THE THEORY OF REFLEXIVITY FACING & BACKING REGULATORY PRACTICE THROUGH THE MIRROR OF DIGITAL DEVELOPMENT

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Abstract

This paper is a meta-exercise of reflexivity, i.e. personal reflexivity applied to the concept of reflexivity itself. This exercise is placed in the context of the development of digital society. The aim of the author, both an academic economist and an ex-regulator (2005-2011) in the field of telecommunications, is to question his own primitive and intuitive views about "modern" regulation of the electronic communications sector in the face of the recent theoretical corpus about reflexive governance, as it was brought about by the economy of institutions and political science. This confrontation is organized as follows. The first section of the paper consists in a short review of the literature about reflexive governance and regulation, up to now mostly applied to the handling of sustainable development issues: a literature which indeed was unknown by the author at the time he was a regulator. The second section shows how the societal transformations induced by the digital revolution do exhibit features that are very similar to those usually associated with sustainable development, such as complexity, uncertainty or path dependency, which qualifies the uprising of knowledge society for reflexive monitoring. The third section then presents the intuitive arguments that were made by the author to promote new forms of policy making and regulatory steering when he was himself an actor of regulation in the digital arena. Although the language differs, by using physical and biological metaphors rather than relying upon the more topical constructions of sociology and political science, the messages delivered in this last section significantly resemble those derived from the theory of reflexivity… which eventually closes the loop of our epistemic and meta-reflexive exercise.

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Introduction: a Magritte-like non academic paper

Were this contribution a painting and were the author named René Magritte, the title would likely be: "This is not an academic paper". Magritte was an expert in demonstrating the shift between an object and its representation, in showing the "strange" outcomes produced by the action of the painter's thought onto "ordinary" objects, thus making strange become ordinary and *vice-versa*. When I accepted to participate in this workshop, everything looked ordinary in the academic reality: a scholar was invited by his peers to deliver a paper about the economics of regulation. However, the first sign of "strangeness" appeared when I realized with panic that I could not even understand the very issue addressed in the workshop: the expression "reflexive regulation" sounded just as Chinese to my ears. So I had to learn basic Chinese in the first place, which I did. After having read some scientific literature about reflexivity, governance and regulation, I discovered with surprise that, before knowing, I already was an ardent promoter of reflexivity in regulatory practice: in the Magritte's universe, I very well knew what a "pipe" is but I just gave it some other names, making it look as "not a pipe"!

Then, since reflexivity was at stake, I decided to build-up the present paper as a meta-exercise of reflexivity, *i.e.* as an essay about reflexivity the structure of which would itself be reflexive. Consequently, my contribution is made-up as a mimic of Magritte's masterpiece "Not to be reproduced" (*La reproduction interdite*), in which a man, seen from the back, faces a mirror which reflects his back instead of his face.

Who is the person really concerned with the virtual image given by the mirror? Either she is the character represented in the painting and then the mirrored image should show her face; or she is an external observer seeing the back of the character from the outside and then the mirrored

image – to be "true" – should itself show a back! Assuming that I am the character in the picture and that you, reader, are the observer, you will see twice my "back" in this paper!

- My academic "back" appears in section 1, consisting in a brief review of my very recent insight into the scientific conceptualization of reflexivity, as developed by sociologists and political scientists who applied it to governance and regulation in the background of sustainable development issues.
- My regulatory "back" is displayed in section 3, giving an echo of the time when I was still a regulator and tried to investigate, in the "naïve" terms of a practitioner, which directions should take "modern" regulation in the field of electronic communications. To that purpose, I used physical or biological metaphors that "reinvented" in a way the concept of reflexivity, while not knowing they did.
- The "mirror" which sends "back-to-back" regulatory practice and reflexivity theory is erected in the intermediary section 2. This mirror's silvering is nothing but "digital revolution", which – I claim – does constitute a very powerful engine of societal transformation in the 21st century, as important as (and also a part of) sustainable development, thus loudly calling (shouting?) for the need of reflexive governance.

Just as one's eyes should be free to move from one part to another of a Magritte's painting, in the same way sections 1, 2 and 3, namely the "scientific knowledge", the "mirror of digital revolution" and the "practitioner's intuition", may be read in an arbitrary order. Each piece of the patchwork makes sense by itself, while a meta-message is (maybe) delivered by the whole. In other words, this text is definitely not an academic paper: it is a triptych made of three sub-papers in each of which speaks a different "expert", or rather the same expert considered at different moments in time. As for the "artist", if any, he will leave the reader enjoy discovering by himself the meta-message(s) hidden behind the global work… and will just give him some clues! A first clue is that, in the manner of "Not to be reproduced", science and intuition do "back" each other as much as they "face" each other. A second hint will be suggested in the conclusive remarks, when referring to Socratic irony.

1. The theoretical approach to reflexivity[2]

First and second order reflexivity

To use a Hegelian expression, reflexivity is a thought turned into itself, a thought freely contemplating its own presuppositions and assumptions. In terms of governance or regulation, reflexivity thus implies a search for arrangements that do promote "double loop learning". In this expression, the second loop refers to the capability of questioning underlying goals and values of

[2] Not being myself a political scientist or an economist of institutions, I must confess that I knew (almost) nothing about reflexive governance or regulation before I had to write this paper. Fortunately, serendipity saved me and the "googlization" of the words "reflexivity + governance + regulation" immediately oriented me towards two excellent texts: (a) *Sustainability and reflexive governance*: *introduction* by Jan-Peter Voss and René Kemp (2006); (b) *Valuing metaphor: a constructivist account of reflexive governance in policy networks*, by Kathleen McNutt and Jeremy Rayne (2010). The first section of the present paper is nothing but a summarized merger of these two major contributions. Although I skipped the quotation marks for the sake of a lighter presentation, they are everywhere and my debt is total: I most often used the very phrasing of the authors, when unable to find out a better one. Only the structure and organization of the arguments may sometimes slightly differ, in the original and in my reduced copy.

strategies, rather than merely improving the chances of achieving these in the first loop: technical or instrumental learning takes place in the first loop, whereas conceptual or political learning is at work in the second one. Indeed, reflexivity calls for a kind of meta-regulation which, instead of monitoring specific sectors or economic actors, steers the process of rule formulation, adoption, enforcement and evaluation.

Seen in terms of meta-learning, reflexivity is a concept in the direct line of the administration literature, as it was produced in the 70-80s (Argyris and Schön, 1978). A more recent and original construction is derived from the sociological theories of the 80-90s (Beck, 1994) and is known as the theory of "transition management". The basic idea in this theory is that the so-called "modern governance" (or "modern regulation" or "modern management") is inevitably confronted with an increasingly complex set of unintended consequences, due for instance to the development of disruptive and transformative technologies or to the emergence of non embedded social relationships. This self-confrontation of society with unintended results of past choices and with outcomes of its own particular path of development, this feedback of modernity onto itself, is called first-order reflexivity; and the self-created problems revealed by first order reflexivity are called second order problems. Then, second-order reflexivity consists in a reflection on the structures and systems that produce and reproduce the second order problems, so that reflexive governance or regulation implies the exercise *ex ante* of deliberate agency, rather than *ex post* unintentional reflexes in the face of unpredicted consequences.

In short, reflexive regulation is concerned with itself. It understands itself to be an element of the dynamics that are regulated, so that regulatory activities are entangled in wider societal feedback loops and are partly shaped by the effects and side-effects of their own working. Reflexive regulation is about the organization of recursive feedback relations between distributed steering activities.

For processes of societal transformation, as are the challenges of sustainable development or of digital revolution, we face fundamental uncertainty about the effect of deliberate interventions such as policy, regulatory or management decisions. We also do face path-dependency, since future developments are influenced, enabled and constrained by structures that have grown out of specific historical developments. Acting generates both uncertainty and a risk of lock-in and the only way out of this dilemma is to stay in it, but to do it consciously: a high probability of unintended consequences and irreversible effects need to be taken as essential conditions of any strategy and this would mean that ignorance and indetermination are actively dealt with and are not blocked off by pretending full knowledge and the existence of best solutions.

The standard approach of "rationalist problem-solving" seeks to eradicate uncertainty, ambivalence and interference of uncontrolled influences. But, at the same time, it causes unexpected and unintended consequences. Those second order problems break the structure of modernist problem solving as they request to leave away the isolation of instrumental specialization, to widen filters of relevance, to trade-off values, to engage in interaction with other specialists, in short to transgress cognitive, evaluative and institutional frontiers.

Second order reflexive regulation cannot be called problem solving anymore as it entails the application of modern rational analysis, not only to the problems that are self-induced, but to its very own processing, conditions and effects. The vicious circle of first order reflexivity – just

think of Sisyphus pushing his boulder again and again – has to be broken out. Second order reflexivity then consists in a procedural approach towards reflecting the interdependencies, understanding aggregate effects of specialized concepts and strategies, and engaging in the modulation of ongoing societal developments by establishing links, organizing problem-oriented communication and interaction among multiple stakeholders. Reflexive regulation modes are therefore geared towards continued learning in course of modulating ongoing transitions, rather than towards complete knowledge and maximization of control.

Reflexivity requires alternative methods and processes of problem handling (not problem solving!) which are more open, experimental and learning oriented than traditional instruments of governance, in order to explore actively the uncertainties, ambivalences and control problems in a confrontation of various rationalities. Reflexivity is needed at the three successive stages of problem handling, namely system analysis, goal formulation and strategy implementation. In their conclusion to the book *Sustainability and Reflexive Governance*, Voss and Kemp (2006) identify six strategies of reflexivity : (1) integrated knowledge production; (2) experiments and adaptive flexibility of strategies and institutions; (3) iterative and participatory goals formulation; (4) anticipation of long term systemic effects of measures; (5) interactive strategy development; (6) creating congruence between problem space and governance. Those diverse strategies should be implemented by using tools such as constructive technology assessment, interdisciplinary research, participatory decision making, deliberative policy making, foresight exercises, etc.

Can we really expect reflexive regulation to produce better outcomes? The answer is hopefully yes, provided that reflexivity finds the uneasy way out of the "efficacy paradox", by achieving the right balance between the two contradicting requirements of opening-up and closing-down. On the one hand, opening is needed to allow for the interaction of various factors, values and interests; on the other hand, closing and selection are necessary to take effective decisions and to act. This is not truly a dilemma: it is not a question of either keeping up action capacity or widening problem handling, but it is both… which definitely makes reflexive regulation more an art than a science!

Whenever practiced wisely, second order reflexivity should bring about three major advantages.

- It avoids or limits repercussions from unintended effects, the so-called second order problems, and thereby contributes more effectively than narrow problem-solving approaches to achieving societal ends. Note that this does not happen through the creation of acceptance for predetermined solutions but through the exploration of a broad set of alternatives with respect to a diverse set of criteria.
- It allows for learning about ends: reflexive strategic plans do evaluate and reconsider societal goals against the background of various concepts and values.
- It upgrades the quality of problem definition by involving diverse viewpoints. Participatory knowledge production is based on insight into social pluralism and distributed intelligence, as should very naturally be the case in a democracy!

Reflexivity and policy networks

A fundamental feature of reflexive regulation is distributed control: strategies are tempered in anticipatory interaction, rather than in real time trial and error (Rip, 1986). Coordination across agents is then a necessity and it cannot rely solely on institutional hierarchies or markets. In a given field, as for instance electronic communications, coordination takes place in a "policy network", in which problem perceptions, interests and practical knowledge of the various stakeholders become linked together in processes of interactive strategy development. The network's dependence upon its environment also contributes to shape its behavior through exogenous impulses and may create new participations or defections. Indeed, the reality of reflexive regulation includes opportunistic behavior and struggle over power across a variety of actors, as much as orientation towards problem handling, argumentation and cooperation. Then, for reflexivity to prevail, a policy network must fulfill two requests: (a) a diversity of perspectives must be involved in the interaction; (b) interaction must not be dominated by one or a group of actors.

In terms of agency, reflexivity is used both to explain and to encourage self-conscious learning practices where agents recognize how their own beliefs, values and preferences both shape and are shaped by the context in which they are situated. In terms of structure, on the other hand, reflexivity is typically concerned with system's statics and dynamics, such as expressed by the various network concepts of nodes, ties, openness, connectivity, cohesion and so forth. But whatever the perspective is, agency or structure, reflexivity is intended to encourage an open ended set of practices in which policy design becomes more transparent, self-critical and creative. Since reflexive governance strategies both consist of agents using diverse types of learning instruments and generate a process of fundamentally reconsidering the way our socio-technical systems are structured, practiced and governed, the contribution of policy networks must be examined in terms of both agency and structure.

The use of the "network metaphor" in sociology and political science is founded on the empirical observation that many of the mathematical properties of computer, biological or neural networks do properly describe as well the behavior of social and policy systems, especially in reaction to endogenous and exogenous pressures. Governed as they are by the two generic laws of "incremental growth"[3] and "preferential attachment"[4], a network is constantly striving for internal equilibrium and, as a result, is affected by the external environment. As any type of network, a policy network is vulnerable to exogenous disruptions. When external stimuli produce instability, reorganization is triggered and this, in turn, introduces opportunities for innovation. Through this lens, disequilibrium encourages reflexivity, while network equilibrium does not. In brief, the two main lessons from the "science of networks" to policy issues are that: (a) power remains concentrated in a small number of nodes; (b) network change is more likely to occur through shifting ties than through changing actors.

To sociology's focus on network organization, political science adds its interest in the role of the State and configurations of power. Political scientists often use the policy networks metaphor to

[3] Ties are not projected at one time onto a global set of preexisting nodes, but new nodes are rather introduced step by step and tied to already existing nodes.
[4] Nodes with already many ties are also those which most "attract" new ties.

describe power relations within sectoral or issue-specific policy settings. In particular, the "iron triangle" is a convenient geometric image to illustrate the risk of capture when the three prominent actors are the State, the public industrial sector and the private sector. At the opposite, structures such as issue networks, policy communities, epistemic communities, knowledge networks or advocacy coalitions are open network systems with transcient membership, fragmented power and absence of authority, which may lead to unpredictable relational configurations.

Policy networks have severely destabilized the traditional conceptualization of power. Power is no longer simply a matter of organizational capacity, institutional authority or market control, but it must now be partially earned through network influence. In this regard, State institutions and political arenas hold a double position. On the one hand, they make up a crucial part of the external context in which policy networks are embedded and they are thus a source of exogenous disruption. On the other hand, State bodies do participate in networks directly: through networking strategies such as strengthening existing ties, expanding weak ties or bridging among network actors, they seek to steer policy towards State-sanctioned goals.

This dualism in the role of the State reflects the move from government to governance and it reveals how political modernization has decoupled progressively agency from traditional structures, with institutional authority increasingly replaced by the influence of networks; within the latter, reputation, legitimacy and credibility cannot be taken for granted any more. Now, what is the impact in terms of reflexivity? To become fully reflexive, governance should leave open the possibility of a fundamental transformation of the institutions and structures of governance itself, whereas policy networks typically operate around and within these structures. The ability of networks to ensure reflexivity may then be questioned.

It could be argued that, even though policy networks give rise to more open processes in which legitimacy is negotiated at "reflexivity interfaces", civil society remains typically valued as a source of opposition to – rather than cooperation with – existing institutions and structures and hence, to the extent that networks do operate in the "shadow of hierarchy", they no longer have much value as vectors of reflexivity! This view, however, is likely exaggerated and one should not overestimate the ability of the State actors, or institutions existing alongside and independently of policy networks, to engage in steering by invoking hierarchy at critical moments: the threat of acting independently of the networks has become hardly credible and State must participate in networks or not govern at all! State must indeed secure a central nodal place in the network structure, in order to influence policy outcomes.

Therefore, power is more and more exercised in network settings, where not only hierarchy, but even the shadow of it, is weak or absent. However, traditional governing capacity has not completely vanished; it is exercised in new ways and its main attributes, especially legitimacy and organization, can sometimes be translated into network influence, although a price has to be paid… in a loss of reflexivity: a trade-off exists between reflexive governance and the nodal governance strategies of the State.

In the face of major transformations, such as climate change or digital revolution, policy networks have become powerful "epistemic engines", as they become places for "making meaning". In this constructivist perspective, the degree of centrality of a given agent in its

relevant network appears to be a good predictor of that agent's power to shape the production of meaning, as centralized actors have more access to network resources, a greater understanding of what is happening in the network, more ability to detect information and to effect behavior, as well as more opportunity to exchange and establish diverse relationships with other network actors. To obtain and to keep such a key position, the optimal strategy consists in creating weak ties to promote innovation and in maintaining strong ties to resist external pressures. Being a major "hub" in many policy networks, the State is of course in a very good position to shape knowledge about the future but it can do it only interactively and through the networks. Nevertheless, the State is not the only one to be qualified in this regard: as noted by Bas Arts and Jan van Tatenhove (2004), "the capacity to argue, to name and to frame on the basis of which outcomes in deliberation can be achieved is probably as unevenly distributed among agents as hard resources such as money, technology, knowledge, are".

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In this first moment of the paper, devoted to my discovery of the academic literature, we learned how the need for reflexivity, both in the "double learning" and in the "transition management" sense, originates in the limits of scientific analysis and policy approaches aimed at achieving predetermined objectives. This is especially true in matter of sustainable development, where complexity, uncertainty or path dependency are so pregnant that they call for new forms of problem handling, in which feedback is injected into governance. In the next section, we shall argue that the upcoming of the "digital society" and the imperious need for digital ethics – I propose to name it "*digicology*" – do raise critical issues which are similar in a way to those associated with sustainable development and which thus require reflexive regulation in order to account for long term effects, indirect impacts and the inter-linkage of different problems and scales.

2. ICTs and the Internet as transformative technologies[5]

Two short stories

Has the Internet been "invented", as suggests the recent awarding of the Queen Elizabeth prize for engineering to its presumed five "co-inventors"? Two illustrative and (I hope!) pleasant short stories will shed some light on this tricky issue!

The first story aims to show that although the co-winners of the prize did undoubtedly invent it in the first place, the Internet has had since, and will have for long, many other inventors. Indeed, each of us, as a web user, invents the Internet every day and at every minute. I now come to the story, which is due to Vinton Cerf, one among the five laureates of the prize. Vint is said to have replied what follows to someone who seemed duly strongly concerned by the ruling of the Internet:

- You pretend that you could rule the Internet? To achieve such a crazy thing, you should at first know what is going on in the Internet! Imagine a plate of spaghettis. Imagine that

[5] This section resumes the content of a conference I gave in June 2013 at the French Institute of London, at the occasion of the attribution of the Queen Elizabeth prize for engineering, which was jointly awarded to Marc Andreessen, Tim Berners Lee, Vinton Cerf, Robert Kahn and to the French Louis Pouzin, for their major contributions to the creation of the Internet and the World Wide Web.

plate placed in a working washing machine. Imagine this washing machine plunged into the rotor of a concrete mixer. Imagine the whole moving system hanging from a lianas' bridge in the equatorial jungle during an earthquake. Now, be honest with me: could you tell what is the equation of the dynamics of the ketchup?"

Vinton Cerf was quite right. Such is the very essence of the Internet, being a continuous creation by the crowd of its users in a permanent "impermanence"! The blood running in the veins of the network is not merely a flow of bytes. It is much more than that, namely a torrent of bursting innovation. The very essence of the Internet is to be a "cauldron of creativity", the only possible formulation as any other definition of the Internet's "essence" would immediately be violated by the Internet's "existence". Contrary to most of familiar objects, Internet definitely cannot be reduced to a predefined menu of its potential usages, since it is rather the place of an open and bottom-up innovation process, emanating from the user base.

The second story aims to show that the Internet was invented with the very remarkable and unexpected result that, forty years later, digital natives are fully convinced that the Net has existed for ever! The story consists in a discussion between someone from my generation and his grandson or granddaughter. I would have liked so much to tell you that the story is personal and genuine but I must confess that I picked it up somewhere in the erratic and creative Web flow! The grandfather is showing to the child old pictures from the times of his own childhood. Looking at the images, the child is most surprised by the total absence of personal computers, digital tablets, mobile phones and other electronic devices. Then, he asks:

- Hey, Granddad, you had no computers in those times?

With a touch of secret satisfaction and retrospective relief, Granddad answers:

- This is perfectly true, my dear, we had no such gadgets when I was a child!

The child's reply is immediate and made of an irrefutable logic:

- Then, Granddad, how did you have access to the Internet?

To the eyes of this young digital native, a world without Internet is an unconceivable world that never could have been real, as he/she "thinks" – and thus he/she "is" – through the Internet: he/she chats with friends through MSN, listens to music downloaded from sharing platforms, socializes *via* Facebook, learns from Wikipedia, etc. Human cognitive functions are today all affected and altered by Internet usage, so that those who were born in this "system" cannot even imagine the past existence of other systems.

The emergence of the "noosphere"

Bringing together the messages from the two stories gives us an important key to apprehend the very nature of the so called "digital revolution" and to understand why it differs in depth from the previous industrial revolutions that occurred in the eighteenth and nineteenth centuries. The latter gave birth to objects such as the plane, the train or the car, which certainly did change drastically the economic and social organization, but which left unchanged the cognitive dimensions of human life. In this respect, information technologies (IT) exhibit a feature that technologies issued from mechanics or chemistry don't possess. The Internet is not just a tool made by the hand of man to become a prosthetic extension of this hand. It rather constitutes a

"global object" in the philosophical sense, *i.e.* an artifact with respect to which man is both in an external position (since he invented it!) and in an internal position, since we all elaborate and post there the creations of our minds in a continuous process. The global object named Internet may indeed be seen as a prosthetic extension of the brain rather than of the hand or, much more exactly, as a collective and shared extension of all human brains, literally a "noosphere", *i.e.* a sphere of the mind. In short, whereas past industrial revolutions operated in the "technosphere", made of material items, the digital revolution operates in the "noosphere", made of cognitive items.

The neologism "noosphere" is by no means a recent one! At the beginning of the twentieth century, far before the birth of the Internet, two geologists, Vladimir Vernadski and Pierre Teilhard de Chardin, imagined the interconnection of brains all over the planet and they named it the "noosphere". In the vision of Teilhard (who was also a priest of the Jesuit obedience), the noosphere, coming after the biosphere, coming itself after the geosphere, constitutes the third and last stage in a cosmogony leading the Universe from its starting point Alpha of pure matter to its ultimate point Omega of pure spirit. Teilhard, who "saw" the noosphere as a kind of biofilm, surrounding the atmosphere, would today be most astonished to "discover his invention" under the appearance of a spider's web named Internet, made of routers and optical fibers. In his vision, he certainly missed the physical shape of the noosphere but he was perfectly relevant as regards its function: bringing human brains together into a "collective mind".

Of course, the noosphere did not emerge from scratch with the Internet. It is as old as humanity but it evolved at a much slower pace in the past. About 5 million years seem to separate the birth of humanity from the use of articulated speech, which probably occurred around 5 hundred thousand years ago. Then, the first paintings in grottos date back to 50 thousand years ago, the first written texts back to 5000 years ago, the printed book back to 500 years ago, the invention of Internet back to 50 years ago, the development of the Web 2.0 back to 5 years ago… What is fascinating here is the logarithmic character of this time scale. As much progress was likely accomplished in the Internet arena during the last five years as was accomplished in the cognitive capabilities of the *homo erectus* during the five hundred million years going from the first speech to the first painting.

This does not mean that we are about to reach some Omega point of singularity. It just means that "big data", mobile connectivity, cloud computing and social networking do increase exponentially the occurrence of "digital events" in a given frame of time. In other words, all these phenomena do increase the "density" of the noosphere. It also means that "neutral" connectivity becomes as essential to human kind as drinkable water may be, so that countries which deny or restrict open access to the Internet do heavily sin against civilization… sadly recalling, in a way, the censorship achieved by the Inquisition in the times following Gutenberg's invention.

A global revolution

Any major cognitive seism occurring in the noosphere induces transformations in all aspects of human organization and activity. Political power is questioned, economic processes are altered, social relationships are shifted, moral and ethic guidelines move as well. Let us give a very sketchy view of what are the main driving forces currently at work in those four different "orders".

In the political order, Internet challenges governance and power, at every level. Often mentioned, is the ability of the Net – as a worldwide network ignoring geographical borders – to generate behaviors which escape from the direct control of the States and easily bypass national laws, creating fiscal evasion, violating trade settlements, harming intellectual property, in brief creating a cyber-criminality which proves very difficult to fight through classical means. Often mentioned too, is the electronic tribune that the Net offers to political leaders, enabling them to increase considerably their audience; an opportunity which, in turn, is counterbalanced by the capacity of citizens to create efficient lobbies and influential communities online, or to post informational "leaks" which may become highly explosive electronic bombs.

In the economic order, the main impact of the digital revolution consists in a "flattening" of costs and utilities, which do not depend significantly any more on the volumes of provision and consumption, but quasi-exclusively on the conditions of access. In an electronic network the additional cost of conveying and managing an extra byte is almost zero, the only cost being the fixed initial cost of installing the network's capacity. Symmetrically, from a web user's standpoint, the utility derived from an extra byte is deprived of sense and only matters the utility of accessing to an "all you can eat" informational corpus. Under the flatness of costs and utilities lies indeed a terrifying revolutionary agent! Since increasing the quantity of information costs and benefits nothing at the margin, the economically efficient price of a byte is zero! This, of course, does not imply that information, as an economic good, should be delivered absolutely free of charge but it implies that the access to information should be provided against a lump sum payment, such as a subscription. Fixed costs and utilities do imply fixed prices. One should pay when entering the "Ali Baba's digital grotto" but, once entered, should be given a free access to all digital jewels present in the magical grotto! The digital economy is an economy of profusion.

Such is the context in which originated in France the legitimate claim in favor of a global licensing for copyright of protected content, all over the Internet. Of course, this was and still is seen as a terrible revolution by the majors of the music, book and picture industries, which have built their pre-digital business model on the sale of units, rather than on the sale of access. These industries of culture now face the imperious need to revise this model, which has been made obsolete by the digital technology and which cannot survive for long, even with the "help" of ephemeral and unsuited legal devices. In this regard, the controversial HADOPI law in France, intended to protect intellectual property online, reveals the dangers of an intrusive and repressive approach when trying to settle the necessary "disorders" created by a drastic innovation in the noosphere.

In the social order, what Internet has brought up is the ubiquitous and immediate one-to-one interconnection. Although social scientists point out with relevance that "friends" on social networks are not really friends and that the number of people with whom one maintains close links has not changed very much with the use of the Internet, it would be a severe mistake to draw the conclusion that information technologies did not move the lines of social link. In this regard, the Internet gave rise to three important phenomena, namely: "instrumental intimacy", "serendipity" and "long tail" distribution.

Although my friends of Facebook or Linkedin are not intimate friends, they are indeed instrumental relationships, posting on the Web a myriad of data which help me to get better

information, to get better value from my professional curriculum, to consume in a more advised way, and so on. Precisely because those friends are not real friends, I may "use" them as human resources without complying to the rituals of standard sociability, in order to make unexpected findings over the course of a free surfing on the Net, just in the way as the lords of Serendip did ride from treasure to treasure through the antique Perse. Because most of my friends online are not real friends, I do share with them on the Web a long tail of data, each individual unit of content being of an infinitesimal value whereas all units do aggregate into a huge corpus of an inestimable utility, as each of us may retrieve from it at any moment what happens to be useful *hic et nunc*. Such is the cognitive "power of the crowd". The blogosphere of the Net is nothing else but Teilhard's noosphere!

In the moral order, Internet affects the conditions in which fundamental human rights are enforced, such as freedom of speech and protection of private life. Online practices may generate conflicts between these two rights. For instance, while aiming to secure personal data or to protect fragile audiences from undesirable content, one may at the same time restrict freedom of expression by prescribing insufficiently targeted remedies. Conversely, to request an unconditional liberty of expression on the Web would cause damage as it would hinder the eradication of obnoxious content encouraging terrorism, promoting xenophobia or favoring pedophilia. The enforcement of fundamental rights may also conflict with the defense of a variety of other rights: for instance, unlimited file sharing online, in the name of free speech, harms intellectual property of protected content in the lack of a global license; or the privacy of citizens may be threatened by the administrative interceptions requested by the Police or the Justice for the sake of national security.

The pervasive incursion of the Internet in everyday's life and social behavior thus shifts the driving forces which rule the balance between different rights, resulting in disputes. Besides the legal settlement of these disputes on a continuous flow, an ethical approach is imperative in order to analyze the evolution of practices and to better define what is deemed as being acceptable and desirable in a democratic society. The essential role which digital technologies are supposed to play as key instruments in support of a sustainable development is most often underlined in the particular framework of the Green IT issue. This legitimate aspiration must not make us forget that those technologies, being themselves a constitutive part of the development process, not to say the very engine of this process, they chiefly contribute to the building-up and to the preservation of our welfare. The "digital ecology" or "digicology", *i.e.* the study and the monitoring of evolutionary digital ecosystems, thus appears to be a problematic at least as important as Green IT: we all are co-responsible and co-regulators for the quality of our digital environment.

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To conclude this section, two sentences in French borrowed to the inventor of the concept of noosphere:

« Lorsque, en tous domaines, une chose vraiment neuve commence à poindre autour de nous, nous ne la distinguons pas… Rétrospectivement, les choses nous paraissent surgir toutes faites. »

« Rien, dans l'univers, ne saurait résister à un nombre suffisamment grand d'intelligences groupées et organisées. »

Pierre Teilhard de Chardin, *Le Phénomène humain*

Change is insidious and it always catches the forecaster off-guard. Nevertheless, little by little, the noospheric spider weaves its cobweb. Today, it is called the Internet. What tomorrow will be made of? Let us bet that the ongoing convergence between ITs, nanotechnologies and biotechnologies, as well as the coming-up of the Internet of objects, will lead to a more advanced noosphere, in which the barrier of yhe skin will be crossed over, mankind then mutating from the age of *homo socio-numericus* to the age of *homo bio-numericus* !

3. The naïve approach of a practitioner to reflexive regulation[6]

The various transformative phenomena described in the previous section call for a monitoring of the transition towards the knowledge society and for some kind of Internet "regulation". But which form such a regulation could well take? How could one regulate the plate of spaghettis so nicely described – in its erratic move – by Vinton Cerf, without wasting at the same time the very special flavor of that plate? How to find the way out of the following paradox?

"To regulate is to reduce uncertainty.

The essence of Internet is to be unpredictable.

Hence, regulating the Internet amounts to distorting the Internet."

Discussing that paradox is the object of this section. The substance of the following argumentation was elaborated in 2011, at a time when I still held a regulatory position and had not yet read the literature about reflexive governance, as presented in section 1.

Innovation and unpredictability

As we demonstrated in section 2, in order to fully appreciate the contribution of electronic communication networks and services – notably the Internet – to the dynamics of the digital revolution, one must explore further than the obvious fact that these networks and services make up a system for the distribution of information and communication signals, just as the railway allows for the transportation of persons and commodities, or energy networks allow for long-distance transmission of electricity, petroleum, or gas. Under the surface of this façade, electronic communications are a boiling forge where the processes of innovation that are generating and shaping our knowledge-based society gestate.

Of course, electronic communications are an infrastructure, or better, an "infostructure," which creates synergies between networks, services, applications, and content. But, at the same time, they are much more than equipment for the transmission of signals: they are truly a melting pot for innovation, a platform of creativity whose shifting borders are framed by the innovation process itself. Their close relationship to innovation – and therefore, with its inherent unpredictability – characterizes electronic communications and fundamentally distinguishes them from other network infrastructures.

[6] This section is an updating and adaptation of my paper "Innovation and regulation serving the digital revolution" (2011), published in the Journal of Regulation, during my last year as a member of the board of ARCEP, the French authority for the regulation of electronic communications and Post.

During the inception of the railway, two centuries ago, engineers did not have much doubt concerning the future utility of the infrastructure they were designing: it would always be used by trains that would transport people and freight. One hundred years later, some imagined, in the early days of the telephone, the advent of the "*théâtrophone*" by which concerts could be broadcast in opulent Parisian flats, just as some anticipated that the Minitel would quickly and completely replace the postal service. None of these people could have forecast the future dominant use of these then-nascent technologies: interpersonal communication for the former and dating chatlines for the latter.

Similarly, the engineers who are currently building fiber optic networks or fourth-generation mobile networks are at least partially incapable of predicting the potential usage of these infrastructures, which are the fruit of a process of collective invention and production, consubstantially implicating network operators, content providers, and users… in a tangle of supply and demand where new business models and new social practices are being invented. This economic and social invention is highly unpredictable, for it follows a random and unplanned path… just like surfing on the Internet, which – according to the model of "serendipity" – more certainly leads one where he does not yet know he wants to go, rather than where he thinks he wants!

In deliberately exaggerated words, one could say that the "fluid" carried by electronic communication networks is not information, it is innovation!

Innovation and regulation

Therefore, regulating the electronic communications industry does not simply involve regulating network infrastructures, which is the traditional goal of sector-specific regulation; it also means regulating the third industrial revolution's engine of innovation, which is a much less classic and much more ambitious target! The regulator must adopt a duality of behavior in order to achieve this duality of goals: he must be both a problem solver and an uncertainty reducer in fulfilling the first goal; and a midwife for creativity and a catalyzer of initiative, in fulfilling the second.

But is it possible and sensible to "regulate innovation," or is this simply a provocative oxymoron? Napoleon Bonaparte is reported to have said these incisive words during his Italian campaign:

"Rules are for soldiers and not for warriors. The battle mocks codes, it demands new rules, invented for it and by it, and which disappear once it has finished."

This is quite a relevant analysis: innovation is the "battlefield" of electronic communications, the innovators are the "warriors" of technological progress, and the regulators are the rule makers. Just like the battlefield and the military code, innovation and regulation seem to be antonymous: whilst regulation, like military rules, are in principle stable, certain and prescriptive, innovation is like the theater of operations, in that it is essentially effervescent, unpredictable and unable to be planned in advance. Just as an inappropriate rule must not hinder the efficiency of the battle, overly restrictive regulation must not inhibit innovation.

The "Napoleonic" vision of antagonism between regulation and innovation is especially put forth by those fiercely opposed to any form of regulation for the Internet. These players, including major network operators such as AT&T, fear that regulators want to treat the Internet like a historical monument that must be preserved intact by coercively enforcing the principle of

neutrality, which would dangerously threaten the exceptional dynamic of innovation of which this network is the stronghold.

The argument against regulation naturally flows from Vinton Cerf's striking image of the spaghettis' plate. It is thanks to the traditional absence of regulation that the Internet is a constantly changing thread, which creates new connections and deletes others every day for the benefit of innovators and users. The few documented cases of discrimination and anti-competitive behavior have been minor and rapidly cleared up, so why should we change direction today, why should we create laws and a body of *ad hoc* rules?

Regulation as maieutics

However, arguing of the innovation's unforeseeable and self-organized character to assert that regulation is completely unfounded seems excessive. Indeed, unpredictability does not mean that regulation cannot succeed, as long as it is designed differently. The regulator cannot decide on what technologies to adopt or what applications to invent; but he can serve as a catalyzer, a stimulator, an inciter, a trustworthy third party, in order to create the most favorable conditions for innovation to take place. This change of perspective opens the way to regulation as "maieutics", in which the regulator encourages collective invention without trying to take the innovators' place.

The maieutic regulator must agree to supplement his familiar problem-solving behavior with an approach designed to give birth to cooperative solutions, such as hearing market players, organizing forums and working groups, publishing good practices, etc. Then, like the host of a party, the regulator must not organize and feed the conversation himself, but rather must make sure that his guests feel at ease and are able to fruitfully exchange. Of course, this approach is not radically new; what is more original is to propose it as a methodology of its own for regulating an industry.

This promising path has recently been followed by the ARCEP[7] in order to promote – but not impose – the respect of the principle of network neutrality, which is a necessary foundation for the full and free expression of digital innovation (Curien and Maxwell, 2011). In this case, we observe the double distance the regulator has taken from the regulatee: on one hand, innovation is not being directly regulated, but its upstream condition, neutrality, is; on the other hand, the method of regulation is not prescriptive, but incentive-based.

The princess and the frog, Darwin and Lamarck

The innovators who invented *Google* or *Facebook* in their garage or dormitory room are like fairytale princesses who kiss frogs that transform into princes. The princess does not know beforehand whether the frog she chose will turn out to be a prince, but she puts so much faith into her kiss that she cannot expect any other outcome. No regulator, no planner, no monarch, however powerful he might be, could choose the right frog in her stead, nor could tell her how to kiss it, and especially could not kiss it instead of her!

Like the kiss of the princess, the act of innovation is more like Kant's categorical imperative than his hypothetical imperative: instead of deciding whether or not to take initiative based on a

[7] Autorité de régulation des communications électroniques et des postes (the French regulator of telecommunications and Post).

minute examination of his chances for success or failure, the innovator creates movement by believing in it. Even though this proactive attitude promotes success, it obviously does not eliminate the probability of failure – this is the difference between reality and fairytale! – so the process of innovation, like biological evolution, works based on natural selection: many projects must be aborted so that a few can prosper.

Therefore, innovation is a Darwinian[8] biological process that combines chance and necessity, alternates between trial, error, and success; it is sequential and path dependent. It is not a Lamarckian[9] process in which the innovator's hand would be guided by an end goal, or held by a regulator, like the giraffe's neck would grow longer by constantly having to stretch it to reach the highest leaves of the trees.

For some paleoanthropologists, the Darwinian nature of innovation is far from being fortuitous and is part of a global process of biological and cognitive co-evolution: since prehistory, a parallel can be drawn between "progress" on one hand, meaning the growing diversity of technological and cultural production, and on the other hand, the biological evolution of the human species. If Darwin, rather than Lamarck, is right about the correct interpretation of the principle of transformation that they both promoted, then the trajectory of progress is to be interpreted as an unpredictable sequence of randomly selected innovations, rather than a deterministic progression of answers to problems that man successively encountered.

Faced with Darwinian innovation, a wise regulator must avoid any tendency towards abusive planning, because he knows he will never be able to replace the market's random dynamics. Because the "infostructure" of electronic communications' very value is the unpredictability of the innovations it will produce at any given time, trying to reduce this unpredictability would mean suffocating the birthplace of the digital revolution. If he were overly-inspired by Lamarck, the regulator would be tempted by economic "eugenics" and would risk creating a "*Jurassic Park*" effect by preconceiving unnatural scenarios, meaning that he might orient the supply towards services that would be rejected by the demand, or by smothering applications that are the most promising.

In this respect, the flavor of planning that emanates from the *Digital Agenda* adopted by the European Commission should not fool national regulators. They must remain fully conscious that their sole desire to see this calendar carried out will not affect its course, but rather, that change will depend on the market players themselves. Therefore, a wise regulator will take the regulated system's unpredictability into account, and, since this unpredictability feeds innovation, will ensure that it is maintained at a sufficient level, rather than suppressed. He will respect the market's spontaneity and abstain from inhibiting its creativity, usefully meditating upon this message from George Eliot[10]:

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[8] From the name of Charles Darwin (1809-1882), an English naturalist, father of the model of natural selection according to which the evolution of species takes place over generations through the natural selection of individuals best adapted to their environment.

[9] From the name of Jean-Baptiste de Lamarck (1744-1829), a French naturalist, the first before Darwin to have proposed a transformative vision of biological evolution, thereby eradicating the theory of creationism. Lamarck's model differs, however, from that of natural selection: it supposes that creatures change in reaction to their environment, and the mutation of species takes place via intergenerational transmission of acquired characteristics, rather than by natural selection.

[10] British novelist of the Victorian era, 1819-1880.

"The stars are the golden fruit upon a tree out of reach."

In this poetic expression, the stars are none other than the fruits of innovation, and the tree is the system of collective invention that causes them to ripen; the tree is out of reach because it grows free from any sort of planning. The regulator is the hidden character of this metaphor, and yet he is well present: he is the nurseryman, the gardener that prepares and waters the loam of innovation; a Darwinian gardener that does not try to take nature's place, but creates the right conditions for it to work; a gardener that prevents the emergence of an uncontrolled jungle without trying either to design a French garden.

Although the regulator's natural tendency is to follow Lamarck by attempting to define goals and try to attain them by shaping the market's mutations, he must become Darwinian by allowing the regulated industry itself propose solutions to the problems its changes have caused, in accordance with the model of participative regulation initiated by the ARCEP concerning net neutrality. Going from Lamarck to Darwin means practicing regulation as maieutics, on the basis of round-table discussion, co-regulation, and even self-regulation by the industry. The regulator must not completely disappear, but rather act as a facilitator of relationships across the various players in the industry.

Between under-regulation and over-regulation

Nonetheless, Darwin did not kill Lamarck, and their two points of view are more complementary than contradictory, in biology as in regulation. Thereby, the regulator that fosters unpredictability must at the same time reduce uncertainty. This is certainly a paradox, but not an antinomy, because in order to better tap the creative sap of unpredictability, market actors need a certain amount of security: maintaining the degree of uncertainty inherent to the process of innovation would not be possible without reducing the degree of uncertainty to which innovators are subject. Therefore, the regulator will act to preserve the randomness inherent to the genesis of innovation, and at the same time will make innovators' environment less uncertain. His definitive goal is to provide market players with the confidence they need to innovate, and to temper "exogenous" uncertainty in order to keep up "endogenous" uncertainty.

Somehow, the regulator is like a bus driver in foggy weather: confronted with uncertainty concerning technologies and applications, he ensures the safety of his passengers – the market players – and must therefore adapt his speed in function of his visibility and the power of his headlights. If he drives too slowly, too prudently, going so far as to stop the bus on the side of the road, he "over-regulates": then, the driver-regulator certainly prevents dangers caused by the fog but, in doing so, he reduces the market's dynamics to immobility. By attempting to eliminate all exogenous uncertainty, he also dries up all endogenous uncertainty. On the other hand, if he drives too quickly, accelerating through turns until the market-bus drives off the road, he "under-regulates" by allowing the fog to blindly take full control of the trajectory: by attempting to give free rein to endogenous uncertainty, he allows exogenous uncertainty to destroy the system.

In accordance with his visibility, the regulator must set his cursor at an intermediate position between the two undesirable extremes of under-regulation and over-regulation: the thicker the fog, the more intense the regulation must become, because the need to ensure players' safety by reducing exogenous uncertainty is more important than promoting innovation by fostering endogenous uncertainty, and *vice versa*. The alchemy of regulation means neither over-regulating,

nor under-regulating, but striking a balanced compromise between stability-inducing market oversight and freedom provided to innovators. Another metaphor: if the market for electronic communications were a gas, the regulator would be in charge of maintaining it at the correct temperature. When the system is thermodynamically overheated, regulation must cool it by slowing molecular movement in order to avoid chaos due to destructive entropy. On the contrary, when the gas is too cold, regulation must heat it up by accelerating its molecules in order to avoid the glaciation of absolute zero, caused by a lack of creative entropy.

The "physics" of regulation

Looking at regulation through the prism of physics is not simple rhetorical artifice, for the very conceptualization of the notion of regulation is precisely due to scientists, especially Ampère[11], who studied the conditions for stability of systems. Seeking for regulation's foundations in "hard" sciences naturally leads us to examine the mechanism that links regulatory devices to regulated systems. Indeed, regulation is not "absolute," but rather "relative" to the system it regulates. This is a property of interdependency that evokes the modern concept of gravitation, as defined in relativistic mechanics, which contrasts with that issued from classical mechanics' older theory.

Going along with the metaphor, the regulation of electronic communications does not follow – or no longer follows – a heliocentric model, where planet-operators orbit around a sun-regulator. Regulation more closely resembles gravitation of general relativity than that of classical mechanics: it is due to a geometric deformation of the electronic communications' space created by the market's stars, which themselves are moved by the force field they contributed to generate. Thereby, we have gone from Newtonian regulation to Einsteinian regulation, which is transformed by market actors as much asit impacts them, in a loop of dynamic reflexivity.

Notably, in order to create the best possible conditions for innovation, regulation must accept that it can be changed by the very market forces it is trying to influence. The simultaneity that characterizes this reciprocal relationship provides an original vision of regulation. We should revisit the sequential scheme according to which a phase of essentially symmetrical, reactive and adaptive regulation comes after a phase of mostly asymmetrical, proactive and prescriptive regulation designed to limit the incumbent's power. In the relativist view of regulation, the reactive phase does not replace the proactive phase, but the two indeed coexist in osmosis, for flexible incentives and directive supervision are not mutually exclusive.

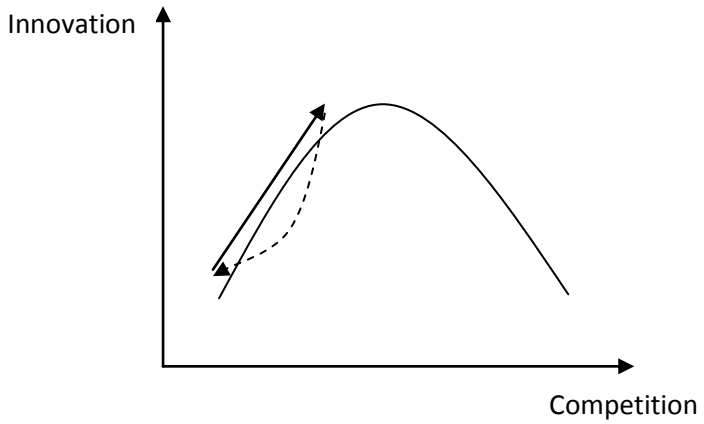
Competition and innovation

European sector-specific regulation, especially that of the electronic communications industry, is by essence pro-competitive. But does competition foster innovation? According to Frédéric Bastiat[12], "*Destroying competition means killing intelligence!"* But what about the other way around? In other words, does promoting competition necessarily mean developing intelligence? Does it mean encouraging innovation?

To answer this question, economic theory has established the existence of an inverted U-curve (Aghion *et alii*, 2005). When competition is weak and then increases, innovation increases as innovative companies thereby acquire a competitive advantage: this is the so-called effect of

[11] André-Marie Ampère, French physicist and mathematician, 1775-1836.
[12] French politician and liberal economist, 1801-1850.

"escaping competition" On the other hand, when competition is intense and then gets even more intense, innovation is inhibited because the expected profit decreases as competition destroys any hope of earning money on innovation. In reality, the two opposite effects of escaping competition and rent confiscation are always simultaneously present, but the first effect dominates the latter on the rising side of the U, and the latter is stronger than the former on its declining side.



Consequently, regulation favorable to innovation should encourage "optimal" competition, rather than "maximal" competition. In the case of electronic communications, it is sensible to think that the oligopolistic market structure, which prevails in Europe today fifteen years after the industry was opened up to competition, is located on the rising side of the inverted U-curve; so stimulating competition will not harm innovation. Furthermore, in comparison to other industries, the considerable potential of technological progress feeds the engine of entrepreneurial innovation with a particularly powerful fuel, which stretches the inverted U-curve's domain of growth towards the right.

Lastly, in this industry, the development of competition is not so much due to a progressive increase in the number of competing firms using a stable technology as to a permanent race towards technological renewal, in which a limited number of same players compete. In other words, the innovation-competition dynamics cannot be represented by a linear left-to-right shift along the inverted U-curve, but rather describes cycles back and forth within the rising branch (see figure). The game of competition is made-up of consecutive matches with each new technology: today, the match is being played on the court of fiber optics, as it was yesterday on the one of copper wire; and on the court of fourth generation mobile phones as opposed to previous generations. Thereby, a virtuous cycle is at work, wherein competition fosters innovation, which likewise reignites competition.

Precaution and innovation

In his dictionary of received ideas, Gustave Flaubert concisely defines innovation with an alarming exclamation:

"*Innovation: always dangerous!"*[13]

[13] Gustave Flaubert (1821-1880), *Dictionnaire des idées reçues*, 1913.

It is indeed possible to try to regulate innovation, not in order to encourage it, but to prevent, reduce, or correct its possible negative externalities on the environment or on society. This is where the very (overly?) well known principle of precaution comes from: even though the causes cannot always be foreseen, we can nonetheless prepare ourselves for the consequences.

One should take care, however, that excessive precaution does not nip innovation in the bud. This means that we should adopt a "principle of audacity" rather than a principle of precaution, but that we should still be cautious: innovators' main goal is "to dare," but in order to be able to dare in the long term, it is not prohibited, and is even advisable, to take a few precautions!

In other terms, we must not confuse the "risk", which is inherent in all forms of innovation and human initiative, with the "danger", which is caused by uncontrolled or poorly controlled risk. This is why we "avoid" dangers, which is precaution, but we "take" risks, which is audacity! Regulating innovation according to the principle of audacity means allowing for unforeseeable benefits, while remaining capable of anticipating and preventing potential collateral damages; the undesirable opposite would mean suffocating any new ideas beforehand because of an unreasonable fear as to what they might engender.

The principle of audacity is a remedy against the dictatorship of fear and it can be applied to technological innovations as well as to the invention of new services. To take an example from each register, we could say that the realization of electromagnetic waves' potentially negative effect on human health must not stop the roll-out of mobile networks, but must lead us to impose safety standards. Similarly, the advent of internet-ready television sets must not cause the audiovisual industry to stop taking initiatives, but rather must lead this industry to form win-win partnerships with online content producers in order to develop innovative applications that combine interactivity and access to content. In both cases, regulation is necessary, in order to ensure public health in the former case, and cultural diversity in the second. However, regulation must be designed in such a way as to allow innovation to flourish, rather than simply seeking to avoid the worst.

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As a conclusion of this section, the way out of the "innovation/regulation" paradox lies in finding an original path of regulation; a path which might be summarized in the following "commandments": (a) move from a prescriptive regulation, which forbids and punishes, towards a regulation inspired by maieutics, which gives incentive to innovate; (b) leave away a regulation in which the regulator dictates to the princess which frog she should kiss in order to make her prince appear; rather adopt a regulation in which the regulator prepares the most favorable conditions for creative kisses to occur in the market place; (c) forget about the administrative regulation *in vitro*, centered on problem solving, and do prefer a regulation *in vivo*, based on the delivery of solutions by the market actors themselves; (d) move from a centralized regulation towards a self-organized regulation, *i.e.* an auto-regulation; (e) move from a compartmented regulation towards a shared regulation, *i.e.* a co-regulation.

A regulator should inspire confidence rather than give lessons, he control uncertainty rather than create certitude, he should help market actors to find appropriate solutions rather than solving problems for them. It is a necessity, for history is an evolutionary process that would soon

eliminate any form of regulation unsuited to the new environment that the digital revolution has created.

Conclusion: second order reflexivity and the Socratic irony

As announced in the introduction, the aim of this paper was to experience a personal exercise of reflexivity, a self-confrontation of the author with himself or, more exactly, a confrontation between an avatar living in the present and another living in the past: on the one hand, a retired regulator now returned to academic matters and freshly made aware of the theoretical literature about reflexive governance; on the other hand, a regulator in activity trying to place himself at some distance from his own practice and to think about the needs for a change in the modes of regulation. In other words, my goal was to adopt the reflexive attitude well described by Pierre Bourdieu (2004) in the fields of sociology and ethno-methodology, and to apply it to my two successive approaches to the concept of reflexive regulation: reflexivity applied to the analysis of reflexivity!

I deliberately did not make fully explicit the comparison between: on the one hand, the top-down lessons that I learned from discovering the theory of reflexivity, in the second act; and, on the other hand, the bottom-up inductions that I made when guessing about reflexivity through listening to the signals from the ground, in the first act. I am sure that the reader will easily draw the conclusion by himself: across the two acts of the play, the wording differs significantly but the meaning is basically the same: indeed, the intuitive notion of "maieutic regulation" and te formal concept of "reflexive regulation" are much more than just cousins, they rather are Siamese twins! At the risk of a serious lack of modesty, I could assure that I "discovered" in the second act what I "invented" in the first one! This observation was indeed a very uncomfortable one and it took me some time to recognize that I had been both a poor regulator, by reinventing concepts that already existed; and a poor academic, by superbly ignoring a vast field of relevant literature. Such is the price to pay for self-applied reflexivity!

All along my laborious path towards the understanding of reflexive regulation, Socrates was a precious and faithful guide, in two respects: first, in the process itself of understanding, which was indeed of a maieutic nature through a virtual dialogue between regulatory practice and governance theory; and, of course, in the outcome of that process, since the understood concept, namely reflexive regulation, is in itself a maieutic process. All the art of Socrates in practicing maieutics consisted in his famous usage of "irony": of course not the passive and detached amusement of a disillusioned philosopher about the beliefs he might accept for himself, but rather the active discipline of forgetting about any presupposition or prior "knowledge", before dealing with a new issue; in short, pretending to know nothing *ex ante*, in order to access to better knowledge and wisdom *ex post*. Socrates, although he never wrote anything, is indeed the genuine father of second order reflexivity, *i.e.* questioning thoughts in permanence within an interactive setting.

"Ironic regulation" is the very sap of this paper. Now imagine an apocryphal painting by Magritte, called *Ironic regulation in the digital age*! Maybe, it would look like this "superb" meta-enigmatic Gioconda-cyborg!

One might of course look at this picture in a very pessimistic way, in seeing solely that the symbolized regulator dropped his mask of quiet benevolence to show the terrifying horror of his narrow-minded cybernetic brain. I prefer personally to read in this image the optimistic message of second order reflexivity: having dropped the mask and holding it tightly in its hand, as the promise of a new potentiality, the regulator will soon give the mask a life of its own, he will transform his old fake face into his new true face and he will use his restored smile of irony to think and shape the future in a radically different perspective!

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