# The Construction of a Normative Framework for Technology-Driven Innovations: A Legal Theory Perspective


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**Abstract** Technology developments change the way we conceive the normative force of law and legal systems. Traditionally based on written texts, and on their interpretation by a professional class of jurists, normativity seems nowadays to migrate into technological devices, increasing the performative effect of regulation. This shift calls into question the "flexibility" of law as a fundamental performance of the rule of law and of constitutional democracy. These problems can only be addressed by taking into consideration the multifactorial prism of regulation, in a pluralistic dimension that has been highlighted by studies on the architectural dimension of cyberspace and, in particular, on the "code". In this perspective, asserting that technological devices are sheer "instruments" divested of normative implications is anything but an illusion: their regulative force, in fact, is embedded in their own "design" from the outset. Before envisaging scenarios dominated by ungovernable technology, it is therefore useful to emphasize the "responsibility" of coders and operators. In this way, the question of human responsibility re-emerges as a crucial factor for the elaboration of a normative framework that preserves the conditions of an intersubjective coexistence marked by freedom.

## 1 Some Introductory Considerations Through the Lens of Privacy

The dialectic tension underlying the relation between law and the sudden development of technology emphasises the complex "relation between the legal power and the other kinds of power"[1] leading jurists to regard technological innovation as a limitation of law to a mere *instrumentum scientiae*.[2]

[1] Irti (2007), p. 13 (my own translation).

[2] Rodotà (2012), p. 352. In this regard, Pascuzzi (2016) writes as follows: "The technological standards are defined based this is not a field on the most advanced knowledge in a specific historical

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Unlike "old" technologies, the new ones—intended as instruments for the control over the world and nature—not only meet the requirements of instrumental rationality: they also penetrate mankind and change it. The exponential growth of information and communication technologies (ICT) affects also the other scientific and human fields—like medicine and biology—and urges the overcoming of the extent and speed "limits". As a consequence, a contamination has been observed between the various scientific branches—"bio", "nano", "neuro"—technologies—and between "human" and "non-human", which saw the advent of a "hybrid" era.[3] In other words, men and new technologies re-construct each other and simultaneously co-define the sense of reality and the genesis of subjectivity.[4]

In the light of the current technological development, it is difficult to reject the feeling that "the existing legal provisions are inadequate and unable to govern *in all its implications* the relation between men and these machines - clearly 'different' from all the others"[5]—and, consequently, we should opt "with fewer respect for established traditions, which however tend to become fossils".[6]

Law cannot ignore the onset of a new anthropology, and must critically analyse its dynamics, thus preventing its normative implications from being so contingent as to turn men into "the happy slave of machines".[7] On the other hand, the normative consequences of technology have always shaped behavioural patterns,[8] define the conditions of use and eliminate the possible alternatives, thus influencing the perception of what is "natural" and inevitable. Consequently, the material area within which the protection of fundamental rights becomes crucial is expanded and requires a deeper understanding and redefinition.

This is particularly evident in the protection of privacy. In 1884 the snapshots provided by Eastman Kodak Company to the public enables the unauthorized

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context in a certain field. The industry experts are able to define the most advanced notions: in this sense, they are referred to as technicians. The law standards in the digital age are determined by technicians (who address other technicians.)", p. 297 (my own translation).

[3] Khanna and Khanna (2012).

[4] "[T]echnologies of the self, which permit individuals to effect by their own means or with the help of others a certain number of operations on their own bodies and semis, thoughts, conduct, and way of being, so as to transform themselves in order to attain a certain state of happiness, purity, wisdom, perfection, or immortality". Foucault (1988), p. 18.

[5] Salazar (2014), p. 257.

[6] di Robilant (1973), p. 230.

[7] Butler (1872).

[8] The introduction and the following development of the telephone technology, for example, shows the change in the interpersonal behaviour: soon it was evident that the 'sociality' value embodied by the telephone (albeit involuntarily) was in conflict with the 'privacy' one. A telephone call, in fact, is an intrusion into the lives of friends, family members and (potential) customers. The protection of the private space of the individuals has been further questioned by the introduction of mobile telephones, through which we can be reached anywhere and at any time. (…) Users have started (…) to call the others without any prior notice, via email or an SMS, which is regarded as an improper behaviour. (…) This change in the habits goes hand in hand with a different priority relationship between the value of sociality and privacy. In this context, privacy is stronger than sociability". Bisol et al. (2014), p. 247.

real-time diffusion of personal images, leading two American lawyers to write a short essay—*The Right to Privacy*—to ask for the introduction of this right into the US federal law system.[9] Today, privacy is faced with new technological progresses which require its implementation: every day, in fact, men interact with smart devices, from the *Internet of Things* to the 3.0 web, through digital administration and *cloud computing*. These systems represent an "infosphere"[10] or "smart environment" which extracts a continuous flow of information: data, preferences and individual attitudes subjected to contextual profiling processes—'*data-mining*'—yielding a statistical projection and, consequently, an anticipation/enforcement of the decisions of the individual in question.[11] The subject becomes totally 'predictable' and the surrounding environment is able to anticipate his/her requests—which are assessed by means of special algorithms—meeting them even before they are expressed.

Mankind has entered an era ruled by *ubiquitous computing*,[12] which will help overcome the *desktop* paradigm and will culminate with an invasive extrapolation of data thanks to sensors installed in the objects and connected to the web. New risks of vulnerability and discrimination will be observed basically due to the loss of control resulting from *classification* through socially binding models likely to impair the autonomous decision-making process. These risks arise from a strong "information asymmetry"—a kind of "computational divide"[13]—between the user and the digital environment, where the former acts without knowing the segmentation methods and mechanisms, as well as of their results, which are out of his/her control.

The algorithm defines the risks which each individual is likely to face, by assigning them to a specific group, more or less reliable; it also establishes the probability of committing crimes, the inclination towards the purchase of tangible goods, the (genetic or social) risk of developing diseases, the reliability in case of loans. Thus it marks unaware people with a "stigma", influencing their existence, and "affecting your reputation without an assessment of risk because it says what kind of person you are and who you are treated as equivalent to".[14] This may lead some users to change their behaviour to avoid the classification suggested or any reputational damage (normalization), with objective impacts on the social construction of the identity of the subject.

In this sense, the concept of privacy has acquired a new, more complex dimension, which is conceptually associated with the "control of one's data"; privacy thus

[9] Warren and Brandeis (1890).

[10] Floridi (2014).

[11] Rodotà (2012), p. 335.

[12] Weiser (1993).

[13] It is no coincidence that the traditional social divisions, represented by the classes, have been replaced by new categorisations based on the ability to use the new information technologies. In 1999 the American writer William Gibson said during a radio program: "The future is already here, it's not just very evenly distributed".

[14] Balkin (2016), p. 40.

shifted from its conventional meaning—"the right to be left alone"[15]—to the "control of information about oneself"[16] up to the "ability to choose which parts in this domain can be accessed by others, and to control the extent, manner and timing of the use of those parts we choose to disclose".[17] Thus a private legal claim gradually takes on a public character, since—to the extent that it promotes the free formation of one's project—it fosters a model of social regulation which prevents any external interference. Law, albeit slowly, changes and adapts itself, facing the new challenges arising from regulation.

In the next paragraphs, with constant reference to concrete technological innovations, both current or incoming, the main challenges to be faced by law will be examined, together with its meaning and its capacity to constrain social behaviours. After a brief analysis of the meaning of the normativity of the law, an attempt will be made to observe how technology influences the legal categories and to what extent it changes their resistance and quality. Meanwhile, a special attention will be paid to the issues of "code" and the theory of regulation "by design", as suggested by Lawrence Lessig. Eventually, some proposals made by the discipline to safeguard the "constitutional" dimension of the law strictly connected with the freedom of individuals will be reviewed.

## 2 The Normativity of Law from Writing to Technology

### *2.1 Law, Written Texts and Interpretation*

The technological revolution questions one of the strongest interpretations of law, namely its view as a series of provisions strengthened by the threat of a penalty. This assumption relied on the implicit possibility of "knowing" the law, basically through written texts: from this point of view, the printing was a support and, at the same time, a precondition for the development of the modern legal theories. The modern "writing" *technique* has enabled the mass distribution of legal texts requiring an interpretation, thus promoting the establishment of a professional category—i.e. legal experts—who studied those texts and interpreted them with the purpose of finding a systemic consistency. In this regard, the following observation has been made:

> Writing enables a new practical situation of communication. For the first time, the discourses can be separated from the specific circumstances in which they were delivered. Therefore, the hypertexts of the author and the reader can be completely different (…) from generation to generation, the distance between the author's and the reader's world does not

[15] Warren and Brandeis (1890), p. 193.

[16] Westin (1967), p. 7.

[17] Westin (1982), p. 112.

> cease to grow, and the gap as well as the semantic tension are reduced thanks to a constant interpretation.[18]

The (written) text offsets a *gap*—between author and the reader—destined to be filled only through a constant interpretation. However, the willingness to eliminate this gap remains inevitably unsatisfied: it is a mere desire that preserves the *flexibility* (or *under*determinacy) intrinsic in the written law, although the legal science has tried to hide it behind the value of "certainty".[19] The interpretation suggested by the lawyers, therefore, preserves the ductility of law which allows for its actual implementation, regardless of the technological innovations introduced over time and, especially in the modern industrial society.

In this way, in spite of a growing and constant regulation concerning any aspect of human activity, the jurists have not given up their main target, i.e. granting order and rationalization, even when it comes to power, 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. (…) 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 (…), mandated to safeguard the coherence of the legal system (…). The force of (written) law thus depends on the coercive authority of the state in combination with the labors of the lawyers' guild.[20]

Within this relation between *written* text and *interpretation* there is a fundamental trait of the peculiar form of normativity represented by "law", which consists of the possibility of binding the political authority to the assessments of the interpreters. Law is a legitimate control instrument, but is also a limitation to power. In this regard, Mireille Hildebrandt introduced the "paradox of Rechsstaat", because the interpreter and the legislator co-determine the meaning of the juridical statements, thus mitigating the (political) authority and depriving it of the monopoly on the legal regulation.[21]

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[18] Lévy (1990), pp. 100–101 (my own translation).

[19] Recalling Radbruch (1950), Agata Amato Mangiameli says that "no weaver knows what law weaves", Amato Mangiameli (2017).

[20] Hildebrandt (2008), p. 175.

[21] For an insight into the meaning of *Rechsstaat*, especially in relation to the *Rule of Law*, *see* Krygier (2009) and Palombella (2009).

## 2.2 *Norms Without Interpretation: The Dark Side of Technological Normativity*

Another important feature of modern law is the distinction between "constitutive rules" and "regulatory rules".[22] This distinction concerns also social theory in general. The first category includes, for example, those rules which establish a social practice. Let us think of chess: its rules not only regulate the game, but also establish it. In fact, it relies on the agreement upon these rules and could not be conceived *before* them. The second category—the *regulatory* rules—encompasses, for example, the rules underlying the road traffic: the drivers failing to comply with the speed limits are punished according to the legal system, but it is impossible to prohibit them from "driving a car".[23]

This alternative is indirectly reflected in the power of modern technology, since the latter promotes or "imposes" the people's adhesion to its "code". Let us consider smart cars, a feasible perspective, able to assess the energy consumed by the driver during the journey and estimate the remaining attention thresholds; as soon as this level drops approaching the (preset) safety threshold, the car can react in two different ways: it may ask the driver to slow down and stop (using a sound alarm) or it can immediately activate an "autopilot" system which prevents the driver from speeding up. The same thing may happen if the car realises that the driver has drunk too much alcohol or has taken drugs.

These two cases both imply a techno-regulation, however it is important to stress the qualitative difference between the two possible answers: in one case, in fact, the car will provide a *regulatory* reaction and the driver is practically prevented from adopting a dangerous driving behaviour (*norm-enforcing technology*), while, the other case represents a *constitutive* reaction, since it prevents the same possibility of making hazardous manoeuvres (*norm-establishing technology*.) Since the "[r]egulation of users' behaviour is imperative in automated cars",[24] then in this case technology simply defines what is allowed and what is prohibited, by overlapping the *being* dimension ("ius") with the *having to be* one ("factum"). As evidenced by Koops, recalling Brownsword's assumptions, "[f]or human dignity, it is important not only that right choices are made (to comply with the rules) but also that wrong choices can be made, and that not all 'bad' things are simply made impossible, for human life is enriched by suffering".[25]

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[22] Rawls (1955) and Searle (1964).

[23] Palombella (1990) says that: "The "regulatory crisis" of the contemporary State is certainly the result of the principle of the omnipotence of law, which has turned into the widespread standardisation of every aspect of social reality. But the fact that the law influences the events through a *qualification* process leads to at least two alternatives: on the one hand, the principle of juridical qualification becomes the constitutive principle of reality; on the other hand, the intervention of the juridical rule adheres to a pre-existing reality", p. 367 (my own translation).

[24] Leenes and Lucivero (2014), p. 14.

[25] Koops (2008), p. 165. Cfr. Brownsword (2005).

The performance power of technology—while dramatically reducing the range of the possible choices—raises some questions about the structural changes in the normativity which, in this form, can compress freedom, thus strongly influencing the people's behaviour.[26] It especially emphasises the responsibility of programmers and developers, the ethical sustainability of their choices and the liability that they assume towards the public whenever they focus on a specific result or functioning model. In other words, jurists and philosophers ask themselves whether and how—through which procedures and criteria—the technological normativity can be accepted or not.[27] The relevance of a "public decision" seems to be extended to practical issues and professional sectors which some years ago were still sectorial or at an embryonic step.

## *2.3 What Is Left of Law? The Rule of Law Put to Test by Technology*

The quick technological development constantly raises policy issues to which law is often unable to react with the same speed. This "reaction" asymmetry resulted in a situation when many normative—procedural, substantial, ethical or purely juridical—issues were primarily addressed by individual subjects—namely programmers and computer scientists, or individual private bodies—deprived of any accountability mechanism or even of any democratic supervision. In case of norm-enforcing technology, this problem produces adjustable outcomes which can be questioned through a debate originating from a "public sphere" of regulators and regulated. Conversely, the performance results of the technology establishing the norm can be adjusted or changed by law more slowly and with a greater effort.[28] Future "always comes too fast" and law cannot keep pace with it.

This scenario introduces another series of reflections. Law has traditionally manifested itself as an adaptive and context-sensitive (flexibility) technique. In this

[26] "[L]iberty is constructed by structures that preserve a space for individual choice, however that choice may be constrained", Lessig (1999a, b), pp. 7–8. As evidenced by Koops, recalling Brownsword's assumptions "[f]or human dignity, it is important not only that right choices are made (to comply with the rules) but also that wrong choices can be made, and that not all 'bad' things are simply made impossible, for human life is enriched by suffering". Koops (2008), p. 165.

[27] "Technology that sets new norms clearly raises questions about the acceptability of the norms, but also if technology is used 'only' to enforce existing legal norms, its acceptability can be questioned, since the reduction of 'ought' or 'ought not' to 'can' or 'cannot' threatens the flexibility and human interpretation of norms that are fundamental elements of law in practice". Ibid., pp. 157–158.

[28] "Because technology is often irreversible — once it is developed and applied in society, it is hard to fundamentally remove it from society in those applications—the process of developing technology is a key focus when normativity is at stake. After all, it may well be too late when technology simply appears in society to ask whether it is acceptable to use this technology; quite often, the genie may then be out of the bottle never to be put back in". Ibid., p. 166.

sense, it has granted the limitation of power; in fact, it is no coincidence that the application technique of contemporary constitutional democracies is not a subsumption but rather a balancing, since the latter is able to simultaneously weigh conflicting arguments, establishing a rule at the meeting point of the various reasons involved. The expression "Mild law"[29] ("diritto mite") helps us to understand this concept, far from the rigidity of the *'dura lex, sed lex'* motto and in line with the pluralism of modern societies. The instruments ensuring this flexibility are the constitutional principles, including above all *proportionality* and *reasonableness.*[30] Conversely, the technological normativity, programmed through a *code*, is not affected by the variable concreteness of experience, and features an all-encompassing and inflexible efficiency.[31] The algorithm, for example, always reproduces the same decision, without exceptions, and this invariability seems to express an impersonal and unlimited power. As stressed by Reidenberg: "[f]lexibility is only undesirable when fundamental public interests are at stake and the public interest requires rules that individual participants in the network might not choose themselves".[32]

In the example of the drunk driver, it is certainly desirable to force him/her make the only decision able to save his/her life: a technological application implementing this option would be compliant with the norms and social values shared by the majority of people. But, evidently, some circumstances imply more comprehensive values—such as the freedom of speech, the freedom of movement, social equality and the prohibition of discrimination—whose specification is possible only thanks to the mediation of men.

In this regard, an anecdote may help understand the issue. Jan Klabbers says that, once, while he was in Holland to visit his mother, he hired a car and got a spot fine speeding in a certain area of the country where he had been only once and over 30 years earlier:

> So I appealed the fine, suggesting that perhaps the photographs taken by speed cameras had been mixed up. The response was disheartening: I received back a standard form, saying that the camera in the place where I was supposed to have been (but never was) had been properly aligned. This may well be true, of course, but it did not relate to the point I was making – my point was never addressed. In the end, I resigned myself to paying the fine (…), but under objection. Given the structure of the speeding ticket system and the largely automated nature of the process, it would have been rather costly to prove my innocence, but at least I wanted to have it on record that I had not been in the area.[33]

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[29] Zagrebelsky (1992).

[30] As stated by Zagrebelsky (1992): "The modern English parliament does not rely on a clear shift from the production of law through the activity of the Courts to the "legislative" production. Among the essential criteria of this "extraction" of law from the practical cases, there are "circumstances, conveniency, expediency, probability"—The progresses of law did not actually depend on the increasingly refined deduction from great immutable and rational principles (the *scientia iuris*), but rather on the induction from empirical experience, enlightened by situations (the *iuris prudentia*), through "challenge and answer, trial and error"" (pp. 27–28). *See* also Kluxen (1980), p. 103.

[31] Koops (2012).

[32] Reidenberg (1998), p. 584.

[33] Klabbers (2017), p. 28.

From this point of view, the main problem is the safeguard of the guarantees of a *due process*, not in jurisdictional sense but rather in the broadest and truest sense of the term, i.e. the possibility of confronting and challenging "on equal footing"[34] the actions of power—any kind of power—before a third party able to give an effective and successful remedy. More generally: "Due process entails that a person has access to an effective remedy where she feels that her interests have been harmed".[35] Therefore, it is crucial to combine the deterministic and mechanical dimension of technology with the analysis of the effects exerted by the latter on society, law and politics.

## 3 The Legal Theory of Design: Towards a "Hybrid Normativity"

### *3.1 The Code in Lessig's Pluralistic Perspective*

Lawrence Lessig[36] has always focused on the possibility of governing the techno-regulation, especially in the cyberspace dimension. While highlighting the qualitative and structural differences between "real" and "virtual" space, he points out the persistent regulatory potential of law by combining it with other constraining elements, thus obtaining a mixture globally able to preserve the fundamental virtues of constitutionalism. The peculiarity of his contribution lies in the reference to the "code" as an architectural dimension of cyberspace as well as to the relating responsibility of the coders, who are liable for most of the Internet structure.[37]

More specifically, Lessig has highlighted how the behaviour of the affiliated subjects in a certain environment is influenced only partially by law—"the most obvious self-conscious agent of regulation".[38] In addition to this constraint, he emphasis the role of social rules[39]—for example, those which sanction the drivers exceeding the speed limit on the city roads or near parks and areas attended by families and children—of economy—car manufacturers which determine the price of cars also

[34] This is the meaning generally attributed to Article 6 of the European Convention on Human Rights associated with the concept of due process, in the sense that the accused must be able to effectively defend himself/herself.

[35] Hildebrandt and Koops (2010), p. 438.

[36] It is worth mentioning the significant contributions of Mitchell (1995) and De Monchaux and Schuster (1997).

[37] A "code policy" is, first of all, a policy concerning the intellectual property and the forms that it can take in the digital era. This leads the code to be regarded as a "common good" (commons), together with the contribution provided by the opening of the code to the re-evaluation of the idea of commons". Goldoni (2007), p. 23.

[38] Lessig (1999b), p. 511.

[39] Posner (2000).

based on their speed—and of "design"[40] which, in case of physical spaces, corresponds to urban planning and architecture.[41] The design of a road—its width, the creation of sidewalks along the roadways or bumps, the presence of roundabouts—affects the drivers' behaviour,[42] and not only the preference formation process, as happens with the first three constraints.

According to Lessig, the architecture is "the most pervasive agent",[43] because it directly defines the range of choices that the user can make. Furthermore, the architecture carries out an early regulation, *ex ante*, while the law—net of its feeble dissuasive function—intervenes only at a later time with *ex post* penalties.

Within the virtual context, design refers to the economic and social organization of the Internet and the cyberspace, especially focusing on the ownership of the code. Let us think of the TCP/IP and http "codes", in relation to issues concerning the anonymity in the Internet and the spamming, in addition to the copyright protection by means of DRM (*Digital Rights Management*). From this point of view, design has a *norm-enforcing normativity*[44]:

> the architecture of cyberspace, or its code, regulates behavior in cyberspace. The code, or the software and hardware that make cyberspace the way it is, constitutes a set of constraints on how one can behave. The substance of these constraints varies — cyberspace is not one – place. But what distinguishes the architectural constraints from other constraints is how they are experienced. (…) The conditions, however, are different. In some places, one must enter a password before one gains access; in other places, one can enter whether identified or not. (…) In some places, one can elect to speak a language that only the recipient can understand (through encryption); in other places, encryption is not an option. Code sets these features; they are features selected by code writers; they constrain some behavior (for example, electronic eavesdropping) by making other behavior possible (encryption).[45]

Law—intended in its traditional sense, i.e. as a series of provisions supported by penalties—is just one of the instruments that "force" men to behave in a certain way. According to Lessig, it influences the other three constraining factors on which it exerts a direct impact, but, at the same time, is affected by them: each of these factors significantly contributes to the regulation of human behaviour, pursuing a bal-

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[40] Lessig (1999a, b). This article was written to reply to Judge Frank Easterbook who, during a lecture held at the University of Chicago, said that a law of cyberspace could not express any general heuristic resource, precisely just like a "law of the horse" or any law specifically focusing on a particular object or space. *See* Easterbrook (1996), pp. 207 ff.

[41] Cfr. Vermaas et al. (2008) and Yeung (2008).

[42] According to Langdon Winner, the overpasses in Long Island were low, because they had been intentionally designed as such: thus the buses could not pass under the overpasses, and the lower social classes could not reach the beaches of New York. See Winner (1980).

[43] Lessig (1999b), p. 511.

[44] It was observed that "architecture should be intended in a broad sense, i.e. as the organization of any kind of space by means of the materials available. Architecture somehow represents the "nature" of a context but, unlike natural data (which can be rarely changed, therefore they are considered stable or unchanging), it can be either fully or partially changed to review the organizational structure of the space in question". Goldoni (2007), p. 3.

[45] Lessig (1999b), pp. 508–509.

ance (mix) which obviously varies depending on the "space" to be regulated.[46] The context is an unavoidable element for the adjustment of the regulation and the impact of its architectural dimension: from this point of view, there is no *space*, but rather *spaces* to be regulated. The stringency of each constraint varies according to the structure of the "place" to be regulated, and law can be either suitable and successful or only partially effective and inadequate.

However, in this regulatory scenario, there is a significantly new element introduced by the "code"; it embodies the potential and the strength of the new technologies as a technique able to actually influence the people's behaviour:

> The novelty of 'code as law' is that technology is nowadays being used *intentionally* as an instrument to influence the way people behave, supplementing law as a regulatory instrument. A key difference between 'code' and 'law' is that normative technology, both in its norm-enforcing and in its norm-establishing form, influences how people *can* behave, while law influences how people *should* behave. This is why the rise of intentionally normative technology, in contrast to traditional technology, raises the democratic and constitutional issues…[47]

Therefore, the code is the control architecture that allows (or not) the user of the cyberspace to activate or disable certain functions and make a certain decision. However, it can be changed, since the way in which the cyberspace has been designed is not necessarily the way in which *it should be*. Due to its entirely plastic and artificial character, cyberspace is a space totally moldable and doesn't have any intrinsic "nature" resisting to man chemical interventions. In this respect it represents a paradigmatic space to light the architectural dimension. The privacy-related issues, for example, consist of the fact that the automatic collection of the data is invisible and, to the extent that it hides necessary information, it precludes an informed choice concerning the navigation experience and the *bottom-up* control by the users. Political institutions, however, can introduce a *top-down* change in the code which enables the expression of one's own preferences with reference to the use of the data. This example shows the importance of changing both the architecture and the law. Nevertheless, the modification of the law may not yield positive results; the economic organization of the code turns out to be decisive for the purpose of its adjustability: paradoxically, a private software can be changed more easily, since it is sufficient to influence the behaviour of the owners of the "source code": in fact, the license does not allow the user to change the code. Conversely, where the property of the code is open (neither private nor state), the code is provided together with its source and, consequently, it is free and can be changed by users. In this case, the penetration capacity of the legal rule is significantly impaired. In the Nineties, *Privacy-Enhancing Technologies* (PETs) such as the so-called "cookie crunchers" and, more recently, awareness instruments such as *Transparency-Enhancing Technologies* (TETs) were introduced to inform "users on how their

[46] "The 'net regulation' of any particular policy is the sum of the regulatory effects of the four modalities together. A policy trades off among these four regulatory tools. It selects its tool depending upon what works best". Lessig (1999b), p. 507.

[47] Koops (2008), p. 159.

personal information is used by the service provider".[48] The ultimate challenge is the tuning of law and code in order for them to support each other and result in a single ethically sustainable regulatory design.

In this case, engineering, ethics and law must cooperate and face the regulatory challenge by shaping technology according to specific regulatory expectations. The combination of different scientific perspectives must rely on the use of technology as an instrument of freedom which strengthens the virtue of law.[49] In this regard, the reflection according to which "[i]f only because 'code' is not equivalent to 'law', the 'rule of law' cannot simply lay down all the criteria for the 'rule of code'; it shall need to adapt, if only to a small extent, to the particulars—positive as well as negative—of normative technology"[50] sounds persuasive.

Beyond the cybernetic context, the relation between law and architecture shows its regulatory potential even in non-virtual dimensions and "illuminate the entire law".[51]

As already anticipated, the perspective suggested by Lessig is intrinsically pluralistic: according to him, in fact, the regulatory phenomenon is hybrid and includes different regulatory specificities, which cannot be limited to a mere legal dimension.[52] The impact of the regulation of the cyberspace will lead to results with a variable effectiveness depending on the optimisation of each constraint in a complex and multifactorial structure: those who want to refer only to one of these constraints are not aware of the concrete dynamics of real space, let alone the virtual one.

## *3.2 Minimum Taxonomy of Technological Regulations*

*Design theory* is applicable to the whole field of artificial intelligence (AI): not only to cyberspace—which seems to reflect its full potential—but also to environments and intelligent products, robotics, and all the devices managed by a code and/or an algorithm.

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[48] Janic et al. (2013), p. 18; in terms of differentials "[w]hile PET's 'think' in terms of shielding personal data, TETs 'think' in terms of empowering individuals by making profiling activities visible". *See* Hildebrandt and Koops (2010), p. 450.

[49] "[R]ules must be embedded in such a way that they share the nuance and flexibility of the natural-language rules that determine the written law. (…) there is a democratic challenge: is value-embedded technology or the articulation of legal norms in digital technologies legitimate?", Hildebrandt and Koops (2010), p. 452.

[50] Koops (2008), p. 172.

[51] Lessig (1999a, b), p. 546.

[52] Lessig's assumption falls within paradigm of the downfall of the legal exclusivism (or centralism) because, "although it did not give up the role of the authoritative constituting, it has put it in relation with other factors which, in various ways, affect the conduct of the partners, precisely identifying the binding character in the result of this mechanism". Laghi (2015), p. 156.

The scientific assumption behind this theory is that the on-going technological progress, during its development, already *absorbs* aims, purposes, values that makes its own, thus weakening the distinction between "tool" and "end" which directs most of the ethical and legal reflections on new technologies. The *prima facie* may seem a neutral tool, actually it has already built itself an "entelechy" and, therefore, legal and ethical analysis must take place already in the design phase, to orient the use, which otherwise would be just an expression of mere contingency forces. As written by Pierre Lévy:

> …the debate over the oppressive, antisocial, or benefactress and convivial informatics nature is not limited to the circle of the sociologists, philosophers, journalists or trade unionists (pretended specialists of purpose, customs, and relationships between men). It begins among scientists, engineers, same technicians, among the so-called professionals of relations between things, those who should not take care of instruments, tools. The abstract distinction between ends and means does not resist a precise analysis of the social-technical process in which, in fact, the mediations (means, interfaces) interpreted each other for local, contradictory, continually called into cause purposes, so that in this deviation game no means stays long tied to a stable end.[53]

Moreover, this is confirmed by the fact that the objectivity parameter that should inform the work of scientists is conditioned by their conscience, as well as by their ideological and epistemological prejudices: in other words, technical choices are never *only* technical choices, which means that they are never[54] neutral. This applied also to the invention of writing, printing and, most recently, PC—just to name a few—therefore, the assumption according to which technology is just a pure "instrument" becomes illusory.[55] The effects of technological mediation are reflected also in the field of law.[56]

The basic goal of the *design theory* is, therefore, to determine the behaviour of the individual by preventing and correcting malfunctions, by identifying them already at the design time and providing effective protections to prevent the downgrading of the laws into "paper dragons"[57]:

> …lawyers need to be involved to prevent inadequate reformulation of legal norms into technical architectures. This does not imply that articulating law in novel technological

[53] Lévy (1990), p. 68 (my own translation).

[54] "Technology is neither good nor bad; nor is it neutral", Kranzberg (1986).

[55] "The way a technology is designed, in short it defines and influences the actions of the subject, preventing some, allowing or helping others. In this sense, objects of daily use have a moral content: prescribe, oblige, allow, prohibit and regulate the behavior of users". *See* Bisol et al. (2014), p. 246.

[56] "[M]oving from one type of infrastructure to the next has major consequences for the manner in which legal authority and normativity can be sustained. For lawyers and legislators it may be too obvious to note that modern law is in fact technologically embodied, namely in the technology of the script and the printing press", Hildebrandt (2011), p. 237.

[57] *Ibid*., p. 231, thus wrote: "If we want to sustain the rights and freedoms that developed with modern legal systems, legislators need to engage in the design of the novel computational infrastructures, taking care that they at least provide effective legal protection against their own omniscience and their capability to enforce a normativity that goes against the grain of constitutional democracy".

> frameworks renders written law redundant. Just as written law has not replaced the role of unwritten law but complemented and changed it, written law as well as unwritten law will continue to play a key role in providing legal protection….[58]

Regulation through the *design* is a matrix that includes many models differing from one another according to their objectives and their level of 'constriction' impressed by the relating implementing arrangements, i.e. on the basis of the "amount of choice"[59] that they offer to the user. In short, four fundamental models are identified.

*Persuasive technology* falls into design forms of *messages* and aims at changing the behaviour of the user *by suggesting* the best solution simply describing it as the most rational. From a technical point of view this architecture does not provide any external material interference and maintains the full spectrum of choices; however it "influences" and directs the user's choice with an achievement that depends on the degree of persuasiveness of the message itself. A practical example of such regulation is the *Speed Monitoring Awareness Radar Trailer* near "sensitive" areas like playgrounds: in this case, the device indicating the speed limit invites the drivers to reflect and adapt their driving attitude without perceiving a real external constraint.

The second regulatory model is represented by the *nudging* theorized by Richard Thaler and Cass Sunstein[60]: it challenges the economic theory that regards man as "rational" actors—*homo economicus*—and embraces the approach of cognitive psychology in which the individuals' choices considerably affect the cognitive limitations and failures, along with strategic reasons.[61] This model belongs to the field of communication design and, again, the spectrum of possible choices remains essentially unchanged but, unlike the previous model, the *design* establishes a hierarchy among the policy options thus making a subtle "manipulation" of the context where the decision should be made. The *nudging,* in fact, gives—a gentle "push"—that alters the behaviour of individuals in a predictable way but without excluding any option. Obligations, coercion and prohibitions make way for a general strategy of incentives and benefits which makes the choice identified as optimal by the regulator easier (and more practicable). In other words, normativity gets rid of the heavy burden of rules and dissolves itself into a system of "tips". In this context, the *nudging* is a paradigm of *soft paternalism,* because it assumes that the individuals alone are not able to decide rationally and guide them towards the "best" solution. An example of this model is the *anticipatory computing,* namely the tendency of new technologies—in particular of social networks and e-commerce platforms—to address and anticipate the future through algorithms suggesting forecast models.[62]

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[58] Hildebrandt (2010), p. 454.

[59] Leenes and Lucivero (2014), p. 209.

[60] *Cfr.* Thaler and Sunstein (2008).

[61] Becker (1976).

[62] "Computers weren't initially created to persuade; they were built for handling data – calculating, storing, and retrieving. But as computers have migrated from research labs onto desktops and into everyday life, they have become more persuasive by design. Today computers are taking on a variety of roles as persuaders, including roles of influence that traditionally were filled by teachers,

These predictive systems use the traces left by the users, anticipating their choices and actions.

"Affordance" is the term that characterises the third relevant regulatory model and designates the set of "the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used".[63] This research was inaugurated by the studies of Donald Norman[64] and focuses on the adaptive character of design *so that the 'performances' always prevail over the aesthetic component* of the design. Evidently, it belongs to the field of *product* design. Still today, for example, hotels use uncomfortable and particularly heavy key chains urging guests to hand over the keys at the reception before leaving the hotel.[65] The key chain contains an "action programme" (*script*) which is inscribed in its form,[66] which immediately indicates the "function" and allows for a "pragmatic mediation" leveraging the natural signs provided by the objects. A bad *design* makes the perception of using an object more complicated or hides its primary use behind the others, either wrong or misleading.

The fourth model is the techno- regulation[67]: it differs from the previous ones because it expects to encode the regulation directly into the technological *device.* In this sense, the techno-regulation is a "strong" performance-efficient architectural model: it completely eliminates the "mouldabilty" strongly emphasized by Lessig starting from the basis of the artificial character of the code and enables the mechanical application of the regulation. In this case, the model does not give any impulse, push, or the correspondence between form and function: the range of the possible choices is drastically reduced to only one possible option, thus determining the individual behaviour in advance. In other words, the *compliance* of the behaviour is automated and the need for a specific action arises from the deterministic force of a "law of nature, like the force of gravity".[68] The car able to automatically prevent the pilot from accelerating is the paradigmatic case of this type of regulation: the legal value is embedded within a technical solution. In this case the "social control" is not exercised under the penalty of punishment, but rather by means of a practical solution, a self-applicable "technology".[69]

As already observed, the techno-regulation, evoking the possibility of total control, raises important questions in terms of compatibility with the principles of modern constitutionalism. In this sense, *the techno-regulation, like rule by law,* seems to be a threat to freedom meant as non-domination. Techno-regulation exceeds and

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coaches, clergy, therapists, doctors, and salespeople, among others. We have entered an era of persuasive technology, of *interactive computing systems designed to change people's attitude and behaviors*". Fogg (2003), p. 1.

[63] Norman (1988), p. 9.

[64] Norman (2007).

[65] Akrich (1992).

[66] Latour (1992).

[67] Leenes (2011).

[68] Rossato (2006).

[69] Pagallo (2014), p. 130.

amplifies the dangers of paternalism to the extent that it results in devious forms of authoritarianism, even if it has often been useful to fight against particular crimes such as terrorism and, specifically, cyber-terrorism. As stated by Kant, nobody can force us to be happy *in one's own way*, "in accordance with his beliefs about the welfare of others"[70]: paternalism, at least in its strongest meaning, is a detrimental form of despotism which extends the instrumental size of the law compared to the assumption according to which it has its own value.

From the perspective of techno-regulation, as Roger Brownsword noted, obvious problems emerge from the profiles of transparency and accountability: unlike the rules approved by the legislator, typically through an open 'deliberation' procedure, the architectural regulation hides the reasons underlying the draft code[71]—the *pedigree*[72]—and the subject is no longer able to perceive what is 'the right thing' and why. In other words, it can be said that a completely techno-regulated society is likely to affect the self-control mechanisms and leads to what David Smith has called "de-moralising" effects.[73] Moreover, the operating settings of the new technologies are often installed by default and act in an essentially "invisible" way, so that users cannot challenge their accuracy.

The design of new technologies is an interesting research path and is potentially able to offer a decisive support to the processes of legal regulation; however, the measures and technical needs inevitably require a social awareness and a legal background that regard the guarantee of the individual's freedom as a commitment. In other words, we need a new ethics of responsibility, adjusted to the new technological era, which revises some legal categories and inspires new regulatory solutions.

A quick look at robotics may provide an insight into some directives on the regulation of artificial intelligence.

## 4 From Robots' Liability to Humans' Responsibility

### *4.1 The Case of Robots: Do We Have to Forget Asimov?*

Through the collection and categorization of data the algorithm "introjects" preferences, attitudes, choices and prejudices of real users but, obviously, it does not have its own. As already pointed out in relation to the theory of design, the

[70] Kant (1991), p. 74.

[71] "Regulation affects the behaviour of individuals and (often) restricts their autonomy and freedom to act. This requires justification. This requirement equally applies to restrictions imposed by the state and to those imposed by private entities. The nature of the justification may differ. The legitimation of state intervention is well understood: it has to be legitimate and based on the rule of law. The justification of intervention in freedoms of individuals by private entities is usually based on consent or the protection of rights", Leenes (2011), p. 149.

[72] Lessig (1999a), p. 98.

[73] Smith (2000).

"nomopoietic" power of the code cannot hide the "human factor" of the programmer and his/her responsibility. The shape of the technological device may oppose a certain "resistance" to the exploitation, making it improbable but not impossible.

The issue of responsibility applied to robotics must be based on a fundamental distinction: autonomy vs. freedom. These categories are often considered the same thing in the legal debate, thus leading to a misunderstanding that prevents us from making distinctions and indispensable clarifications.

"Androids" are in many cases "autonomous", in the sense that they regulate themselves and take basic decisions in an independent way: they are able to prefer an option among many alternatives and have a cognitive dimension that allows them to adapt their behaviour under different circumstances, starting from coded 'experience' data (machine-learning).[74] Those arguments, however, cannot establish any kind of "freedom" in the robot. Robots do what the user wants to do and follow the "instructions" following inference rules. Their *choice* relies on instructions and "do not give up what is not chosen, as human beings do"[75]: the latter, in fact, feel an inevitable regret for the alternatives that they have excluded. The robot programming already includes the option to be preferred, therefore it is not appropriate to refer to good or bad choices: "for these devices we should rather refer to right or wrong, correct or incorrect behaviour".[76]

The famous three Asimov's laws[77] have shaped our imaginary: they were formulated as the "technological" version of the values and fundamental principles underlying the relationships between people and human beings, first of all the *neminem laedere* principle. But this transposition conceals the fact that robots are not moral subjects able to give themselves norms, therefore, they cannot be considered "responsible".[78] The artificial agent emulates the reason as a calculation and emulates the will as *feedback* through formalization operations. But humanity cannot be limited to its functions and, therefore, "[t]he attempt to compare the human mind to the computer is doomed to fail" because "[h]uman conscience is a property of the whole person and must be considered in the entirety that distinguishes human intelligence".[79]

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[74] This type of intelligence is largely used, for example, for self-driving cars as well as for the autopilot system for civil aviation and drones. A famous example is Deep Blue, a robot which defeated the chess champion G. Kasparov in 1997.

[75] Fabris (2012), p. 80.

[76] *Ivi*, p. 81.

[77] The three laws formulated by Asimov in 1942 in his "Runaround" short story are listed below:

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm; 2. A robot must obey orders given it by human beings except where such orders would conflict with the First Law; 3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law. *Cfr.* Asimov (1950).

[78] From this point of view, the application of a "black box" to smart cars has been suggested so that any failure can be detected; moreover, the users of these cars should enter into an insurance agreement which covers any damage possibly caused by "autonomous" robots.

[79] Moro (2015), p. 530 (my own translation).

In other words, Asimov's laws focus on robots, but today it is more urgent to define the rules for artificial machine developers. Although some authors, such as Ray Kurzweil,[80] believe that the quick development of artificial intelligence will soon lead to the production of self-aware robots, this scenario does not seem to be imminent.[81] Therefore, robots do not have their own *agency*. Those who think otherwise fall in what Jack Balkin has called "homunculus fallacy", according to which there is a "homunculus" in the algorithm that governs artificial intelligence and robots which determines the good or evil nature of the activities carried out.[82] In this way, we accept the shift of responsibility from the coder to the code, by redirecting the dysfunctions to mere side effects that man cannot address because they cannot be predicted upon the design stage.[83]

Therefore, a share of responsibility rests with each operator, in a global mechanism that requires the contribution of everyone, although it is cannot be individually controllable by anyone in particular.

Then it becomes necessary to establish a legal background of normative principles and models, in addition to an ethics for operators, a professional ethics for designers and users: in this perspective the expression "techno-ethics" must be understood as "ethics in the age of robots" since "the object of reflection in ethics is new (robotics), but the way to face the issue (deontological method) is 'classical'".[84]

## *4.2 Some Conclusive Thoughts: A Framework for Operators and Authorities*

The latest-generation devices, including robots, could not work without an underlying algorithm governing their interactions based on coded predictive models. The algorithm, in turn, could not work without processing and reprocessing a permanent flow of information: from this point of view the case of self-driving cars is paradigmatic. Robots, or any other intelligent tool, need an external environment from which they receive stimuli and impulses in the form of 'data'. Therefore, it is clear

[80] Kurzweil (2005, 2012).

[81] Searle (1980).

[82] These cases are referred to as "anthropomorphism" or "zoomorphism", i.e. the tendency to assign the characteristics of men or animals to inanimate beings: "[h]umans may also project emotions, feelings of pleasure and pain, the capacity to form relationships with others, and the capacity to care for others and be cared by them in turn. The projection of human or animal emotions onto inanimate objects is as old as history itself. People hear the wind howl and the ocean roar; they project agency and loyalty onto their ships and cars. The projection of humanity onto what is not human is the reflection of the self on the outside world", Balkin (2015), p. 56.

[83] "When we criticize algorithms, we are really criticizing the programming, or the data, or their interaction. But equally important, we are also criticizing the use to which they are being put by the humans who programmed the algorithms, collected the data, or employed the algorithms and the data to perform particular tasks", Balkin (2017), p. 14.

[84] Grion (2016).

that the nature of new technologies is basically 'informational' and is ultimately based on the "hardware-big-data-algorithm" trio:

> Because robots are cloud robots, we shouldn't forget that one of the central issues in robots and AI agents is the handling of data, and in particular, Big Data. Robots are nothing without data, and since many robots will be cloud robots, and many AI systems will be connected to the Internet cloud, they will depend heavily on data analytics.[85]

Jack Balkin theorized three general rules which constitute a "minimum" normative framework that should inform the institutions (either political or private) and above all the ethics of operators: unlike Asimov's laws, they are not intended for the robot but rather for the individuals.

The first rule states that "the algorithmic operators are information with respect to their clients and end-users". Recalling the obligations for particular professional categories such as doctors and lawyers, this rule asks the programmers of smart machine to use the information collected by the algorithms as "trust information" as they identify sensitive user data.[86] For example, physicians must use "confidential"[87] information relating to their patients by complying with duties of diligence and correctness, thus avoiding the occurrence of conflicts or risks that may jeopardize the physical and mental wellbeing of the patients. In other words, they must adapt their behaviour to the principle of good faith.

Large IT companies, from this point of view, have similar obligations: Google, for example, collects, analyses and classifies a huge number of data relating to the users, who read (and "accept") the privacy policy allowing for the "improvement of the browsing experience". Google asks its customers' trust and the latter cannot help but trust it: on the other hand, the use of some search engines is difficult and the verification of the data classification solutions and purposes is almost impossible. Therefore, while the users' lives become virtually transparent, the browsers promote the "logic of secrecy".[88] Putting the duties of data-users on an equal footing with fiduciaries means following a "principle of finality" in the sense that the data,

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[85] Balkin (2017), p. 8.

[86] Balkin (2016).

[87] "Confidentiality law arose centuries ago to keep certain kinds of shared information private. Multiple areas of the law provide confidentiality protections for preventing the disclosure of information in intermediate states, whether through professional duties of confidentiality, implied or expressed contracts for confidentiality, evidentiary privileges, or statutory rules. We have long had confidentiality rules like the duties lawyers owe to their clients and doctors owe to their patients to incent individuals to feel safe in sharing their confidences to advance important societal values of providing effective legal representation and medical care. We also have statutory rules that explicitly create confidential relationships regarding health, financial, and video records information. We also protect obligations of confidentiality that arise through voluntary promises or confidentiality agreements like preventing employees from revealing business secrets. Confidentiality law reveals how we have long recognized shared information can still be kept private using effective legal tools. Expanding confidentiality law approaches would seem to be one way to help keep shared information private", Richards and King (2014), pp. 415–416.

[88] As written by Frank Pasquale, the large companies of the digital era are "black boxes" whose operation, often subjected to market targets, are not accessible not only to users but also to the analysts. Pasquale (2015).

"although available, may only be used in accordance with the reasons that the party has decided to make them public in some way."[89]

Profiling mechanisms, as noted above, may present a threat to society as a whole. The second rule formulated by Balkin—"algorithmic operators have duties toward the general public"—emphasises the public consequences of the private use of social media and search engines. It has been appropriately observed that" [t]he technical community, willingly or not, now has become a policy community, and with public policy influence comes responsibility".[90] Jonathan Zittrain has proved that Facebook has the potential to manipulate the data of its users in order to guide their voting intentions, thus affecting the overall outcome of the presidential election.[91] This example inevitably stresses the social and public dimension of the digital sphere, which is able to influence crucial aspects of life, including those not profiled or lacking a digital culture. Therefore, the operators have obligations even towards third parties and 'public' duties to protect the society in general terms.[92] This trend reflects the mechanisms of attribution of legal responsibility developed at the beginning of the twentieth century, when the large manufacturing companies were held liable for the damage caused to third parties by their defective products, regardless of the absence of a direct contract between the producer and final consumer.[93]

The third rule assumed by Balkin establishes that "[a]lgorithmic operators have a public duty not to engage in algorithmic nuisance": again, the algorithm has no intentions—neither good nor bad—while the coders should not entrust the algorithm activity to any third party, as companies are legally obliged to minimize the environmental impact of their activities. The use of IT tools produces a continuous data flow elaborated by the algorithms thus generating categorisations: this means that the users' identity is processed but also influenced and exposed to the risk of

[89] Rodotà (2012), p. 322.

[90] Reidenberg (1998), p. 583.

[91] Zittrain (2014).

[92] "[G]overnments should intervene…when private action has public consequences", writes Lessig (1999a, b), p. 233. Mireille Hildebrandt pointed out and further developed this aspect stating that "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 concern".

[93] The current Italian legal system includes a civilistic category which addresses the same need for "protection": they are agreements with "protective effects" towards any third party leading to the division between the *obligation of protection* and *performance obligation*, and the content of the obligation is not only what is written (primary obligation of performance) but also what is right (secondary obligations of protection, either instrumental or accessory).

reputational damages,[94] tampering[95] and normalisations.[96] In this regard, the legal framework that offers the best heuristic resources is the environmental law and the concept of "nuisance"[97] Just like pollution, as evidenced by Balkin, the discrimination caused by the algorithm does not have any binary demarcation line between "permission" and "forbidden" as a degree logic, since it relies on the continuous elaboration of the data accumulated incrementally.[98] Therefore, programmers should not to pollute the digital environment, i.e. not produce unreasonable "costs" which may result in an increase in the users' vulnerabilities.

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[94] "[T]he algorithm affects your reputation by placing you in a category or class, which is not necessarily an assessment of risk. The algorithm constructs groups in which you are placed and through which you are known and therefore potentially acted upon. Classification can affect your reputation without an assessment of risk because it says what kind of person you are and who you are treated as equivalent to (and, implicitly, better than or worse than according to some metric)", Balkin (2017), p. 40.

[95] "[H]uman beings and organizations can use algorithms to lead you and others like you to make (more or less) predictable choices that benefit the algorithm operator but do not enhance your welfare and may actually reduce your welfare", Balkin (2017), p. 41.

[96] "[T]he algorithm causes you to internalize its classifications and assessments of risk, causing you to alter your behavior in order to avoid surveillance or avoid being categorized as risky", ibid.

[97] Balkin discourages the application of criminal law and anti-discriminatory law: in fact, the use of the "respondeat superior" principle would make no sense, since the algorithm itself does not represent any subjective attribution and, consequently, it is impossible to transfer the responsibility which must be assigned—since the very beginning, to the human being.

[98] *Ivi*, p. 34.

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