—and highlighted the problematic, non-deterministic and socially situated way in which these tools are applied in practice, this section draws connections between the foregoing and the fundamental concerns of lawyers. It is therefore necessary to consider the basic values which should underpin this, particularly the rule of law. This section attempts to identify its essential elements and explore what connections exist between this high principle and the seemingly mundane tools of the bureaucrat. What follows is not an attempt to provide a comprehensive literature review on the rule of law. That would be a significant project in itself, particularly as the rule of law is difficult to define clearly [100, p. 7].

To begin, there are ‘thin’ perspectives, which focus on formality and procedure rather than substantive rights. According to Lord Bingham, ‘[t]he core of the existing principle is ... that all persons and authorities within the state, whether public or private, should be bound by and entitled to the benefit of laws publicly and prospectively promulgated and publicly administered in the courts.’ [14, p. 69] Craig states the same idea in shorter but perhaps more open terms: ‘[a] core idea of the rule of law to which all would subscribe is that the government must be able to point to some basis for its action that is regarded as valid by the relevant legal system.’ [119, p. 98]

However, Hildebrandt and Koops, two leading theorists in this area, are clear in their preference for a more substantive (or ‘thick’) perspective on the rule of law [62, p. 456]. Following this, and taking cognisance of the disconnect between formalist notions and the reality of modern governing [34, p. 33], and the need to examine closely the exercise of discretion [34, p. 215], I adopt the ‘thick’ conception put forward by Allan, who rejects

*“... any rigid distinction between procedure in substance, as artificial and unworkable, [and explains the rule of law as] ... a set of closely interrelated principles that together make up the core of the doctrine or theory of constitutionalism ... [including] the procedural ideal of ‘natural justice’ or due process, if it is to provide real protection against arbitrary power, [which] must be accompanied by the equally fundamental ideal of equality... The latter ideal imposes substantive constraints on governmental power, ensuring that all citizens are treated alike in certain crucial respects.” [2, pp. 1–2]*

Embodying those ideals of natural justice and equality in information systems requires considerable effort. Hildebrandt and Koops argue that ‘the way in which a legal rule is translated and inscribed in a technology is a separate activity that should be assessed in its own right.’ [62, p. 456] However, the focus of scholarly writing on the rule of law is firmly on the courtroom, on the formal hearing, and on the functioning of the police power of the state. However, the majority of the dealings that ordinary citizens will have with the law and the various arms and agencies of government will take place in the context of routine administrative procedures [43, p. 291].

A conception of the rule of law in the context of ICT therefore must ensure adherence to the minimum requirements of formalist notions, particularly protecting legality while avoiding legalism; balance discretion, accountability, and transparency; and ensure respect for the individual, the independence of the decision-maker, and the fairness of the process. It must also embrace openness, pay attention to design issues, and function in a flexible, consultative fashion in order to avoid hidden biases. While the upholding of the rule of law may make the design and implementation of a regulatory system more complex, it should lead to a better functioning system in the long run [110, p. 170], a truly ‘smart government’.

#### ***4.1 ICT as an Enabler of ‘Ambient Law’***

It is also necessary to place this discussion in the context of the possible future development of the so-called ‘Internet of Things’. ICT is being used in public administration to an ever-increasing extent. This is a process that is likely to accelerate with time, and become more distributed and localised. Some consideration of an extreme example will help to highlight how this might interfere with basic values. Bullinga predicts, perhaps with some hyperbole (and certainly with an overoptimistic faith in the capacity of software developers to produce error-free code), a future of omnipresent and ambient technology with a significant regulatory dimension:

*“Permits and licenses will be embedded in smart cars, trains, buildings, doors, and devices. Laws will automatically download and distribute themselves into objects in our physical environment, and everything will regularly be updated, just as software is now automatically updated in your desktop computer.*

...  
*In the future, all rules and laws will be incorporated into expert systems and chips embedded in ... our physical environment. No longer will police officers and other government personnel be the only law enforcement. Our physical environment will enforce the law as well.”* [20, pp. 32–4]

In a similar (although less far-fetched) fashion, Gil-Garcia paints an appealing picture of a ‘smart State’, in which

*[g]overnments would ... use sensors and HD cameras to obtain information about air quality, electric power consumption, public safety, road conditions, and emergency preparedness, among many other policy domains. Citizens would be helping government to identify problems and to develop solutions in a crowd-sourced fashion.” [46, p. 275]*

The scenarios above are no doubt pleasing for those charged with the implementation of regulation but are as unrealistic as the over-enthusiastic claims that electricity would remove ‘disease and strife’ [22, pp. 88–9]. Very few of these ideas are yet embodied in real devices [109, p. 120]. They are probably never fully attainable [46, p. 276, 32] because of technical, financial, and privacy constraints [93].

It is certainly not the case that ‘smart’ regulators are allowing computers to make decisions for them. It is questionable whether any complex legal decision-making can be automated to this extent [26, p. 62, 67, p. 565, 77]. The issue I am raising is not a distant dystopia of unquestioning control by machines, but the extent to which reliance on software may subtly and invisibly alter the regulatory process in ways that invisibly erode the protections encapsulated in the rule of law. If Zouridis is correct, and ‘the major challenge the rule of law will face in the next decades is the movement from the rule of law as an abstract doctrine to the rule of law as real governmental practice’ [141, p. 90], there is a clear need to consider in detail how the tools which are used by modern bureaucrats affect the bringing to reality of the values which underpin this fundamental notion.

The widespread use of ICT as an element in a regulatory system raises important issues with regard to individual privacy and autonomy, as our every move may be tracked and automated systems may invisibly intervene in order to manipulate the information on which we base decisions or to mistakenly conclude that we have transgressed a rule that we have, in fact, observed [62]. Lanzara highlights that the final outcome may not be a utopia of complete cybernetic control, but one in which ‘many government functions and mechanisms are inscribed in and delegated to the technology, which then “acts” as a regulatory regime with enforcement capabilities.’ [73, p. 37] Gil-Garcia acknowledges that this could lead to ‘a new vision of a dangerously powerful government’ [46, p. 276].

The study of ICT and its relationship to legal and regulatory systems is a topic that is still in its infancy as the subject of academic attention, although its consequences are pervasive and the potential resulting improvement or dis-improvement in public services are obviously important to all citizens [63, pp. 165–6]. What literature does exist is focused on intellectual property [90] and the challenges for legal practitioners [128, 129, 127]. The focus is on ‘code as law’ [79] (the ways in which software can constrain consumers more effectively than legal rules) or perhaps ‘code meets law’ [133] (the interaction between the two types of rules in property regulation) but not on ‘law through code’ (in the sense of software implementations

of regulatory schemes) [For isolated examples, see 25, 24]. Issues arising from the use of expert systems in law were discussed in the 1990s [42], but this technology has not developed to the extent expected at the time. The use of computers for legal decision making was studied in Scandinavia in the early 1990s [13, pp. 204–5], but very little has been published on this in English [An example is 114].

The use of digital computer technology in public administration is inherently complex, dynamic, and cross disciplinary, bringing together aspects of science, information systems, information technology, engineering, organizational and social dynamics, and law. The general topic of this article, which is the interaction between these new digital technologies and the rule of law [For an early example, see 89, pp. 184–6], is almost untouched [For examples of instances where the topic has gained limited academic attention, see 74, 72, 25, 87, p. 61, 24].

Those who write critically on the impact of ICT on the state focus on the public sphere and how it can foster better debate [See, for example, 106, pp. 102–8], or on the new tools that it offers [See, for example, 64, pp. 184–203]. Writers on e-government seem to focus on making government more efficient [See, for example, 131], which is a laudable goal, but either ignore or are unaware of the possible impacts of ICT on basic rights and procedures [See, for example, 37, which has no mention of ‘rule of law’, ‘rights’ or ‘human rights’ in its index.]. Those who write about ICT and the rule of law have tended to focus on privacy issues [For example, see 21, which contains a chapter entitled ‘The Rule of Law’ but is primarily concerned with surveillance.].

From the information systems discipline, those who write with an awareness of issues of power and politics tend to focus on the context of individual commercial firms [See, for example, 70]. The key problem arising from this point of view is that adopting a commercial perspective on e-government may undermine the legitimacy of democracy [124, 45].

#### ***4.2 ICT as a Support for the Rule of Law***

ICT may be both a support and an impediment to the rule of law, particularly by providing citizens with access to information on court procedures and legislation [104, pp. 38–9]. Online capabilities also open possibilities for ‘reputation-based governance’, providing citizens with easy access to the information that they need to assess different proposals in a standardised fashion and thus making the State ‘legible’ to its citizens [101]. Nonetheless, despite the possible positive outcomes from the widespread use of ICT in legal and regulatory systems, details matter. What little initial research has been done indicates that the results can be ‘very uneven and mixed’ [140, p. 11], and the Internet has proven to be both ‘an

instrument of bureaucratic control and of personal liberation, a conduit of communal ideals and of corporate profits.’ [22, p. 110] It is therefore necessary to spend some time considering how ICT can be a barrier to the effective implementation of the rule of law.

### ***4.3 ICT Impeding the Rule of Law***

A technocratic administration may in fact present serious challenges to the ideal of the rule of law. A common complaint regarding modern lawmaking is that it is labyrinthine, opaque, and not easily accessible to the public—what the legal futurist Susskind has referred to as ‘hyper-regulation’ [128, pp. 12–8]. This problem is likely to be accentuated, rather than ameliorated, by the use of ICT. ‘ “[T]ranslating” open legal norms into rigid technical code’ is by no means straightforward and requires careful and detailed consideration [62, pp. 452–3]. Elaborating the rule of law in practice is problematic because, as Davis highlights, discretion extends not only to ‘substantive choices’ but also to questions of procedure, method, forms, and so on [34, p. 4]. A shift from paper-based methods of bureaucracy to computerized systems will change the way in which internal processes operate in a way that makes them significantly more opaque, less equitable, and less open to legal challenge. As Zouridis and Thaens explain,

*“... e-government transforms legal processes into administrative-technical processes. ... If individual situations are brought under the rule of law, legal reasoning is never completely unilinear (from general rule to individual situation). Legal decision-making proceeds from the general rule to the individual situation and back again, with each individual case testing the tenability of the rule as such and the justification for its application. Computers do not and cannot do this.” [142, 175 (citations omitted)]*

The rule of law demands not only accurate application of rules but justifications of distinctions between individuals [2, p. 2]. It is difficult to hold software developers accountable for their work—there are ‘many hands’ involved in constructing computer-based systems, bugs are seen as inevitable rather than preventable, it is easy to shift blame from humans onto ‘the computer’, and end-user licence agreements disclaim liability on the part of the manufacturer [91, pp. 35–6].

Development errors make regulatory schemes implemented through software deeply problematic from the perspective of legal theory because all such systems have four characteristics that make them potentially subversive of the rule of law:

*“First, along the traditional continuum between rules and standards, software lies at the extreme rule-bound end. ...*

*Second, software can regulate without transparency. ...*

*Third, software rules cannot be ignored. Parties facing a decision made by software can, at best, take steps to undo what software has wrought. ...*

*Fourth, software is more fragile than other systems of regulation. Hackers can*

*turn its plasticity against it, and its automated operation means that unintended consequences are shielded from human review. Its immediacy also speeds up failures.”* [49, pp. 1723–4]

For example, expert systems are already used as a support for decision-making by some government agencies, despite their occasional errors [51]. These decision-making (and ultimately, enforcement) systems will not be amenable to straightforward examination or easy challenge by those affected [48, pp. 144–7]. Decision-making processes are being supported or even implemented through software which is not available to the public, amenable to unskilled scrutiny or accessible to the putative decision-makers themselves [25, pp. 1254–5].

It is also often very difficult to challenge an adjudication made by computer [125, p. 102]. Computerized consistent implementation of rules removes the possibility of individual discretion [25, p. 1253]. ‘Closed’ systems, with source code not available to the public, render opaque the fact-gathering and decision-making processes for which they are used, thus reducing the accountability of public officials and reducing the possibility of effective input from civil society and skilled professionals [24, p. 357].

For example, Parkin highlights how a seemingly simple requirement that the attendance of a recipient of welfare in New York City be positively recorded on a computer system by a caseworker tilts the system against individuals. Any ‘non-attendance’ results in a loss of benefits, and therefore if a caseworker forgets to record a meeting or a legitimate excuse, there are financial consequences for the recipient [98, pp. 1357–8]. These minor shifts in the rules may have legitimate roots in clearly articulated and promulgated laws, in which case they are unobjectionable from a formal perspective, but they may also be due to misunderstandings or mistakes on the part of systems developers. Unthinking implementation of computer-based systems can have effects which fundamentally undermine the rule of law, natural justice and due process.

Allan highlights how ‘the wooden application of rules to inappropriate cases is often *unfair*’ [2, 128 (emphasis in original)]; the problem is multiplied when the application is algorithmic:

*“Seemingly, algorithms could be a boon to due process because they formalize decisionmaking procedures. ... At the same time, algorithms may involve rules of such complexity that they defy attempts to trace their reasoning. Is this the perfect perversion of due process: the uniform application of an inarticulable rule?”* [8, pp. 8–9]

The design of computer systems that reduce the possibility of human error requires effort [111]. While systems generally work well, results are not guaranteed [52]. The legal basis of the systems may be incompletely documented, obscure or mistaken [114, pp. 336–41]. It is difficult to ‘translate’ from the natural language of statute to the formal and limited language of computer programming [113, p. 132], particularly when legislation has a deliberately open

texture [113, p. 134]. In the worst cases, programmers may make mistakes when developing systems that implement statutory or regulatory rules [25, pp. 1268–71], or policy-makers may avoid more effective schemes because they will be difficult to automate [25, p. 1255]. Identifying systemic or cognitive bias in decision-making is already difficult [43, p. 438] without adding the impenetrability of computers. Databases may contain systematic errors because of biases in the ways in which they are constructed, such as the undercounting of particular racial or ethnic groups in a census, or the unequal willingness of different socio-economic groups to report problems to their local authority [68, pp. 2–4]. These biases will tend to be towards the ‘knowable and measurable ... as well as towards existing types of metrics.’ [6, p. 705]

These problems are compounded by the fact that a legal review of computer-assisted decisions would need to compare the source code to the law, something which will be outside the competence of most lawyers [13, p. 205]. A prominent example of this is in access to source code for breathalyser devices [123, 97, 80, 137].

ICT can seriously hamper the ability of administrators and regulators to gather and process the information that is necessary for their decision making. This claim may initially seem counter-intuitive—ICT seems to make it much easier to assemble and assimilate information—but once a dedicated information system is put in place, this will constrain what can and cannot be brought to the attention of the regulator. Of course, regulatory processes have long depended on the collection of structured data through forms, but a computer-based form is even less flexible as it is often impossible to ignore ‘required fields’ (even if they do not apply) or to add additional information in the margins.

ICT can also constrain the hearing of an individual’s case. The computer system will often follow a fixed ‘script’, which enrols and constructs both administrator and citizen into a particular pattern of interaction. It can be difficult (although not impossible) to deviate from this. In practice, what is likely to happen is that, through force of habit, regulatory staff will simply follow familiar procedures without taking the time to consider if they are appropriate for the particular individual that they are dealing with.

ICT can significantly channel internal processes. This is not always inappropriate; indeed, properly applied business process re-engineering can go a long way towards improving the efficiency of a regulator—but can lead to inflexibility over time. ICT can also lead to bias within the system. This can sometimes be obvious but may also be quite insidious, difficult to identify, and even more difficult to root out.

This use of new technology in government may challenge the ideals underpinning the rule of law in a number of ways. Bowker and Star claim that the use of ICT means that ‘values,

opinions, and rhetoric are frozen into codes, electronic thresholds and computer applications.’ [18, p. 187] Although speed, flexibility, and responsiveness are often ascribed to modern ICT, the reality is often more prosaic. Software development is notoriously difficult, with many high-profile failed public sector projects, and systems may, in fact, become ‘encrusted ... with earlier ways of thinking’ [12, p. 156], too costly to modify, and a barrier to change. This fossilization of policy in ICT goes beyond what would already take place in a non-technocratic bureaucracy because modifications to ICT are generally not possible in the short term, shortcomings in the system are too expensive to work around, even on a small-scale, and the costs, complexity, and difficulty of ICT have tended to grow over time. These difficulties make administrators reluctant to make minor changes to such systems; and many organizations outsource their ICT operations, which imposes additional barriers to change in the short term [35, pp. 25–7].

This section has defined ‘thin’ and ‘thick’ conceptions of the rule of law, explained how ICT can enable the developing phenomenon of ‘Ambient Law’, and shown how such embedding of legal constraints into everyday software and hardware objects may be the opposite of ‘smart’, with technology becoming a tool of unfairness and a barrier to change. The next, and final, section summarises the argument made and concludes that e-regulation and legal questions should be a key focus for e-government research.

## **5 Conclusion**

This article had three objectives: first, to propose a new field of study, ‘e-regulation’, which it has defined as *the use of ICT by regulators and those who deal with them, such as regulated entities, NGOs, and ordinary citizens, as an integral part of the process of measurement, assessment, and feedback which is central to regulation.*

Second, the article set out to critique the resulting application of ICT for schemes of government regulation. While generally positive about these developments, it has identified e-regulation as a possible cause of inflexibility, disempowerment, and ossification. It is particularly important to avoid the simplistic adoption of private sector frameworks and approaches in public sector IS development. It is also necessary to be aware of the limitations of models and simulations as a tool in regulatory processes, as these can constraint debate, decision-making, and discovery of salient facts if they are not carefully used.

Finally, it sought to highlight the connections between so-called ‘smartness’, the Internet of Things, and the rule of law. It has presented an argument that the increased use of ICT in government, and specifically in regulatory regimes, is a significant development with potentially negative consequences for the proper application of the rule of law in the routine

work of government. With the move towards ‘Ambient Law’, the biases, assumptions, and mistakes that may be embedded in widely-distributed and difficult to avoid information systems should be a topic of urgent concern for researchers and academics in ICT, IS and law. However, there is little interchange between these disciplines.

In response to these challenges, and in the hope of achieving the greatest possible benefit from these new tools, this article has highlighted the need to ensure that lawyers are involved in the details of planning such systems. It has also underlined the point made by other scholars that it is essential that legal rules must be embedded into the ‘smart environment’ in a reflective way which protects basic values, such as the rule of law. In conclusion, this article argues that e-government researchers must include the poorly-understood processes of regulation, which is a central activity in present day government, in the activities which they study; and must include a deep consideration of law (and the basic values which law seeks to protect) as a central discipline in their research.

### **Acknowledgements**

The author is grateful to Professor Willie Golden of the School of Business and Economics at the National University of Ireland Galway, Professor Jane Holder of the Faculty of Laws at University College London, and three anonymous reviewers and the editor of this special issue for their comments on earlier drafts of this article, all of which greatly improved the final text. Any errors are the author’s sole responsibility.

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