
A Vision of Ambient Law

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I. Introduction

On 1 November 1755, All Saints' Day, Lisbon was shocked by an earthquake that brought on a series of waves in European politics and architecture. In her *The Faces of Injustice* Judith Shklar discusses this earthquake as a turning point for the demarcation line between natural and man-made disaster, shifting the borders of responsibility of governments to include harm caused by natural disasters *that should have been anticipated*.¹ The urban architecture of Lisbon, a city with a myriad of small streets that offered no shelter once the houses started coming down, was partly to blame for the excessive amount of casualties.² To have an idea of this architecture the reader—if familiar with Lisbon—could think of the famous Alfama district, the Moorish labyrinth of closely knit alleys, adorned with freshly washed laundry stretched across the narrow streets, stemming from an era when housing was considered a private enterprise not falling within the scope of public competence. After the earthquake Lisbon was reconstructed under the supervision of the marquis de Pombal who practically reigned Portugal as an enlightened absolutist monarch. He planned broad avenues which should allow people to rescue their lives by running to the middle of the road in the case of another earthquake and took care that earthquake-resistant buildings were constructed.³ One could paraphrase Shklar by saying that when natural disaster has public consequences, governments should intervene to the greatest extent possible to prevent harm.

It seems remarkable that in today's world, bristling with socio-technical imbroglios that have a major impact on the risks and opportunities of citizens everywhere, the development of technological infrastructures is left mainly to scientific research, technical engineers and market forces. Quoting Lawrence Lessig one could claim that 'governments should intervene ... when private

¹ J Shklar (1990) speaks of passive injustice when referring to a blameworthy lack of intervention by governments that could have prevented serious harm.

² The phrasing could suggest that we can blame non-humans for harm caused. About the issue of attributing civil or criminal liability to non-human intelligent agents, see Hildebrandt (2008a).

³ Mullin (1992: 157).

action has public consequences'.⁴ In fact, we can link his advocacy to Dewey's discussion of the *Public and its Problems* of 1927, in which Dewey claimed that democracy implies that those that suffer the indirect consequences of a decision or action have found a way to participate in the decision.⁵ Dewey's concern for democracy stemmed from the fact that emerging technological infrastructures had facilitated a complex societal context in which indirect consequences of decisions taken outside the domain of national politics were massive, requiring more participatory conceptions of democracy in addition to representative democratic theory.⁶ In today's world one could translate his concern by arguing that citizens who suffer or enjoy the effects of new technological infrastructures, like for instance Ambient Intelligence (AmI), should be able to influence decisions regarding the funding, designing and marketing of such emerging technologies. Instead of endorsing a paralysing technological determinism (akin to a fatalist acceptance of natural disaster) civil society and its government should realise that technologies are neither good nor bad but never neutral,⁷ acknowledging that technologies can be constructed in different ways, with different normative implications.⁸

In this contribution I will introduce the concept of technological normativity and compare it to legal normativity. After establishing how the two compare, their relationship will be explored, coming to the conclusion that modern law is in fact embodied in a specific technology: the written and printed script (section II). The idea that modern law is articulated in the script is elaborated in an analysis of oral, written and letterised traditions, including a speculative investigation of the transition from letterisation to digitisation, followed by a similar analysis of the implications of the transition from orality and the script to the letter-press for law (section III). The implications of the transition from the printing press to digital communication for the constitution of law are initiated with a discussion of the vision of Ambient Intelligence, explaining the massive normative impact the realisation of this vision would have on our every day life. I will argue that this normative impact will change the *mélange* of positive and negative freedom that forms the backbone of constitutional democracy, unless we find ways to articulate the legal framework of democracy and the rule of law into the technological architecture it aims to regulate, creating what has been called 'Ambient Law' (section IV). The conclusion must be that lawyers and computer scientists should negotiate mutual transformations in the legal and technological infrastructure to sustain and reinvent democracy and rule of law in the age of Ambient Intelligence (section V).

⁴ Lessig (1999: 233).

⁵ Dewey (1927); Hildebrandt and Gutwirth (2007).

⁶ An original analysis of the debate between Dewey and Lippmann on the issue of democracy and technocratic government can be found in Marres (2005: ch 2).

⁷ Kranzberg (1986: 544–560).

⁸ Cp Ihde's discussion of the multistability of technologies in Ihde (1990: 144–51), which concerns the different ways in which the same technology can be culturally embodied, leading to a measure of unpredictability of the actual use of a technology after its introduction.

II. Technological and Legal Normativity

A. Technological Normativity?

Before moving into the argument concerning technological embodiment of legal norms, we need to establish the extent to which technologies (devices and infrastructures) have a normative impact. With a normative impact I do not refer to explicit prescriptive rules, enacted by a legislator. Many of the norms that regulate our interactions do not derive from deliberately issued decrees, they rather derive from habits that have given rise to certain expectations, mostly remaining within the scope of tacit knowledge.⁹ Neither do I use the term 'normative' as equivalent to 'moral',¹⁰ recalling Kranzberg's proposition that technology is neither good nor bad, but never neutral. To decide upon the moral significance of a technology we must first define what we hold to be good or bad, after which we can *evaluate* the normative impact in those terms. To do this we must first *describe* the normative impact, which is situated in the way a specific technology induces/enforces or inhibits/rules out certain types of behaviour. A smart car may for instance detect a driver's fatigue and warn the driver of the risk she is taking when continuing the journey.¹¹ This warning may inhibit certain behaviour: the driver may think twice before starting a trip, or, if she is already on her way she may stop the car and take a cab. Another type of smart car may simply direct the driver to a parking lot and technically prohibit the continuance of the journey: in this case the car rules out certain behaviour. In the case of inducing or inhibiting a driver's actions we must acknowledge that the technology is not determinate of the driver's behaviour: the smart car only *regulates* her interactions. In the case of enforcing or prohibiting the behaviour of the driver the car actually *determines* her actions. One can rephrase this in terms of regulative and constitutive technological normativity, regulating or determining our actions and limiting or constituting our ways of doing things. Evidently many technologies are constitutive of our interactions: without eye glasses I would not be able to read, without a telephone I could not talk with another person across long distance, without an MRI scan a medical researcher could not analyse certain types of brain damage. At the same time these technologies may be regulative: a car is constitutive for car-driving as such and if it warns us about not having fastened our seat belt it is regulative of (safe) driving. We can compare the regulative and constitutive normativity of technologies with regulative and constitutive legal norms:¹² the legal prohibition to violate the speed

⁹ Following Wittgenstein's discussion of to rule-following, see Winch (1958: 57–62). Cf Taylor (1995).

¹⁰ Cp Verbeek (2006).

¹¹ Jin, Park *et al* (2007).

¹² On the difference between regulative and constitutive rules see Searle (1969) for an application in the field of law see Mittag (2006). Searle discusses the difference in the context of what he calls brute and institutional facts. Institutional facts are constituted by constitutive rules, which are socially constructed; brute facts exist independent of human existence. In other work I have relativised this distinction (Hildebrandt forthcoming a).

limit is regulative of our driving a car, while the registration of a marriage with the civil registry is constitutive of being legally married. Neither law nor technology have a monopoly on regulating and even constituting our behaviours and in this sense we can agree with Lawrence Lessig, who has saliently described Code's law-like implications.¹³ Apart from law and computer code many other technologies, market forces and social interaction all have a normative impact. For this reason I concord with Lessig that in order to sustain fundamental legal principles like privacy, fairness and non-discrimination lawyers need to take into account the normative impact of technological devices and infrastructures.¹⁴

B. Legal Normativity

The fact that technologies have a normative impact does not—however—imply the equivalence of legal and technological regulation. As Gutwirth, De Sutter & De Hert argue in their contribution, we should not confuse or conflate the practices of lawyers with those of technologists. Neither should we conflate the normative impact of law and technologies on the interactions of citizens. First of all, technological regulation seems to influence our behaviour patterns via a backdoor, creating a tacit understanding of the technology that settles under the skin, allowing us to work with it effectively. Its prescriptions are not written down in the form of decrees one must obey, they are as it were inscribed in the hardware and software that we have to deal with. In a masterly description Bruno Latour narrates how a Berlin key forces its user to lock the door behind him when entering a house, because otherwise he cannot close the door at all.¹⁵ Second, in a constitutional democracy law has a specific role in sustaining the balance of power between citizens (their interaction being regulated amongst others by social norms), business enterprise (their interaction being regulated amongst others by the market) and the state (its interactions with citizens being regulated amongst others by law). Law rules at a meta-level that cannot be reduced to being just one of the instruments of government policy making. It provides the framework within which business enterprise, citizens and government officials can interact. For this reason technological devices and infrastructures should be regulated to a certain extent by law, precisely because they regulate our interactions, whether they were intended as such or not. This implies that legal and technological instruments are not exchangeable tools to achieve specific policy objectives, depending on which tool is more efficient or effective. Such a vision of law and technology

¹³ Though we evidently disagree whereas he states: 'Architecture is a kind of law: it determines what people can and cannot do' (Lessig 1999: 59), because neither law nor technology is per se determinate (constitutive) of human behaviour.

¹⁴ About the normative impact of profiling technologies in terms of human autonomy and non-discrimination see Zarsky (2002–03).

¹⁵ Latour (1993). Of course one can read the 'directions for use' of technological device as a set of prescriptions, but the normative impact is inscribed in the device itself and rather concerns the effects of its use than its conditions.

would boil down to legal and technological instrumentalism (and neutralism),¹⁶ having no regard for the values incorporated into specific legal and technological devices. Legal instrumentalism cannot conceptualise the legal architecture of democracy and rule of law that safeguards a particular set of checks and balances between citizens, state and civil society. In a constitutional democracy law is not just instrumental for achieving policy goals, as it should always be instrumental for the protection of citizens against the state as well.

C. The Relationship between Legal and Technological Normativity

What does this mean for the relationship between law and technology? If we can agree that technologies have a normative impact but should not be conflated with law, the question remains how the two relate. How could the practices of lawyers and the practices of technologists relate, taking into account that technologies do regulate our behaviours and that law aims to provide the meta-perspective?

There is, however, another point, which I will elaborate here. Instead of separating Law from Technology¹⁷ or the practices of lawyers from those of technological experts, I will develop the argument that modern law is already embedded in a specific technology,¹⁸ being the written and printed script. Obvious as this may be, this embodiment had major consequences for the constitution of modern law, and raises the question whether the normative impact of emerging technologies requires us to re-embody parts of the law in technologies other than the script in order to regulate their normative impact.¹⁹ This would require a new interest of lawyers for the practices of computer engineers and perhaps even a new literacy of lawyers in terms of the relevant technologies. No doubt, in a society with an oral tradition some people must have resisted the idea of making law dependent on the written word, claiming it would confuse the practice of writing with the practice of speaking the law. Writing started its history as a monopoly of a class of scribes and making law dependent on writing would greatly expand the monopoly of the literates.²⁰ Speaking the law in an oral tradition was performed by a court that practiced mediation, requiring the cooperation of the parties that were basically

¹⁶ Hildebrandt (2008a).

¹⁷ Lévy (1990: 12–15) on the dangers of using grand abstractions like Technology to describe the impact of technologies. Cf Ihde (1990: 4–10) discussing technological determinism, utopism and dystopian perspectives and Verbeek (2005: 11), arguing against an instrumentalist (technology as a neutral tool) and a substantivist conception (technology as determinative of human action) of technology.

¹⁸ Cf Lévy (1990: 16) who remarks that we take the script and the printing press for granted, blind to the fact that they are in fact technologies (constitutive of our lifeworld and selves). This point is stressed by Eisenstein (2005); Goody and Watt (1963) and by Ong (1982).

¹⁹ Hildebrandt (forthcoming b).

²⁰ About the advent of a class of scribes with a monopoly on administrative functions that require writing skills see Goody and Watt (1963: 313–14). About the privileged role of the scribe in legal traditions that depend on writing Glenn (2004: 62–3).

peers of the judge.²¹ Written law created new hierarchies and segmentations in society, not necessarily beneficial for the illiterate majority. The transition from an oral to a written legal tradition (and from a hand-written to a printing press legal tradition) has transformed law. In fact, modern law cannot be separated from its embodiment in the script, and it may be unwise to resist a transition of written law into one embodied in other technologies, taking for granted this would necessarily be the end of the rule of law. One could even fear that a failure to rearticulate legal norms in the technological infrastructure it aims to regulate, would in fact threaten the rule of law. The challenge we face is to discuss *how* legal normativity should be embodied in *which* technological devices and infrastructure(s). Before initiating an answer to this question I will first describe the transition of the lifeworld induced by the shift from orality to the script and from the hand-written script to the printing press. These transitions will be complemented with a description of the ensuing shift from oral to written law to law in the age of the printing press. Becoming aware of the profound impact of law's embodiment in the script may sensitise the reader to both the possibilities and dangers of reembodyment of legal norms in emerging technologies like Code, multi-agent systems (MAS), personal digital assistants (PDA) and other types of machine to machine (M2M) communications.

III. The Technological Articulation of Law

A. Transition of the Lifeworld

i. From orality to script

To grasp the transition of human societies depending on oral communication to societies based on the written word I will follow the work of the French philosopher Paul Ricoeur, who provided a penetrating account of what happens to our lifeworld and sense of self when we move from orality to written text.²²

The first point he makes is fixation. Both written and spoken text actualise what is virtually present in language by selecting combinations of sounds, words and sentences to create meaning. Written text—however—suspends the volatility of the spoken word, it fixes meaning in a material form by inscribing it in stone statutes, clay tablets, on papyrus rolls or sheets of papers. Paradoxically this attempt to petrify meaning creates a distantiating of

²¹ Glenn (2004: 64–5) about dispute resolution in non-state societies and (2004: 176–80) about dispute resolution in the Islamic tradition. Cf. Hildebrandt (2006b).

²² Ricoeur (1986: 87–114); Goody and Watt (1963); Ong (1982) and Glenn (2004: esp. ch. 3 about oral traditions and the difference with written traditions). Ihde (1990: 80–84) providing a 'phenomenology of reading and writing'.

meaning,²³ because the words are externalised and objectified on a material outside the human body.²⁴

The second point Ricoeur makes is that the text is liberated from the custody of the author, because simultaneous presence of author and speaker is not necessary. It is this distantiating of the author²⁵ that creates the need for interpretation, since the author cannot explain the intended meaning to the reader. The context of the reader will co-determine her response to the text and thus generate new meaning, adapted to the differences of time and location between writer and reader. This does not mean that the meaning of the text is now determined by the reader's response, because the text will be read by many more readers who may discuss their interpretations in writing thus forming a chain of texts that keep the text in constant flux. It also does not mean that the text becomes flooded with discontinuous meaning, because the very fact that fragmentation would render the text meaningless implies that readers will feel constraint by previous and anticipated meaning—thus contributing to the continuity of meaning.²⁶

The third point made by Ricoeur concerns the shift from ostensive reference—referring to a shared Umwelt—to a non-ostensive reference that consists of the world that is created by texts that refer to each other (creating a shared context). Distantiation of ostensive reference²⁷ is already present in spoken language, which allows one to speak of what and who are absent or elsewhere (distantiation of the *here*) and of events happening in the past or the future (distantiation of the *now*).²⁸ Language allows one to plan ahead, based on imagined scenarios of how past and present may evolve. Written language stretches this virtualisation of the here and now, enabling one to reinvent both the past (remembering) and the future (planning) to a much further extent.²⁹

The fourth point discussed by Ricoeur is the creation of a virtually unlimited public, which enables people to form translocal communities that need not share a local Umwelt—as long as they share a common context, as generated by texts. This move from a face-to-face community to a society of strangers was the condition of possibility for large scale empires, even if only a literate class had access to the texts that held them together as a polity. The distantiating of the audience³⁰

²³ Cf Geisler (1985: 73).

²⁴ Cf Goody and Watt (1963: 339).

²⁵ Cf Geisler (1985: 73).

²⁶ The context of the reader not only shapes the reader's response, it is also renegotiated as a result of the reader's acquaintance with the text. The context, in other words, is not a given, but in constant flux, Cf Lévy (1990: 26).

²⁷ Cf Geisler (1985: 74) and Goody and Watt (1963: 306).

²⁸ Cf Lévy (1998: 91–4).

²⁹ Cf Lévy (1998: 50–51). Cf Levinson (1999: 53) about the generalising quality of speech—the capacity that gives us a sense of things not present, the world as it is not—as abstraction. Also Goody and Watt (1963: 330), referring to Spengler's discussion of 'writing' that 'liberates' one 'from the tyranny of the present'.

³⁰ Cf Geisler (1985: 74).

enlarged the scale of societies, providing the tools to install some type of hierarchy between those that rule and those that are being ruled.

ii. From hand-written to printed script

To extend the analysis of the move from orality to script we will follow cyber philosopher Pierre Lévy on the transitions in human society generated by the shift from handwritten script to the printing press.³¹

One of the points he makes concerns the close relationship between a master and a pupil in the medieval system of education, coming down to the fact that one read a manuscript under the guidance of a master. This may indicate the lingering priority of orality, finally disturbed when the massive availability of printed text made individual education impractical, generating a new way of reading: both individual and in silence.³²

Another point made by Lévy regards the limited amount of primary texts in the age of handwritten manuscripts, confounded with accumulating commentaries, written in the (oral) style of question and answer. After the introduction of the printing press this *scholastic way* of teaching was replaced due to the abundance of texts that needed some sort of systemisation to make sense of them. Instead of accumulated texts and commentaries, books were now ordered by means of tables of contents, an index, matrices, graphics and written in a more analytical style announcing the advent of *modern science*.

The shift from aloud and public to silent and private reading,³³ together with the shift from guided study of a limited set of primary and secondary texts to individual study of a variety of texts of which the authority could no longer be taken for granted, tends—according to Lévy—to an exchange of situational, interstitial rationality for cartesian rationalisation, categorisation and universalism. The accumulation of text and context, initiated by the script, enhanced to an unprecedented level by the printing press, required new techniques to sort and file, classify and archive all the printed material in order to retain access to its content.³⁴

So, the alphabetic script,³⁵ and especially letterpress printing, create an external memory, allowing the distantiation described above (of the meaning, the author,

³¹ Lévy (1990). Cf Eisenstein (2005) and Chappell and Bringhurst (1999).

³² Cf Goody and Watt (1963: 319). Cf Manguel (1996: 41–53), who traces instances of silent reading to the early middle ages and before, especially in monasteries. About the primacy of orality in manuscript (hand-writing) cultures see Ong (1982: 117), and Goody and Watt (1963: 316–17) about using the script as a mnemonic technique.

³³ Cf Goody and Watt (1963: 339) about writing as an encouragement of private thought.

³⁴ Lévy (1990: 108–12). Eisenstein (2005: 70–81). See also Chappell and Bringhurst (1999: 39–40) on the invention of the page as a major step forward in systemisation and indexing compared to the scroll. Goody and Watt (1963: 334) about the increasing inconsistency of the totality of written expression leading to social stratification.

³⁵ Before the alphabetic—phonetic—script there were the ideographic and pictographic script, which provided less scope for virtualisation, as they did not constitute a set of letters to be recombined into words. See Lévy (1998: 50–51, 103–4, 111, 127); Goody and Watt (1963: 311–19); Ihde (1990: 82–3) and Ong (1982: 84–91).

the ostensive reference and the public), which can be understood as a process of deterritorialisation (as the written or printed word cannot be contained within a territory and creates communities beyond kinship and territory).³⁶ Lévy speaks of virtualisation, by which he means a process that translates actual events or interactions back into the problems they solved, thus creating chances for a variety of new actualisations. Not only language, the script or the letterpress involve this process of virtualisation, but also eg money, medical technologies and the concept of the contract. They all provide the means to decontextualise actual occurrences into abstract or generic formats that provide a range of chances to experiment with novel responses. In mentioning the contract as a major tool to virtualise violence, Lévy touches upon the workings of the law in terms of virtualisation. One could rephrase his account of the contract by stating that law provides a format to creatively resolve a host of potential problems that could otherwise have given rise to violent combat.

iii. From letter-isation to digitilisation

The alphabetic script and letterpress printing perform what Lévy calls letterisation (movable type printing),³⁷ which means using the same separated individual letter in different sequences to make an array of different words and sentences, out of which stories and arguments can be composed and written down on stones, clay-tablets, scrolls and in printed books. This can be contrasted with numerisation: using just the numbers 1 and 0 in different sequences to make an unlimited amount of hyperlinked texts, models, images, sounds, movements, compiled on discs, in data bases and floating around on the electronic highway. The turn from books, discs and data bases to the electronic highway will be constitutive of a new way of life. Summing up Lévy suggests we are in a transition from a linear sense of time to segments and points; from accumulation to instant access; from delay and duration to real time and immediacy; from universalisation to contextualisation; from theory to modelling; from interpretation to simulation; from semantics to syntax; from truth to effectiveness; from semantics to pragmatics; from stability to change.³⁸ How this change in our sense of time and space will eventually affect us may be too early to spin out with any degree of precision, but that it will require

³⁶ Cf Ong (1982: 102–7) about the distancing effected by writing.

³⁷ Chappell and Bringhurst (1999: 5) indicate that the printing press has been invented four centuries before Gutenberg in China. The fact that the Chinese script is ideographic meant that letterisation was out of the question, restricting the impact of the printing press as compared to its impact in Europe. See also *ibid* at 8, where they distinguish between the phase of woodblock printing, movable type letter press and electronic ‘texts’. Cf Goody and Watt (1963: 319–32) about the effects of the invention of the fully phonetic script in Greece.

³⁸ Lévy (1990, 143). Cp. Levinson (1999: chapter 4) about the similarity between premodern non-literate cultures and postmodern digitalised cultures, (Cf Ong (1982: 133) writing about the age of ‘secondary orality’), Levinson (1999 at 160–164) about horizontal (simultaneous) vs. vertical (historical) dissemination of information, and Goody and Watt (1963: 340) about similarities between mass media culture and oral cultures.

us to reinvent the law as the meta-language that holds together constitutional democracy seems apparent.

B. Transition of the Legal Tradition:

i. From oral to written legal tradition

Having discussed the impact of transitions from orality to script, printing press and digitalisation on the lifeworld, we now need to investigate what this means for our legal tradition. In this section I will trace the first major transition, from oral to written law, inspired by Ricoeur's analysis of the shift from orality to the script.³⁹

First, written law externalises legal norms by materialising them in the form of inscriptions on stone, clay, scrolls and books, thus providing them with an independent existence. The law is no longer in the mouth of the judge as it can now be found on a piece of paper that may outlive the judge, the legislator who enacted it and the first generation who fell under its jurisdiction. This entails a distanciation—or virtualisation—of the meaning of the law.

Second, the externalisation of the law enables a durability in time and space that allows a shift from local to translocal law. This entails a distanciation of the author of the law and creates the need for reiterant interpretation of the meaning of the law. Such recurrent interpretation results in accumulating comments, and commentaries on comments, generating new texts that nourish on intertextual reference. This, then, creates the need for a class of scribes (lawyers) that guards the intrasystematic coherence and the historical continuity of the law. The legal profession is born in the wake of the need for interpretation and systemisation of legal texts.

Third, by enabling a translocal jurisdiction a written law is the condition of possibility for a translocal polity, in which a law enacted by a few can regulate the life of many since the addressees of the law need not have a face-to-face relationship. Their equality before the law consists in their equal distance to the law.

Fourth, as written law has—in principle—an unlimited public it allows for the formation of large scale polities and jurisdictions. In fact absolutist government depends on a written law, executed by an army of civil servants who can be ruled from the center of an extended territory, all constraint by the same written law.

In short, written law has facilitated the emergence of the modern state, exercising a moderate control over a vast territory by means of law, initiating the rule *by law* (legal instrumentalism). At the same time written law has produced a class of professional lawyers to control the intrasystematic coherence of the law, thus laying the foundations for the autonomy of the law which initiates the rule *of law* (legal embodiment or moderate government).

³⁹ Hildebrandt (2002: 90–93). Cf on oral legal traditions Glenn (2004: 8–13, 61–5).

ii. From hand-written to printed script in law

On the verge of written and printed law, the printing press has again extended the set of possible addressees of written legal rules. The audience of printed matter is not only virtually but practically unlimited.⁴⁰ It has allowed a proliferation of texts, demanding ever more permanent care for intratextual coherence and continuity in time, creating a body of texts that emphasise this intrasystematic meaning of written law: legal dogmatics and legal doctrine. The low transaction costs⁴¹ of printed law—compared to handwritten law—have evoked a process of democratisation, enabling addressees to read and interpret legal regulations, while such democratisation depends on the literacy of the addressees of legal norms (principle of publicity), which is of course facilitated by the printing press.⁴²

We may conclude that the printing press was the condition of possibility for written law to be instrumental to the modern national state (providing the means for a detailed rule *by law*), democracy (providing the means to develop literacy on a full scale)⁴³ and the rule *of law* (providing the need for an autonomous class of lawyers to interpret and sustain the intrasystemic coherence of law, *cf* the conclusion of the previous subsection).

IV. A Vision of Ambient Law

A. Law and Emerging Technologies: Mutual Transformations

The point of the analysis of legal traditions dependent on orality, writing and the printing press was to demonstrate that law cannot be separated from its technological embodiment. Facing life in a digitalised world, in intelligent environments with hybrid multi-agent systems, with real time monitoring and real time adaptation to one's inferred preferences, legal normativity will have to be reinvented. Depending on a law inscribed in printed matter may turn out to be like moving around as a dinosaur: it follows a 'logic' that does not match the 'logic' of mass data storage and intelligent data mining. One may counter that this is not a valid argument, because we should not follow whatever logic is on offer. I agree that we

⁴⁰ The only 'obstacle' may be the fact that people do not speak the same language. The rise of the national state—in the era of the printing press—demonstrates an effort to establish national languages and national law to consolidate the territorial borders that are inherently artificial and need continuous maintenance. *Cf* Goody and Watt (1963: 332), about the world of knowledge transcending political units. The reach of the printing press is far greater in the case of multilingual education.

⁴¹ I am using the term here to refer to the relatively low costs of producing—and gaining access to—content in the form of printed books, compared to hand-written manuscripts.

⁴² *Cf* Goody and Watt (1963: 316) about the link between the phonemic system of the phonetic alphabet, the advent of democracy and (1963: 332) about political democracy in Greece in relation to widespread literacy.

⁴³ *Cf* Lévy (1998: 127). *Cf* Goody and Watt (1963: 316, 332). *Cf* Bawden and Robinson (2000) and Habermas (1990).

should not follow technological paradigms as a matter of course but rather use them to balance any emerging monopolies. If we turn our backs on technological embodiment of legal norms we may not discriminate information from noise and may not have access to the knowledge that makes a difference. Law in that case cannot provide any kind of countervailing power, and has no chance to effectively embody transparency rights, nor to effectively embody the opacity required to enjoy the liberties enshrined in constitutional democracy. This does not mean that written and unwritten law should be discarded. As we all know written law depends on unwritten law, like any system depends on the lifeworld it nourishes and feeds on.⁴⁴ So probably a digitalised law will depend on written and unwritten law, extending its scope and its capacity to provide effective protection against manipulation.

To assess the implications of digitisation for law is no easy task. Instead of providing answers I will at least raise a set of questions, building on Lévy's analysis of the transition from letterisation to digitisation. If 'regulating technologies' is indeed understood as the double challenge of sustaining a legal framework that regulates emerging technologies, while acknowledging that technologies themselves have a regulative (normative) impact on human society, we need to urgently face the issue of digitisation as a process that will regulate and constitute our lifeworld and for that very reason needs to be regulated and constituted by law. In that sense 'regulating technologies' implies mutual transformations of law and technology.

The questions raised by the digital age regard the linear sense of time inherent in modern law, confronted with the segments and points defining its digitalised environments (compare reading a book to zapping around television programs or surfing the Internet); the slow accumulation of legal texts like statutes, treaties, case law and doctrine that need to be studied and interconnected, confronted with instant online access to all the sources of the law (compare handbooks with selected cases to direct access to all verdicts given; compare a printed book with a hypertext);⁴⁵ the delay and duration inherent in procedural safeguards that embody protection against hasty judgements,⁴⁶ confronted with series of real time decisions taken by multi-agent systems in smart environments; modern law's ambition to achieve equal application of general legal norms to equal cases (exemplifying law's tendency to universalisation and systemisation), confronted with refined personalisation and contextualisation made possible by advanced data-mining technologies; the care with which legal theory has constructed and

⁴⁴ About the relationship between lifeworld and systems see Habermas (1996: 21–3).

⁴⁵ Lévy (1990: 29–31) describes six characteristics of hypertext: the principles of metamorphosis, of heterogeneity, of multiplicity and incorporation of different levels, of exteriority, of topology and of mobile centres. One could contrast them with principles of identity, homogeneity, unification, interiority, separateness and centrality, that seem to have more affinity with printed handbooks. Cf Levinson (1999: 30–34, 116–18).

⁴⁶ One of the important characteristics of the practice of judges is the hesitation, the delay, the suspension of judgement, Cf Latour (2004: 202–3).

sustained the theoretical legitimisation and critical assessment of the positive law, confronted with a world in which models replace theory (demanding effectiveness instead of correspondance to reality); the hermeneutical practice of law (always involved in interpreting both the facts of the case and the legal norms that should apply), confronted with a world in which simulation rather than interpretation turns out to be the best way to anticipate future events; the emphasis on meaning as a reference to the world outside law (semantics), confronted with an emphasis on links and networks (syntax) and the actual consequences of doing things one way or another (pragmatics); the emphasis on legal certainty, intra-systematic coherence, continuity and stability (legal doctrine and jurisprudence), confronted with a rapidly changing fluid world that needs permanent real time monitoring (pattern recognition) instead of the slow construction of durable knowledge that is universal and survives the ravages of time.

B. Ambient Law: A Vision of Legal Protection in the Digital Age

Coming down from the discussion of orality, script and digitilisation, and having raised a host of questions I will now indicate in which direction we may seek the mutual transformation of law and technology in the field of Ambient Intelligence. This can serve as an indication of what is meant with technological embodiment of law in the case of emerging technologies that have a normative impact which cannot easily be regulated by written law.

Ambient Intelligence is a still a vision.⁴⁷ A vision of a future stuffed with smart things that know about your habits, life style, desires and preferences, about the risks you may run and about the opportunities you may nourish on. Smart cars that communicate with the road (detecting a wet surface), with other cars (preventing collusion), with traffic monitoring systems (to adjust your speed or to change your direction), while at the same time checking your behavioural biometrics (pupil shape, eye movement frequency and yawn frequency) for signs of fatigue or stress in order to advice or force you to slow down or even stop driving. Smart dust travelling in your blood to detect the level of relevant elements in your blood, implants that check your heart-rate, breathing pattern, brain states, all monitoring your health and sending out alarms when things go wrong or communicating with the environment to adapt room temperature or oxygen levels. Smart fridges that order groceries you seem to prefer when they run out of stock and communicate with other fridges to get the last update on bugs in the software or whatever else. Smart things require real time sophisticated profiling, based on data-mining processes that generate new knowledge by detecting unexpected patterns in data bases. These patterns allow refined categorisation

⁴⁷ ISTAG (2001); Aarts and Marzano (2003). For ethical considerations see Bohn, Coroama *et al* (2005).

of people and things in different contexts, providing a detailed profile that can be used to influence a person's everyday choices, credit rating, earning capacity, insurance premium, job offers, discounts. To ensure an expensive car insurance companies already demand a black box installed in one's car that tracks the driving behaviour from day to day, tuning the premium to your expected performance in terms of safe driving. In the case of an accident this black box will also provide justice authorities with a new type of evidence. To be sure, the adaptation of the environment to a person's inferred preferences depends on the extent to which he generates a profit for the service provider that organises the adaptation: someone somewhere is paying for all the comfort and we may guess it will be the consumer in the end.

Data protection legislation fails to protect citizens against the implications of this type of smartness in two ways: first, it is focused on protecting personal data, not on protecting a person against unwarranted application of profiles one is not aware of; second the technological tools to exercise the rights that have been attributed are not part of the technological infrastructure that is constructed, let alone to exercise new rights like a right of access to profiles that may affect the risks and opportunities one is attributed.⁴⁸

To sustain constitutional democracy we need to reinvent the balance between what Gutwirth and De Hert have coined legal opacity tools and legal transparency tools.⁴⁹ Opacity tools protect individual citizens from being transparent for their government (or any other large organisation that could manipulate an individual in the case of a knowledge asymmetry), they provide a kind of right to be left alone. Transparency tools provide individual citizens with rights to gain access to their personal data, to correct them if wrong and to check whether they have not been stored longer than necessary, used for other purposes or transferred (sold) to third parties without consent. In terms of Berlin's concept of liberty opacity tools provide negative freedom (freedom from) while transparency tools provide positive freedom (freedom to).⁵⁰ The problem with today's legal opacity tools is that they fail to conceptualise the legal status of profiles, while it is profiles (not data) that constitute new ways of making people transparent. At the same time there is an urgent need for lawyers—whether legislator, judge, advocate, prosecutor or academic—to sit down with the technical engineers, information system specialists and computer scientists to discover how the technological infrastructure that is prepared at this very moment could be designed in a way that enables the right balance of opacity and transparency. Lawyers may have to learn from constructive technology assessment (CTA)⁵¹ to ask the right questions in order to initiate the mutual transformations necessary in a constitutional democracy.

⁴⁸ Hildebrandt (2006a).

⁴⁹ Gutwirth and De Hert (2005).

⁵⁰ Berlin (1969).

⁵¹ Rip, Misa, *et al* (1995).

V. Conclusions: The Blind and the Lame

In his *Les technologies de l'intelligence* Lévy discusses the relationship between computer engineers and sociologists as one between a blind practice and a lame practice: as long as engineers stick to the technicalities and sociologists move in afterwards to add some social aspects, the problem of the human machine interface will not be resolved.

To separate knowledge of machines and cognitive and social competence boils down to the artificial construction of a blind person (the 'pure' technologist) and a lame person (the 'pure' social science specialist) who are then forced to associate, but too late, the harm has been done.⁵²

The point made is valid for the relationship between computer engineers and lawyers as well. The embodiment of modern law in the written and printed script cannot be taken for granted and may need extension into emerging technologies. Having studied the impact of such embodiment and having realised that technology is neither good nor bad but never neutral, the conclusion must be that it will require the active involvement of both ICT specialists and lawyers to figure out which technological developments will sustain constitutional democracy and which will destroy it. In the case of Ambient Intelligence (AmI) we may need to develop an Ambient Law that is embodied in the algorithms and human machine interfaces that support AmI and for this we will have to break through our paralysis, ready to become literate in terms of a new script.

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⁵² Lévy (1990: 61). Some Kantian undercurrent may be suspected (sensual input without concepts is blind; concepts without sensual input are empty).

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