Fall 2008

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Abstract
Within science technology and society studies the focus has long been on descriptive micro-analyses. Several authors have raised the issue of the normative implications of the findings of research into socio-technical devices and infrastructures, while some claim that material artifacts have moral significance or should even be regarded as moral actors. In this contribution the normative impact of technologies is investigated and compared with the normative impact of legal norms, arguing that a generic concept of normativity is needed that does not depend on the intention of whoever designed either a law or a technology. Furthermore this contribution develops the idea that modern law, which has been mediated by the technologies of the script and the printing press, may need to rearticulate its basic tenets into emerging technologies in order to sustain what has been called the paradox of the 'Rechtsstaat'.

Keywords: technological normativity, legal normativity, constitutive rules, regulative rules, rule of law, democracy

Introduction

Since the beginnings of modernity law has become the most important instrument for the regulation of human society, amounting to a rule *by* law. Its success can be attributed in part to its alliance with the technologies of the written script and the printing press, which extended the reach of modern law both in time and space, allowing an ever more detailed design of human intercourse. It also generated the need for a professional class of lawyers to sustain some form of legal certainty in the midst of proliferating texts. This class of lawyers guards the relative autonomy of law in relation to politics and morality, enabling what continental lawyers have called the 'Rechtsstaat' or 'État de droit' resulting in a 'Rule *of* Law', the terms used for the Anglo-Saxon equivalent.[1] This rule of law embodies the paradox of the 'Rechtsstaat', protecting citizens against the authority of the state by means of the authority of the same state, facilitated by the internal division of sovereignty (into legislation, administration and adjudication) that provides the setting for resisting governmental action in a court of law.

Emerging technologies like RFID-systems and interconnected sensor technologies prepare the ground for smart devices and the socio-technical infrastructures for Ambient Intelligence (AmI), somewhat equivalent with autonomic computing and ubiquitous computing. Though AmI is a vision that has not yet been realized and is hard to define, a set of recurring aspects can indicate the salience of the changes it could provoke in everyday life. AmI is suppose to imply embedded, ubiquitous, invisible technologies, hidden complexity, absence of keyboards meaning that the environment itself becomes the interface, real time monitoring, allowing context-awareness, customization and personalization, adaptive and last but not least proactive environments. In as far as such socio-technical environments are used to spy on us or induce compliance with technologically embodied regulations, they may threaten the system of checks and balances between governmental powers and the possibility to contest the inferences made by the profiling machines they employ. However, the dark scenarios that have been developed around this technology do not necessarily focus on governmental interference (Wright et al. 2008). AmI will most probably be controlled by the service providers that hope to make a profit on the seamless customization that is offered. If its vision comes true, many authors expect a further erosion of the

concept of privacy by reducing it to the disclosure of personal data that can be traded at will (commodification of personal data), while, at the same time, the advanced data mining technologies that underlie smart infrastructures may result in refined and dynamic segmentation of society (social sorting) to an extent previously unheard of. If citizens are not aware of what can be done with the profiles inferred from their or other data and have no access to the techniques used to categorize them, such refined profiling could result in manipulation and unfair discrimination (Zarsky 2002-2003, Hildebrandt and Gutwirth 2008b). This contribution argues that to counter such threats we may have to rethink the idea of written law, making a first attempt to conceptualize a law that is articulated in technologies other than the (printed) script.

Having discussed the nature of the threats of autonomic profiling elsewhere (Hildebrandt 2008a, 2008d) I will focus this contribution on the development of a generic concept of normativity that can account for the impact of both technologies and law on human interaction. Such a concept should not be confused with morality, which seems to warrant an evaluation in terms of good and bad, while normativity merely describes the way a certain technology or legal rule induces or enforces, inhibits or rules out certain types of behavior. In the second section I will assess the way lawyers regard the regulation of society, after which I will develop a generic concept of normativity in the third section, resulting in a discussion of the regulation of the collective of humans and non-humans in section four. In the last section, five, I will provide some tentative conclusions.

1. The regulation of society: A lawyer's perspective[2]

1.1 What in fact is law?

The German legal historian Uwe Wesel made a salient point when he wrote: 'What in fact is law? Answering this question is as simple as nailing a pudding to the wall' (Wesel 1985).[3] Despite the accuracy of this proposition we need to clarify the role of law in the regulation of society, if only because democracy seems to depend on the enactment of legal rules by a democratic legislator.

Common sense understanding of legal norms – even amongst many lawyers - seems to circulate somewhere between the positivist accounts of three scholars of legal theory: 'the command theory of law' attributed to John Austin (1995, first published 1832), 'the pure theory of law' of Kelsen (1960, first published 1934), and 'the concept of law' of Hart (1994, first published 1961). Austin, writing in the first half of the 19th century, basically claimed that laws are commands of a sovereign, emphasising the relationship between law and the sovereign state. In opposition with natural law theories, law in his view is man-made and depends on the power of the sovereign to impose general rules on his subjects. Like Austin, Kelsen made a strict distinction between the 'is' and the 'ought' of the law. Writing in the first half of the 20th century, he described the 'is' of the law as a set of rules that form a pyramid of hierarchically ordered normative rules, which in the end all derive from one *Grundnorm*. This 'Basic Norm' guarantees the unity of the legal system and the validity of all the legal rules that should be seen as derived from it. Like Austin's command theory, law always depends on the authority of the state, but, according to Kelsen, this authority also depends on the law: the state is a legal construction. Building on Austin's opposition with natural law, Kelsen claims that the analysis of what law 'is' must be distinguished from what law 'ought' to be (*das richtige Recht*). To allow a moral evaluation of the law, according to Kelsen, one must first describe its normative content, taking into account the deductive logic that determines the connections between different legal norms. A similar positivist position is taken by Hart, writing in the second half of the 20th century, even though the nature of 'his' law is defined in terms of social interaction instead of 'purely' normative statements. While Kelsen's *Grundnorm* can be understood as a hypothetical rule that ensures the unity of the system and the validity of its elements, Hart's 'Ultimate Rule of Recognition' is firmly rooted in social acceptance or what he calls the internal aspect of legal rules. Hart discriminates between primary legal rules that define which conduct is prescribed, prohibited or allowed, and secondary legal rules that define the competence to recognize, change or adjudicate primary legal rules. The distinction between primary and secondary legal rules has developed into a canonical approach within law and legal theory. In short, Austin linked law to the power of the sovereign to impose general rules on his subjects, Kelsen elaborated the systematic character of the body of legal rules and their clear distinction from moral rules and political competence, and Hart understood law as a complex system of social norms, coining the difference between

regulative and constitutive rules in terms of primary and secondary rules. Roughly speaking legal positivism seems to emphasize that legal norms are general rules, that they depend on the authority of the state and must be strictly separated from moral and political rules.

However, many scholars of law and legal theory have objected to these tenets of legal positivism, which has led to further refinements and alternative positions. Most famous is Dworkin's objection that it makes no sense to understand law as a system of rules, claiming that the interpretation of legal rules implies the guidance of principles, which do not share the binary application of rules. According to Dworkin (1991, first published 1986) the coherence that is inherent in law implies more than just logical consistency, requiring what he calls the integrity of law. With the notion of integrity he introduces moral standards into the law – even if these are inductively generated from previous legal decisions (enacted law, court judgements). Instead of thinking in terms of a legal system that is focused on logical coherence, he uses the metaphor of a chain novel to indicate the continuing story of law-making. His approach to law can be understood as hermeneutical, stressing the fact that any decision implies interpretation and needs both creativity and precision.

The emphasis on interpretation in contemporary legal discourse is not surprising as modern law centers around text and printed matter. The script and the printing press form the preconditions for the modern legal systems that depend on them (Hildebrandt 2002, 2008c). For lawyers, the fact that law is constituted and mediated by the printed script may be too obvious to warrant further investigation, but the profession would benefit from the realization that the (printed) script is indeed a technology, with massive implications for the scope, the content and the nature of the jurisdictions it supports. This is not only the case because the invention of the script – and later the printing press – extended the reach of legal rules beyond face-to-face relationships, forming the condition of possibility for translocal polities and jurisdictions, but also because the script introduces a linear sense of time due to the need to read from beginning to end, while the printing press evoked increasing rationalisation and systematization in order to cope with the explosion of available texts (Lévy 1990; Eisenstein 2005). Another salient feature of written law is a pervasive sense of delay deriving from the complexity of the legal system that needs to mind its coherence in the face of increasing regulation, thus nourishing reiterative doctrinal attempts to create order in the bran tub of newly enacted statutes and newly published case law. This delay is related to the distance between the author and the public, since the public – other than in the case of oral traditions - no longer needs to share time and place with the author to access the text (Geisler 1985; Ricoeur 1986). Written text is the externalization and objectification of the spoken word, bringing about the need for interpretation (Ricoeur 1986; Lévy 1990; Ihde 1990; Hildebrandt 2002, 2008c). Absent ostensive reference, the author is never sure how her text will be understood, while the reader cannot take for granted what the author meant to say. This provides for an inevitable latitude in the use of texts and turns law-making (enactment of legal codes as well as their application) into a creative process rather than mechanical application.[4] Constitutional review in the US has thus moved beyond the idea that the interpretation and application of constitutional safeguards can be based on the 'Framers' intention' or on the 'clear meaning' of the text: a text can not speak for itself and its meaning is not exhausted by a claim regarding the author's intention. This does not imply that its meaning fully depends on the reader's response, which would land us in arbitrary decisionism as to the application of legal texts. It rather means that in the interplay between author and the subsequent readers the texts acquires a meaning of its own that restricts the potential interpretations (if just any interpretation were possible the text would be meaningless), while also providing the possibility for novel applications (requiring creative actualisation in the relevant context).[5] Written law thus generates a dynamic, autonomous law that depends on and nourishes legal doctrine to provide continuity as well as flexibility in the application of law (Hildebrandt 2008c). Such continuity and flexibility are the conditions of possibility for the demand that law combines legal certainty, justice and effectiveness in the face of recurrent changes in the social and technological infrastructure of contemporary society.

1.2 Constitutive and regulative legal norms

To fine-tune our understanding of law we should discriminate between legal rules that are preconditional for – constitutive of – certain legal actions or legal facts, and rules that regulate existing actions or facts. If I violate a traffic rule that regulates driving a car, this does not mean that I cannot drive the car. The rule – e.g., forbidding

speeding beyond 100 miles – is regulative of driving a car. However, if I violate a rule that stipulates the registration of marriage in the civil registry, I will simply not be married. In that case the rule is constitutive for marriage, because it stipulates what counts as a marriage, or in other words, which fact generates the legal consequences of marriage. The difference between constitutive and regulative rules derives from Searle (1995), who discriminates between brute facts, which can be the object of regulation, and institutional facts, which are constituted by social interaction. Searle defines brute facts as facts that can exist independently of human beings and their institutions, while his institutional facts depend on human institutions. Inevitably this boils down to a physicalist worldview that is supplemented with 'the social'. From that perspective, driving a car is a brute fact, as it is not constituted by law, while marriage is an institutional fact, as it cannot exist independent of social interaction. In this view, at some level, all institutional facts are based on brute facts. In terms of Searle we could explain this by saying that brute fact X counts as institutional fact Y, in context C (Colomb 2005). For instance, the brute fact of driving a car counts as the institutional fact of 'being a road-user' in the sense of the Traffic Code (which attributes legal consequences to this institutional fact) in the context of driving on a public road. A closer look thus discloses that the distinction is relative: depending on one's perspective, any brute fact can be rearticulated as an institutional fact, while institutional facts can be 'used' as brute facts to be regulated. The institutional fact of being a road-user in the sense of the Traffic Code is the object of regulation in the Traffic Code. This means that the distinction has an analytical appeal, as long as it is not taken to imply an ontological difference between facts that exist outside human perception and facts that are socially constructed. Other than that Searle argues, even a brute fact involves some form of constitution, namely the one effected by our biological wiring (Varela, Thompson et al. 1991). A bat perceives something else where we see a wall, even if the bat will avoid clashing into the wall just as well as we do (Nagel 1974). At the same time any type of social construction involves both humans and non-humans (Latour 1991). For instance, the social construction of a marriage requires the mediation of technologies that register the marriage as such: written or printed records in the case of a tradition that is mediated by the (printed) script; the wearing of specific types of jewelry like bracelets or a spot on the forehead (bindi), in the case of an oral tradition.

2. A generic concept of normativity

2.1 Three types of norms

Normativity is associated with social norms that have been either deliberately issued *for* or tacitly developed *in* the practices of a certain community/collective.[6] In both cases norms can be equated with constraints that induce or enforce certain types of behavior while inhibiting or ruling out other types of behavior. Deliberately enacted legal norms depend on the competence to legislate, which presumes a form of political authority, while the effectiveness of enacted law in the end depends on the extent to which the issued legal norms become part of the normative practices of the relevant community/collective. This implies that – as in the case of brute facts and institutional facts – the distinction between deliberately issued norms and norms that are part of a normative practice is *analytical and not ontological*. In a modern legal system, *to count as legal* a norm must be covered by state authority, but whether and to what extent it informs the normative practice of a community depends. So, we have three types of norms: legal norms that do not (yet) regulate or constitute the interactions in a particular practice, legal norms that do regulate and/or constitute the interactions in a particular practice and non-legal norms that do regulate and/or constitute the interactions in a particular practice.

2.2 Technological normativity

If we leave the domain of law we may find other types of normativity, pertaining to constraints that have not been deliberately issued but which nevertheless induce or enforce, inhibit or rule out certain types of behavior. Latour's discussion of the Berlin key is a case I point. This key forces the user to open the door by pushing the key through the keyhole to the other side of the door, and after entering the house, the door can only be closed by turning the key and thus locking the door. This key demonstrates how a technological device actually regulates and constitutes the interactions of a resident, the key, her door and others who wish to enter the house.[7] In this case the designer of the key has inscribed a program of action into the hardware, delegating the task of insisting on locking or not locking the door *to the key* (Latour 1993). If we look at the normative impact of technological

devices or infrastructures we must admit that many of the effects they produce on our everyday behaviors have not been planned (Bijker 1995). Contemporary common sense would describe them as side-effects, even in the case that these unplanned effects outweigh explicitly intended effects. When speaking of technological normativity I do not focus on the intention of the designer, I simply refer to

> the way a particular technological device or infrastructure actually constrains human actions, inviting or enforcing, inhibiting or prohibiting types of behaviour.[8]

Such normativity does *not* depend on deliberate delegation since it may emerge unexpectedly in the interactions between devices, infrastructures and humans who make use of them (and are to a certain extent constituted by them). Such a concept of normativity should not be confused with the concept of morality, as this would imply an evaluation in terms of good or bad, whereas normativity merely refers to the way the patterns of our interactions are affected. As to the use of the term 'constraint', this should not be understood as a negative term: constraints are the condition of possibility of (inter)action, they do not only inhibit or rule out certain behavior, they also create or induce certain types of behavior.

If we take the example of a smart device to save energy in the house, we can illustrate how technological normativity can be either regulative or constitutive of human interaction.[9] Image we all have a 'smart meter' in the cupboard that measures the amount of energy we use and the amount of carbon this emits. This will allow more accurate billing, taking into account the costs to the environment of the type of energy used. 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 may have been designed by the national or municipal legislator or by government agencies involved in environmental protection and implemented by the company that supplies the electricity. Alternatively the user may be empowered to program her smart house in such a way. Another possibility 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 behavior. In combination with the 'smart meter' they can begin to anticipate the automatic intervention of the smart home, preventing unpleasant surprises, or they can program their smart home in a more refined way to stop them from crossing specified thresholds. Interestingly enough, the difference between an automatic intervention and a mere advice or provision of information compares well to the distinction between regulative and constitutive rules we discussed above. As long as the technologies enables us to make our own choices, inducing but not enforcing a change of habit, the technology is regulative of our behavior. To the extent that the technological infrastructure intervenes to rule out non compliance, the technology is constitutive of our behavior: for instance, if we do not comply we cannot continue to operate the dishwasher and have to wash the dishes by hand or wait for the next day.

2.3 Comparison of legal and technological normativity

In modern states legal norms depend on state authority, which means that they regulate and/or constitute the relationship between citizens and their government. This can be called the vertical or imperative dimension of legal norms, based on the coercive authority of the modern state. In a democracy legal norms also aim to regulate or constitute the relationships between those that share jurisdiction, which means that citizens feel obliged towards each other to comply with legal rules and principles. This can be called the horizontal or normative dimension of legal norms, best explained in terms of Wittgenstein's discussion of what it means to follow a rule (Taylor 1995; Winch 1958). Technological normativity does not depend on state authority in the sense that this authority creates the competence for the Berlin key to enforce locking the door from the inside. It does regulate and/or constitute the relationship between citizens and between citizens, devices and infrastructures. Does this mean that technological normativity has a normative dimension while lacking an imperative dimension? Like in the case of non-state societies the absence of coercive authority does not imply that power is not at play, rather on the contrary.[10] In non-state societies there is no coercive authority that can

establish a measure of formal equality to empower weak parties, compensating for power imbalances by means of legal instruments like e.g. the 'equality of arms' of the fair trial of art. 6 ECHR (Hildebrandt 2006b). Non-state societies are constituted by peers who cannot depend on governmental intervention in the case of conflict, which warrants them to protect themselves against being overruled by more powerful peers. Absent a monopoly on violence the legal normativity of non-state societies has to be sustained by means of persuasive authority, revenge or war, rewarding the competitive advantages of those with economic or military power (Dubber 2005; Hildebrandt 2002, 2005). Like legal normativity in non-state societies, technological normativity does not depend on coercive authority but on the socio-technical arrangements that constitute or regulate specific practices like consuming electricity, driving a car, etc. Arrangements that generate practices that are *constituted* by specific technological artifacts *enforce* compliance with the norms embodied by these artifacts, while arrangements that generate practices that are *regulated* by specific technological artifacts *invite* compliance with the norms they embody. For instance, if sensors are integrated into our clothes that can measure e.g. heart rhythm, blood pressure, skin resonance and temperature, connected to a device that transmits these data to a database for profiling, extensive monitoring is enabled, providing interesting knowledge about a person's relative health, state of mind or inclinations. Such information may become available to employers, insurance companies, hospital energy services, close relatives and/or to the person herself. In the case of a diabetes patient, the inferred profiles may allow accurate prediction of dangerously low levels of insulin. If such real-time monitoring is coupled with automatic interventions, e.g. blocking access to certain foods or activities, the technology becomes constitutive for such access or activities. If the person receives real-time access to these data and the inferred profiles, perhaps supplemented with advice to prevent an attack, the technology becomes regulative of the relevant activities (like eating, doing sports, driving a car). Evidently self-monitoring – even without advice – may engender self surveillance, self discipline and boil down to an enforcement even more stringent than enforcement embodied in the automatic intervention of the smart environment (Foucault 1988). Nevertheless it makes sense to discriminate between socio-technical arrangements that are constitutive and those that are regulative of our interactions, if only to make clear that technology does not necessarily rule out choice in comparison to law.[11]

3. Regulating the collective: Technological normativity and constitutional democracy

3.1 The force of law and the force of technology

Emerging technologies like smart cars, biomedical monitoring, proactive homes and schools that integrate personalized e-learning with real-time profiling will have a major normative impact on citizens, constituting new possibilities to regulate their lives. The socio-technical arrangements that generate technological normativity may have far reaching implications for the way we live together as a collective. These implications may be far greater than those generated by legal normativity, being restricted at the present moment to a technological articulation in the (printed) script. The printed script has a very specific normativity, because it can invite but not enforce specific interpretations, thus entailing a radical *under*determinacy that may not be evident in smart, proactive technologies that depend on autonomic computing (Kephart and Chess 2003). In fact, even though the script is linked to the coercive authority of the modern state, it is also linked to the relative autonomy of law in relation to political power. This is the case because the proliferation of legal texts since the advance of the printing press produced a potential chaos of interpretations, generating a need for systemization and specialization. This is what resulted in the professionalization of legal practice in the course of the last five centuries. The fragility of the meaning of written text, faced with the need for legal certainty, thus facilitated the appearance of a monopoly on law for the professional class of lawyers (Koschaker 1997, first published 1947), mandated to safeguard the coherence of the legal system (in the interest of both the citizens that share jurisdiction and the government that wishes to implement its policies). The force of (written) law thus depends on the coercive authority of the state in combination with the labors of the lawyers' guild.

Above I have argued that the normativity of socio-technical infrastructures does not share the imperative aspect of legal normativity (sometimes referred to as the force of law),[12] because it does not depend on governmental authority. Technological normativity can, however, like legal norms, be understood in terms of constitutive or regulative effects. Interestingly enough, the extent to which socio-technical devices or infrastructures can

constitute or determine our actions differs from the extent to which legal devices can achieve compliance. In the case of what Searle might call brute facts, like driving a car, though legal rules can constitute what it means to count as a road user or even a car driver, they cannot constitute the driving of a car in the sense that in the case of non-compliance one cannot drive. As has been indicated this incapacity is related to the technology in which modern law has been articulated: the script can regulate the behavior of a driver, it cannot determine it the way a smart car could. The script could, for instance, be constitutive for the competence to drive a car: violating the legal norms that constitute this competence would simply annihilate the *competence*, but it would still not annihilate the *capacity* to drive. A monitoring technology which detects driver fatigue (Jin, Park et al. 2007) could, in combination with a device that affects the accelerator or even the motor, prevent a driver from continuing her travels whenever the measure of fatigue moves beyond a certain threshold. The technology seems capable of enforcing compliance with rules to an extent previously unheard of.

This raises a number of questions. First of all one wonders whether this is a positive development, to be embraced in the struggle against non-compliance. Using technological means to attain what legal means cannot achieve, implies using them as neutral means of implementation, disregarding the normative impact of a mechanical application of legal rules. It sounds like legal or technological instrumentalism, whereby law and technology are seen as interchangeable instruments to reach specific policy objectives. As some legal scholars have indicated (Tien 2004; Brownsword 2005), this type of enforcement could in fact eradicate human freedom and accountability because one would be spared alternative choices of action (creating a world in which one simply cannot commit a crime). Does this mean we should understand compliance by means of technological devices as a negative development, to be warded off as long as possible? Such an attitude would imply that technologies can only be designed in one way, inevitably resulting in the determination of human interaction. It sounds like legal or technological substantivism, attributing determinist qualities to Technology while assuming a voluntarist understanding of Law. Rather than advocating the extreme positions of determinism or voluntarism I will argue a more creative and realist perspective on the relationship between law, technologies and human interactions, recognising the constraints they constitute while acknowledging the fundamental underdeteminacy of human action. As to the technological infrastructures this underdeterminacy is connected with what Ihde (1990) has called the multistability of technologies, meaning there is never just one way for a technology to take its place in the socio-technical tissue of the collective, and it is precisely such underdeterminacy (to be discriminated from indeterminacy) that requires a more active anticipation of different ways to integrate a technology with law.

The second question is how we could bring socio-technical devices and infrastructures under the rule of constitutional democracy: for, if we agree on the need for democratic procedures to regulate the enactment of legal normativity, technological normativity requires similar democratic legitimacy. This means that the relationship between law and technology is no longer one of enactment (law) and implementation (technology) but one of enactment and articulation (of law into a repertoire of technologies, one of which is the script). This may also imply a shift from the regulation of *society* to the regulation of the *collective* (Latour 1999): taking into account that we are living in a world of hybrids or actor-networks of humans and non-humans (folding into black boxes for as long as it goes). In his daring discussion of modernity Latour (1991) describes how we have delegated the representation of humans to politicians, while delegating the representation of non-humans to scientists. Facing the challenges of the normative impact of emerging technologies that will change our daily life beyond recognition, the ineffectiveness of this division of tasks is apparent. Taking democracy serious means that the scientists and engineers that produce hybrids like RIFD systems, genetic tests or technologically enhanced soldiers should be obligated to present their case to the public that is composed of those that will suffer or enjoy the consequences. In other words, the hybrids that are propelled into the collective must survive the scrutiny of the public that constitutes itself around what it considers to be a matter of concern (Dewey 1927; Callon 2001; Latour 2005; Marres 2005; Hildebrandt and Gutwirth 2007, 2008). When funding and developing specific technologies these publics should have the opportunity to voice their opinion, co-determining the direction of research as well as the introduction of such artifacts into everyday life infrastructures. Different types of technology assessment (TA) have been developed to involve lay persons into the early stages of technological design (Rip, Misa et al. 1995; TAMI 2004; Marris, Wynne et al. 2002), often entailing citizen participation. In other work we (Hildebrandt and Gutwirth 2007, 2008) have argued that such experiments could

in fact build on the normative constraints embodied in the 'fair trial' that ensure what Rip (2003) has called agonistic learning processes and robust outcomes.

A third question regards the issue of the technological embodiment of legal norms. On the one hand the relative autonomy of law towards politics and morality seems to depend on the radical underdeterminacy inherent in the printed script, on the other hand written codes seem impotent when it comes to providing protection against the monitoring technologies that may soon inform many decisions taken about the chances we get and the risks we run in life (Hildebrandt 2008a, 2008b, 2008c; Zarsky 2002-2003). Will it be possible to re-embody the legal norms that protect us against invasion of our privacy, violation of the presumption of innocence, unfair discrimination *in the emerging technologies they aim to regulate*, while still retaining the underdeterminacy we value as the core of constitutional democracy? This is an important issue that should not be conflated with the use of technologies for the *implementation* of a law that is *articulated* in the written script. For instance, 'putting tracking devices on criminals awaiting trial to ensure that they do not flee a jurisdiction where they are going to be tried[13] is all about implementing a law that requires suspects to be available for trial. As an example, it follows the traditional separation between law (articulated in the script) and its implementation (considered to be a matter of administration rather than requiring the attention of the legislator or the courts). My point is a different one: if we need to protect ourselves against specific undesirable affordances of specific socio-technical infrastructures, such as AmI, we may need to articulate the legal protection into the technologies we aim to protect against. In the next section I will indicate how privacy enhancing technologies (PETs) and transparency enhancing technologies (TETs) could embody (not just implement) legal norms that aim to protect core tenets of constitutional democracy, like privacy, autonomy and non-discrimination.

3.2 Translating the paradox of the 'Rechtsstaat' into digital code

The paradox of what continental Europeans call the 'Rechtsstaat' or the 'État de droit' resides in the fact that in the substantive conception of the 'Rechtsstaat' law is not just an instrument for the implementation of government policies but also the instrument that protects citizens against arbitrary rule and against dominant frames of reference. The authority of the state is used as a check on the authority of the state: the internal division of sovereign powers allows one power to function as a counterveiling power on the other (Montesquieu 1973, first published 1748). Facing the complex entanglement of socio-technical infrastructures it seems that the need has arisen to translate this paradox into the emerging technologies that may otherwise rule our world. In his ground breaking *Code and other laws of cyberspace* legal scholar Lawrence Lessig (1999) explains in a convincing narrative, enriched with a great many arguments, that traditional law is losing ground against market forces, social norms and especially computer code. His telling description of cyberspace and the way it is constituted as a virtual world that is often real in its consequences has triggered many responses, ranging from adoration for his unconventional approach of law as just one way to regulate society to the complacency of legal scholarship that suspects the present legal paradigm can easily deal with the charges of the digital age. Since he wrote his best selling wake-up-call, quite some funding has been invested into Ambient Intelligence (ISTAG 2001) or the Internet of Things (ITU 2005), which – if realized – will turn our entire offline world online. The borders between cyberspace and our lifeworld will blur, presenting us with an even more pressing need to rethink the limits of (the rule of) law in the era of digitalization (Hildebrandt 2008a).

Lessig presents us with an interesting argument about the need to use computer code to support the legal framework of constitutional democracy. However, it seems that he views law and code as separate domains, not realizing that law's present failure to sustain the paradox of the 'Rechtsstaat' may be connected to contemporary law's embodiment in the technology of the script. Also, he provides no answer for the democratic deficit that would arise if we use technologies instead of law to implement government policies.

Translating the paradox of the 'Rechtsstaat' into digital code – using a technology to protect us against undesired consequences while regulating its use - would thus require two things. First, the use of code must be legitimized in democratic procedure and second, the implications of automatic application must be faced and mitigated. Technologies that are constitutive for our interactions may enforce compliance beyond anything that a written law can achieve. For such technologies to be integrated in the legal tradition of constitutional democracy they

must provide for the means to contest their own application. This will require transparency to empower citizens in their intercourse with the socio-technical infrastructure. For instance, the present focus on the protection of personal data, which often involves a right of access to personal data processed by large organizations, should be extended to a right of access to the group profiles that may be used for social sorting with far reaching consequences for the risks and opportunities attributed to a particular person (Hildebrandt 2006a, 2008d). More importantly, these rights of access need technological embodiment, otherwise they are just paper dragons. This will present major challenges for the industry that is developing Ambient Intelligence, which thrives on real time monitoring and autonomic application of profiling to personalize the environment to the inferred wishes of its users. Next to privacy enhancing technologies (PETs), which are concerned only with the hiding and tracing of one's personal data, transparency enhancing technologies (TETs) must be developed that concern access to the profiles that are being inferred permanently from the mass of data collected from all relevant users and their environment. This requires new forms of cooperation between lawyers, computer scientists, engineers and data mining experts, co-creating a law that is integrated into the technologies without giving up the dual demand for democratic legitimacy and contestability in court. Constructive Technology Assessment for lawyers.

4. Conclusions

The common sense conception of law views legal norms as general rules, depending on state authority and strictly separated from morality and politics. Challenging this kind of legal positivism, philosophers of law have developed a hermeneutical understanding of law, making interpretation the hallmark of law. In this contribution I have developed the idea that modern law is not only influenced by, but rather constituted by its technological mediators: the written and the printed script. I have argued that this mediation has transformed the reach of law and prepared the ground for law as an autonomous practice that is capable of resisting state authority with an appeal to state authority, thus presenting us with what is called 'the paradox of the 'Rechtsstaat'.

The proliferation of emerging technologies, especially smart devices and infrastructures, calls for a new – generic - conception of normativity, which allows one to recognize the normative force of technologies as well as the normative force of law. To this end norms have been described as the actual constraints placed on human actions, inviting or enforcing, inhibiting or prohibiting specific types of behavior. Within the scope of this working definition, both law and technology have a normative impact on human action. To refine our understanding of the similarities as well as the differences between legal and technological normativity I have discussed two aspects of (legal) norms, being an imperative and a normative aspect. While modern law stipulates that all legal rules have an imperative aspect that links the force of law to the authority of the state, technological normativity obviously does not depend on such authority. This does not mean that the force of technology is less powerful than the force of law. To explain this, two types of normativity have been discussed, depending on whether norms are constitutive or regulative of human action. Though both law and technology can be either constitutive or regulative, the extent to which law is constitutive is limited compared to some technologies. A smart car, for instance, could rule out non-compliance with rules about the maximum speed, whereas law leaves room for violation. This limitation is brought about by the fact that law is mediated by the printed script, which cannot enforce a speed limit the way another technological device could. However, this is no reason to oppose a determinist Technology versus a voluntarist Law. The multistability of technologies, which can be developed in different ways, for instance allows for the construction of a speed limit system that makes it harder to push down the gas pedal once the speed limit is exceeded. In this case the technology regulates car driving without actually determining it. The legal rule is thus embodied in the human-machine interaction it aims to regulate.

In a constitutional democracy the regulation of society requires democratic consent. In as far as technological devices and infrastructures have a normative impact they should be brought under the regime of democracy and rule of law. It makes no sense to leave decisions about the introduction of new technologies that encompass normative impact on civil society to scientists, engineers and the industries that aim to make a profit on them. Anticipation of normative impacts by means of constructive or participative technology assessment should inform policy choices at the political level, and the regulative force of technologies should be brought within the domain of law, requiring effective possibilities to contest the legality and the legitimacy of specific applications of legal rules by means other than the script. Thus, the paradox of the 'Rechtsstaat', which implies that the

powers of the state can be contested in a court of law that is based on the authority of the state, should be translated into emerging technologies that are used to implement both the instrumental and the protective aspects of the law. Thus we may sustain the rule *of* law against a rule *by* law and against a rule *of* technology.

Acknowledgments

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Endnotes

1 This equivalence is of course relative in many ways, see Grote 1999. I will use the term 'Rechtsstaat' even if this is less familiar for Anglo-Saxon traditions, because so far the rule of law seems to be an affordance of the modern *state*.

2 The term regulation is used in a common sense way at this point, it is not meant to refer specifically to legal regulation, but can also refer to biological or technological regulation, e.g. the regulation of activities within the cell by genes, proteins or of safe driving by smart cars, speed bumps.

3 Wesel 1985, at 52: "Was ist eigentlich Recht? Eine Antwort ist ähnlich einfach wie der bekannte Versuch, einen Pudding an die Wand zu nageln (translation mh)".

4 About the difference between creative actualization and mechanical realization cp. Lévy, P. (1998). *Becoming Virtual. Reality in the Digital Age*. New York and London, Plenum Trade.

5 Though constitutional review in the US has actually and inevitably moved beyond a naïve understanding of the 'Framers' intention' and 'plain meaning', adherents to legal positivism will deny this. A pletora of relevant literature could be quoted here. Cf. e.g. Dworkin 2005 (first published 1996).

6 In my doctorate thesis I followed the terminology of Glastra van Loon, who speaks of norms having an imperative and/or a normative aspect (cf. Glastra van Loon, J. F. G. (1958). "Rules and Commands." *Mind* LXVII (268): 1-9, Glastra van Loon, J. F. (1985). "Norm en handeling. Hoe regelen wij ons handelen." *Ars Aequi* 34 (12): 697-704. The first aspect looks at the role a norm plays between a government and its subjects or citizens, while the second aspect looks at the role a norm plays between peers. The second understanding of norms comes close to Wittgenstein's idea of what it is to follow a rule (cf. Taylor 1995 *Philosophical Arguments*. Cambridge Massachusetts, Harvard University Press).

7 The story of the Berlin key is even more complicated and involves also the caretaker of the house, who has another key that is crucial for the plot. For the point that I am making a detailed account of how the key enforces specific behaviors is not relevant, see Latour 1993 for the elaboration.

8 One could rephrase by stating that technologies have specific affordances in relation to the subjects that use them. This refers to Gibson's salient understanding of the relationship between an organism and its environment (cf. Gibson 1986). In discriminating between inviting/enforcing and inhibiting/ruling out certain behaviors I seek a further qualification of what affordances trigger and allow.

9 See Luke Nicholson, Finding a smart way to save energy, *BBC News* 22 June 2007, at http://news.bbc.co.uk/2/hi/science/nature/6225938.stm, last accessed on 14th July 2007.

10 About the difference between power ('Macht') and authority ('Herrschaft') see Weber, M. (1976). *Wirtschaft und Gesellschaft. Grundriss der verstehenden Soziologie*. Tübingen.

11 This is not to deny the pervasive effects of self-monitoring; it should be interesting to investigate to what extent regulative legal rules initiate self-monitoring in comparison to the extent to which regulative technologies do.

12 See the lucid description of law's opacity in Derrida, J. (1994). *Force de loi*. Paris, Galilée.

13 This is a quote from one of the reviewers of this contribiution, who wondered whether this would be the type of example that fits the point that I am making (quod non).