Vox Internet Seminar Report

INTERNET GOVERNANCE
Common facts and rights

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THE VOX INTERNET RESEARCH PROGRAM

Vox Internet is a scientific program of the Fondation Maison des Sciences de l'Homme in Paris, with support in 2004-05 from the French Ministry of Research. This program is part of a set of works dedicated to the relations between technologies and society, grouped together within TEMATIC, one of the programs of MSH-DEVAR (Diffusion, Expérimentation, Valorisation de la recherche).

Vox Internet took on the objective of providing support for and increasing the visibility of French and European research on the role of Internet in the building of "knowledge societies," a plural reality that encompasses and goes beyond the notions of information society and communication society.

A first seminar was dedicated to Internet governance, a subject brought to light by the current World Summit on the Information Society.

The present document constitutes the report established at the end of a series of sessions held from September 2004 to January 2005. It makes no claim to exhaustiveness on this complex research topic, often approached with bias due to the lack of a common interface for the applied disciplinary approaches and due to the abundant non-academic remarks made on the considered theme.

This document corresponds to a first experimental step in a work of identifying, deepening and discussing the issue. This work will continue in 2005 and beyond.

A web portal has been online since 30 June 2005 at the address www.voxinternet.fr. This portal will accompany and encourage the continued scientific studies.

During the first half of 2006, a second series of seminars will be held. The organization of an international colloquium is also being planned.

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VOX INTERNET SCIENTIFIC REPORT

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Introduction

Françoise Massit-Folléa

The context of the research

Insofar as information and communication technologies (or ICT), of which the Internet is the figurehead, are being promoted as the current motor for development, the challenges of every sort (political, economic, technical, social and cultural) founded on the nature, the functioning and the uses of the "network of networks" are considerable. At the current stage of its expansion, the Internet represents an "institutional laboratory"[1] of governance, a concept whose boundaries are uncertain, where public policies are confronted with constant technological innovations and with conflicts of interest and values between the State, civil society and the marketplace.

The initiative of a World Summit on the Information Society (WSIS)[2] was launched by the United Nations. The first phase unfolded in Geneva in December 2003. Internet governance was established as the first of three priorities (along with the funding of digital solidarity and notions of access and the right to communication) put on the agenda for the second session, which will be held in Tunis in November 2005. In accordance with the conclusions of the Geneva Summit, issued in a Declaration of Principles and an Action Plan, an ad hoc working group was created by the United Nations Secretariat. Its mission: to propose a *definition* of Internet governance before the meeting in Tunis, as well as an analysis of its conception, how it works and who it involves, resulting in *new solutions* in terms of efficiency, transparency and equity on the international level.[3]

Within the framework of the WSIS, Internet governance is an "orphaned" international challenge, heatedly disputed, whereas the stability and the potential of this socio-technical system are clearly not guaranteed. The questions raised by its governance fuels numerous analyses and controversies. They also constitute a new research field for a growing number of academic disciplines, from computer science to law, political science to sociology. In fact, it is important to sift through the scientific research to discern the current Internet paradigm, the balances of power that drive it, and the technological evolutions that are taking place.

However, on one hand, the scientific literature on the subject is massively North American in origin.[4] On the other hand, the legal dimension has until now been over-represented, notably as far as Anglo-Saxon law – *common law* – is concerned, to the detriment of Germano-Roman law. Other sources of normativity are missing too : the architectural elements of the network, market behavior and the reality of the socio-cultural practices of the users. French and European teams and researchers have been working on these topics for several years, but have lacked any true coordination or any good national and international visibility.

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[1] The phrase is borrowed from Eric Brousseau, professor of economics at University Paris X, co-moderator of the GDR TICS of the CNRS (Centre National de Recherche Scientifique).

[2] See http://www.itu.int/wsis.

[3] "It is asked, *inter alia*, to deal with the following issues:

- Develop a working definition of Internet Governance;
- Identify the public policy issues that are relevant to Internet Governance;
- Develop a common understanding of the respective roles and responsibilities of governments, existing international organizations and other forums as well as the private sector and civil society from both developing and developed countries" (see www.wgig.org).

[4] As shown in the CNRS Scientific Action Report drawn up in 2003 by Meryem Marzouki and Cécile Méadel, entitled "De l'organisation des nouveaux collectifs à l'organisation de la cité : gouvernance politique et gouvernement technique" (see http://www.csi.ensmp.fr).

The debates on Internet governance have long been focused on ICANN,[5] a private association under California law that is linked only to the U.S. Government and that goes well beyond its "technical" mandate of managing IP (Internet Protocol) addresses and domain names. But the scheduled rise of "mass" uses of the Internet raises the issue of a "common good" that goes beyond the existing instruments of regulation and mobilizes conceptual oppositions (public/private, freedom/security, free/taxed, innovation/stability, cooperation/property, identity and locality/virtuality and globalization).

The Vox Internet research project was initiated informally among specialists from different backgrounds during encounters at Autrans (January 2004) and a seminar at the École des Mines (12 February 2004). This project aims at producing new scientific results that are useful for the ongoing debates, casting light on the conditions needed to keep the open character of this valuable instrument of knowledge and exchange known as the Internet.

The state of the questions

When both "the Internet" and "governance" must be defined, there are many proposals, sometimes contradictory, sometimes complementary. In both cases, a "narrow" definition comes in opposition to a "broad" definition.

The Internet, as communication technology, owes its absolute specificity to the protocol TCP/IP, which allows machines to communicate with one another regardless of the network they belong to: it is therefore a language of interconnection, a pure code, a convention that is universally accepted by simple consensus. For some, we must stick to this definition. Others add to this language the "grammar" that is constituted of the sectorial names enabling IP addresses (expressed as numbers, via domain names written in letters and preceded by a period, and sub-domains preceding country codes or generic names) to be memorized. These basic technical resources are managed by ICANN, but for recent years, an ever larger number of connections have no longer been using the Domain Name System.

To these three mentioned elements, the "physical" layer must be added, which is that of the infrastructures: telecommunications were, and remain, the main route for digital signals to be transmitted, but they are nowadays competing against cable, Hertzian, satellite or even power grids. The routers and servers, managed by public or private entities, are found at the core for the former, at the extremities for the latter, of these different networks that transmit information cut into "packets" of bits in a random but effective manner.

Next comes the layer of the software "applications," which make the users more or less forget the technical architecture and reveal data exchanges through human/machine interfaces. These applications are sometimes "open-source," sometimes "proprietary." From this point, the contents of the Internet are elaborated, organized according to several functional modes (e-mail, the web, chat, peer-to-peer, etc.) and made available through intermediaries (service providers) in different devices (computers, but also PDAs, cellular phones, or even television). These contents sometimes come from the public sector, sometimes from the commercial sector, and very often they come from individuals or groups with a more or less long-term motivation. They are entertaining or educational, anecdotal or relevant, licit or illicit. Insofar as they circulate in defiance of temporal and spatial restrictions, a certain vertigo invests any attempt at defining the Internet. The initial technology seems so "versatile

[5] Internet Corporation for Assigned Names and Numbers, a private association under U.S. law in charge of the management of IP addresses and Internet domain names under the aegis of a Memorandum of Understanding with the Department of Commerce of the United States.

and ubiquitous" that the Internet becomes an entity, "not a thing, but an interconnection among people."[6] We have gone from a technical protocol to a political object.

The sharpness of the debates on Internet governance is explained in light of the preceding. Some limit Internet governance to "the management of basic technical resources" (addresses and domain names) but clash on the capacity and legitimacy of ICANN, a private American organism, to exert it. Most players, and in particular governments, are calling for a real internationalization of this management. Others care reinserting the duties of public policy into Internet governance – this is the position that the French authorities have defended since the beginning and that has slowly won out in the WSIS. They extend it to include the supervision of how the Internet works and of the contents it transmits. This option leads to a notion that is as extensive as it is poorly defined: the notion of "multi-partnership" (between the private sector, governments and civil society).

Within this framework, assorted with obligations of transparency and democratic inclusiveness, the project of Internet governance seems like a battlefield between diverging interests, at the crosswords of commerce and public policy, of geostrategy and values. To the point that it is sometimes hard to set a limit regarding global ICT policy, or even the temptations of "world governance," in its most futuristic political sense.

In the shadow of our work some recurrent questions lye: is the notion of Internet governance, such as it is being debated today, an adequate concept? What are its boundaries on a theoretical level? Who is calling for it and for what purpose? How can the stability of the socio-technical system be guaranteed without stifling innovation? On what basis can we imagine the international framework of coordination needed for the transparency and equity of the technical system, and also respectful of the different players' multiple sources of legitimacy?

For the Internet, the challenge is to envisage the passage from a de facto form of governance to a form of governance founded on the rule of law. More than defining the meaning of the generic expression "Internet governance," this implies defining what the players can, should and have the right to do, as well as their optimal level of coordination. Without being afraid to venture a few predictions, because the Internet as we know it today only represents a certain state of technology at a certain moment in its evolution.

One prerequisite is precise knowledge of the technical and economic framework of the policies of naming, addressing, normalization and data transmission. This study must be structured with an analysis of the competitions and synergies of the different players of the Internet, on one hand, and with Use studies, on the other hand, in order to discern a theoretical framework capable of establishing as principles the relationship between technological innovation and the development of democracy.

Organization of the program

The piloting committee

Director:

Françoise Massit-Folléa, professor and researcher in the sciences of information and communication at École Normale Supérieure of Literature and Human Sciences, adviser to the Department "New Technologies for Society" of the Ministry of Research[7]

[6] In Annette D. Beresford, "Foucault's Theory and the Deterrence of Internet's Fraud," *Administration & Society*, 35: 1 (2003), p. 88.

[7] The opinions expressed in this Report are solely those of the author; in no case should they be considered as representing the official position of her institution.

Members:

Cécile Méadel, researcher at the Centre de Sociologie de l'Innovation, École des Mines, Paris

Georges Châtillon, director of the graduate-level DESS program in Internet, public administration and corporate law at University of Paris I – Panthéon Sorbonne

Jean-Michel Cornu, engineer and scientific director of Fondation Internet Nouvelle Génération (FING)

Richard Delmas, Principal Administrator, European Commission's Information Society and Media Directorate-General (INFSO) / secretariat of ICANN's Governmental Advisory Committee[8]

Alain Moscowitz, engineer of the École des Mines de Paris, vice-president of the CECUA (Confederation of European Computer Users Associations)

Louis Pouzin, engineer of the École Polytechnique, project director for EUROLINC (European Languages Internet Conference)

Associate membres:

Marie-Anne Delahaut, Institut Jules-Destrée de Namur, ISOC-Wallonie

Amar Lakel, doctoral candidate in the sciences of information and communication, associate researcher at the CRIS, University of Paris X – Nanterre

A multidisciplinary approach involving many players

The approach chosen for studying Internet governance is resolutely multidisciplinary. Indeed, computer scientists and engineers are concerned by the design and deployment of new technical solutions in terms of network architecture and equipment. Legal experts and political scientists, by the new structuring of rights and public policy on an international scale, including European Union law. Economists, by the modes of allocating and regulating the basic resources and contents of the Internet (IP addresses, domain names, network infrastructures, intellectual and commercial property rights) and by the impact of their externalities. Sociologists and linguists, by the stakes for cultural and cognitive diversity. Philosophers, by the transformations of public space and subjectivity. Geographers, mathematicians and physicists, by the cartography and metrology of cyberspace.

Eight sessions of the seminar were held successively from September 2004 to January 2005. In what was conceived as the initial groundwork, it was impossible to deal with all the questions. Nevertheless, two wagers were made. First of all, not to limit the work to an audience of scientific researchers; secondly, for each theme selected according to the piloting committee's priorities, to associate the viewpoint of a company director or high-level civil servant to the academic approach. The themes were each chosen and introduced by a member of the piloting committee.

[8] The opinions expressed in this Report are solely those of the author; in no case should they be considered as representing the official position of his institution.

Schedule of the sessions

Session 1: The languages and cultures of the Internet

Presentation: **Richard Delmas**

Internationalization of the languages and technical protocols: the limits of normalization

Olivier Guillard, International Relations representative for AFNIC, administrator of ICANN's ccNSO (country code Names Support Organization)

The languages and cultures of the Internet: internationalization, localization, regionalization

Adel El Zaïm, administrator of the Research Centre for International Development – Canada, project manager for Connectivité Afrique, Cairo

Session 2: Users and consumers on the Internet: How to redefine supply and demand?

Presentation: **Cécile Méadal**

Online auctions, a new business model

Fabienne Weibel, legal team, eBay France

Peer-to-peer exchanges: regulation scenarios

Fabrice Rochelandet, assistant professor HDR in economics, ADIS laboratory, University Paris - South, Jean Monnet Faculty - Sceaux

Session 3: The economics of networks

Presentation: **Jean-Michel Cornu**

The infrastructures of the net-economy

Godefroy Dang N'Guyen, professor at ENST Brittany, head of the Department of Economics and Human Sciences, member of the Research Laboratory in Economics and Management I.C.I.

The inevitable pervasive network

Rafi Haladjian, Ozone

Session 4: Architecture of the Internet

Presentation: **Louis Pouzin**

The objectives of a new architecture

Kavé Salamatian, assistant professor at University Pierre and Marie Curie, member of the "Networks and performances" team, LIP6 (CNRS / Paris VI)

What transition strategies?

Jean-Michel Cornu

Session 5 : The Internet, the economy and economic theory

Presentation: Alain Moscowitz

Productivity and organization of exchanges

Philippe Lemoine, co-president of Galeries Lafayette Group, president of LASER, member of the Commission Nationale Informatique et Libertés

Economic theory faced with the Internet

Jacques Cremer, director of the Institut d'économie industrielle (IDEI), member of the Groupe de recherches en économie mathématique et quantitative (GREMAQ), University of Toulouse I

Session 6: The Internet, public good, private good, common good

Presentation: Richard Delmas

Public good, private good, common good: the economic approach and the legal approach

Marie-Claire Roger-Graux, instructor for the graduate-level DESS program in Internet, public administration and corporate law at University of Paris I – Panthéon-Sorbonne

General principles of Internet governance

Bernard Benhamou, delegate for forecasts and Internet governance, ADAE / Ministry of Foreign Affairs

The Internet and the questioning of national and international law

Georges Châtillon, director for the graduate-level DESS program in Internet, public administration and corporate law at University of Paris I – Panthéon-Sorbonne

Sessions 7 and 8 : Regulatory models and approaches to Internet governance

Presentation: Françoise Massit-Folléa

Governance and governability, an approach by Michel Foucault

Sylvain Meyet, researcher at the CEVIPOF – FNSP / CNRS

Oxford Internet Institute Studies on WSIS-WGIG and Spam Issues (research from the OII on the Working Group on Internet Governance of the WSIS and the question of spam)

Chris Marsden, associate researcher, Center for Socio-Legal Studies, Oxford University

Europe/United States: a comparative approach to regulating the Internet

Herbert Burkert, public law professor at the University of St. Gall, Switzerland, president of the Legal advisory board for DG INFSO, European Commission, Luxembourg

Co-regulation and European cooperation

Jean Gonié, moderator of the European Internet Co-regulation Network, Internet Rights Forum, Paris

Katia Bodard, Internet Rights Observatory Belgium, Vrije Universiteit Brussels

Guiding elements

Richard Delmas

The structure of the report

How the issue is dealt with

"At the genesis of great scientific undertakings one does not find a great metaphysical and generic desire for knowledge, but small wishes for truth concerned with the circumstantiated government of men." This phrase[9] pleasantly summarizes the ambition of the present work.

In our effort to mobilize the academic community around the challenges of the WSIS as a global reflection, involving many nations and parties, we began with a single observation: the need to regulate the Internet is generally accepted nowadays, but the viewpoints diverge with regard to the instruments, duties and objectives of this governance. A certain number of options are determinant for the future of the network: the status quo, beneficial for a small number of players? A change in the Internet paradigm resulting from laissez-faire alone? The possibility of international Internet "law" – like space law or maritime law? To start with, it was a question of looking at the ins and outs of these different options.

Our initial hypothesis is the following: the regimes, domains and mechanisms of Internet governance can only be analyzed and mastered using three types of normativity concordantly. Together with legal norms, it would be appropriate to include norms of technical architecture (which makes up the "language" or even the "law" of the network) and behavioral norms, the grounds for the acceptance or rejection of innovation. Old questions such as intellectual property, trademark rights, illicit or harmful contents, communications regimes, cultural diversity, economic externalities, but also the notion of sovereignty, are confronted with new challenges. New questions are raised, concerning for example the redefinition of public domain, digital identities, resolving disputes on domain names or multilingualism in the worldwide communication and information flow. All imply numerous weighty challenges: the Internet may or may not be a "common good," but in any case it is an essential resource for everyone, everywhere.

Therefore, our objective is to accompany, to broaden, or even to contradict or subvert the elements of the current debates and the search for solutions. Each session of the seminar had the goal of broaching the central issue by enquiring into:

- the existing and emerging uses of networks,
- the current stumbling blocks,
- the possible or desirable evolutions of the Internet as an international socio-technical system.

[9] This is excerpted from Frédéric Gros's remarks on Michel Foucault's works in the special feature dedicated to the philosopher in *Le Monde*, 19-20 September 2004.

The report outline

This report follows the order of the sessions of the seminar. Each chapter was written by the session moderator, a member of the piloting committee. The conclusion is a collaborative effort.

The Vox Internet seminar was proposed as an occasion to hone the different analyses and arguments that the participants (moderators, panelists and the public) could articulate in their respective professional contexts based on a vision of the Internet that would neither be rigidified by the current balance of power, nor shaped by unilateral references.

The organizational aspects – no call for contributions, invitation-only sessions leaving a large place to the debate between the approximately fifty regular participants, a final report enriched with their comments – give this report a rather unconventional appearance.

A volume of appendices presents contributions provided to supplement the sessions or to give reactions to the first draft of the report.

Distribution/publication

The report is primarily published online and is the cornerstone of a new project that began in June 2005: a Vox Internet bilingual web portal, dedicated to pursuing and furthering the experience of the first seminar.

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Chapter 1
The languages and cultures of the Internet

Richard Delmas

Introduction

The session of the Vox Internet seminar dedicated to the "languages and cultures of the Internet" asserted as its working hypothesis a two-fold opposition in the architecture and management modes of the Internet:
- On one hand, the opposition between the Internet presented as an infrastructure of networks, technologically neutral and open, but also centralized hierarchically around the unique pivots of routing and DNS (Domain Name System);
- On the other hand, the "web," said to be a communication system with countless cultural and societal effects, also open and free, supporting "peer-to-peer" applications. However, in the end, the content made available on this web comes within the competence of numerous systems regulating intellectual property and copyrights that are continually increasing their level of protection.

The crux of this opposition is also seen in the principles set forth by the organizations charged with managing the Internet, which present their role as that of technical coordination that under no circumstances should involve the regulations applied to the content itself.

Initially, it was also emphasized that the will to move towards a fairer, more united society via the use of digital networks is held back, due to the Internet's architecture and protocols, by a monolingual semantic hierarchy that is most often English-speaking. Therefore, there is an ambiguity in the representation of the overall "Internet" apparatus as having its own internal logic, as the system cannot be both subject to a technical centrality organized along a stable and conservative axis (DNS and routing) and the foundation of an infrastructure of knowledge and exchange, open and decentralized, constantly expanding.
After acknowledging the fact that, throughout the nineteenth and twentieth centuries, the need for centrality and for a series of international agreements guided the set-up of communication systems on an international scale (including river transport, maritime and rail transport, highways, the postal service, airspace, etc.), the subject of discussion turned at length to the advantages and the restrictions of current Internet management compared to a balanced multilateral approach. In fact, at the center of this question were the conditions and the set-up of a technical architecture for serving the values of the common good according to the cultures and languages in use throughout the world.

A quick survey of history listed the scientific and cultural classifications and collections that had been standardized, leading to the creation within the United Nations system of international normalization organisms such as the ISO (International Standardization Organization) or the ITU (International Telecommunications Union). A comparable example of the desire to classify human knowledge is found in the late-nineteenth century initiative by Belgians Henri La Fontaine and Paul Otlet, who laid the foundation of international cooperation for a universal classification, the precursor to the web. Created for this purpose, The *Mundaneum*, housed in Mons (Belgium), preserves to this day the traces of this research.[10]

[10] See http://www.mundaneum.be/

The Internet as expression of tension between centrality and diversity

It was observed that the Internet was deployed outside of the ISO and ITU with the development and implementation of the IP protocols and DNS without any formal international consultation. However, a principle of centrality has been progressively constructed around the Internet Society (ISOC), the Internet Engineering Task Force (IETF) and the Internet Corporation for Assigned Names and Numbers (ICANN), in order to stabilize and manage a single registry, the DNS root. Furthermore, the existence of ICANN has allowed new rights to be created, namely the rights attached to domain names. These generate powerful interests and gains for sales and industry. The process developed by the World Intellectual Property Organization (WIPO) for resolving online disputes, known as the Uniform Domain-Name Dispute-Resolution Policy (UDRP), stabilized the system from a legal point of view by establishing arbitration procedures agreed upon by all parties.

However, the computers used today by peer-to-peer enthusiasts are more than half as powerful as the 500 largest computers in the world. Also, some observers believe that nearly 50% of the current traffic on the Internet takes place outside of the hierarchical DNS structure. Along with this strong tendency towards generalizing the distribution mode, we notice that the need to impose a single standard for achieving connectivity is much more a result of an obsolete ideal of technical centralization than a necessity in and of itself. Therefore, DNS as sole administrative hierarchy could be called into doubt from the point of view of metrological and semantic optimization.

Fundamentally, the unique corpus of English terms that make up the DNS registry (i.e., the Internet naming system) has had the result of presenting a distorted image of the cultures and languages of the world. This corpus brings about use restrictions that limit the basic rights of each individual, especially rights related to the freedom of information and communication. As Jacques Derrida emphasized concerning the impossibility of translating,[11] the proper noun, the name of the individual, the name of a country, nation or place, is not part of the language system and therefore is impossible to translate, even more so by binary code.

At this point, the central observation was that the changing models of the Internet and the web are moving towards a will for expansion on the societal and cultural levels in such a way as to call into question the current architecture. On one hand, there are groups and communities that increasingly manage their communication activities on the Internet according to a diagram that is open, reticular, rhizomic, multilingual, peer-to-peer. On the other hand, the historic actors, telecommunications carriers and IT service providers, are still trying to control access to the network and the web through new proprietary solutions for access and use, such as content indexes, web browsers and search engines.

Following the lines established by Olivier Guillard and Adel El Zaïm, the different possibilities of modifying the policy concerning multilingualism were discussed. This modification would intend to reconcile both the need for an international recognition of protocols in a globalized society of information and the importance of a local development able to address the direct concerns of the populations in question.
The debate then turned towards the restrictions on developing technical norms. As far as developing an international policy of normalization is concerned, there exists a tension

[11] "Des tours de Babel," in *L'art des confins, Mélanges offerts à Maurice de Gandillac* (Paris, PUF, 1985).

between innovation and the path of dependency. One example of this involves the possibility of changing keyboards:
"*The weight of past decisions must be taken into consideration; the economists of innovation are well aware of these restrictions. Twenty-five years ago, when the population was not very computerized, the RATP [the Paris public transport authority] tried to impose a new computer keyboard and it was a very big failure. The earliest technical objects have a weight that makes it difficult to change them afterwards.*"

Nevertheless, by definition, innovation means breaking with what exists. Thus results a tension proper to innovation, a "creative destruction" (Schumpeter) that can only be deployed by integrating itself into the existing socio-technical order (here, the works of Norbert Alter and Patrice Flichy, among others, are referred to).

An international normalization in the drafting stage

On the question of multilingualism on the Internet, we are in the nascent stages of development of protocols whose maturity and stability are not yet adequate for them to be recognized incontestably as international protocols.

Olivier Guillard emphasized that today we are still in a phase of very high instability in addressing. Within just one language, it can be observed that although the domain name is standardized, the URL *(uniform resource locator)* overall does not yet respect any norms and one very often encounters strange characters like "%20." Moreover, within the framework of IDN *(Internationalized Domain Names)*, country codes must still be typed using ASCII *(American Standard Code for Information Interchange)*. This requires switching keyboards while typing. The vast majority of software applications and servers have not yet gone beyond the Unicode stage.[12]

Quite recently, the deployment of standardized IDNs by IETF on the DNS level led to much protest, on the level of both sales practices and social customs brought on by the use of coding unsuited to local practices. ICANN had to issue a statement and start a public comment forum regarding the risks of confusion caused by search engines resolving IDNs and mixing up names with identical spellings. Homograph spoofing, or using certain characters or symbols to take advantage of the resemblance to a name, leads to excesses in litigation and fraud.[13]

There are hundreds, if not thousands, of homographs possible when using Unicode. An additional difficulty is reaching a consensus among the language community for a common script and set of characters. For instance, a proposal for a standardized code for Arabic was rejected because it did not include certain characters used commonly in North Africa.

Today, what is at stake is a global policy for integrating standards for multilingualism recognized by everyone. For Olivier Guillard, "The mechanism functions in a certain restricted context, but its general use still encounters numerous problems, not only technical but also legal. Therefore, there is a series of problems when going from the national to the international level, to which is added the question of interoperability."

Indeed, the grammar of the global Internet has been implemented since the 1990s using the DNS system, which until recently did not allow accented characters, scripts or ideograms to be registered. The Internet naming space was therefore restricted to a strict ASCII 7-bit coding, perfected for the English language, containing neither accented

[12] For more information, see for example http://www.unicode.org/cldr/
[13] See http://www.icann.org/announcements/announcement-23feb05.htm

characters nor characters specific to one language.[14] Moreover, the choice of the first-level domain names was based on English-language mnemonic roots in a limited list (.com, .net, .int, .org, .bizz, .pro, .info, .edu, .gov, .museum, etc.), intended to roughly classify the whole of human activities on the Internet.

Today, the best experts cast doubt on the solutions implemented on the DNS level for extending the international system of domain names (IDN).[15] Several initiatives are trying to go beyond these limitations to introduce true multilingualism on the Internet, such as the French *Eurolinc* model or the *Netpia* service deployed in Korea.[16]

However, aside from the technical difficulties in implementing the Unicode protocols, part of the current and future deadlock comes from the confusion between the meaning of the word "language" in the various ways it is used with regard to the Internet. The term language can refer to human language, scripts and glyphs, keyboards, transcription tables, translation rules, etc. To this list might be added the semantic ambiguity that results in different coexisting meanings for a single ideogram, depending on the culture and population in question: Chinese ideograms in China or abroad, Korean, Vietnamese, Japanese, etc. Therefore, for the IDN system to function, it is absolutely necessary to begin by identifying and agreeing upon the reference source and the coding tables for the type of language and script used, as well as the decision-making authority. To many, this task seems insurmountable.

To summarize, it seems that the path is wide open for exploring new forms of hierarchy, directories, yellow pages and other ways of classifying the activity on the Internet. This is a challenge that goes well beyond just the technical specifications of an infrastructure network and entails numerous consequences.

The Internet, a help or hindrance to intercultural and linguistic exchange?

All the world's languages are not at the same stage with regard to the degree that they are handled by information technology. Different actions can affect different languages in a certain order according to needs: a language that is handled in norms and standards may be lacking in software development, whereas another language may have experimental software applications but still need assistance in developing more content and services.

The presence of a language on the Internet

Adel El Zaïm presented an experimental framework for handling languages in ICT (See the Appendix to this chapter). This is a working tool for arranging proposed actions for the purpose of covering a wider range of needs and areas.

This document develops research perspectives along several axes:
(a) The basis of a localized development program lies entirely with the existence of a language recognized by the technology norms and protocols.

[14] On ASCII code, see the *Encyclopédie Informatique Libre*: http://www.commentcamarche.net/base/ascii.php3
[15] See the works of John Klensin and James Seng, for example: http://ws.edu.isoc.org/workshops/2004/ICANN-KL/
[16] See www.eurolinc.org and www.netpia.com.

Louis Pouzin summarized the concrete challenges: "The first problem area is to always handle the technology question. For instance, the problem of the Arabic language basically exists if there are no Arabic characters, no Arabic keyboard, if there is no software able to transmit these Arabic characters. This is the first problem area, the alphabet as basis for the language, without getting involved in the enormous reflection on language and culture. Today, quite concretely, the Internet belongs to those who understand English and, to a lesser extent, to those who belong to the set of languages that use the Latin alphabet. For 80% of humanity, the Latin alphabet produces no meaning at all. If we wish to include on a global level the societies in their diversity, the infrastructures must be able to transmit languages in their own alphabet. Equipment, software and services that can use all available languages in complete transparency. Language is based on a community, 80% of all communication takes place within a community, regardless of geographic location. Excluding users from the Internet because their language is not accessible means excluding them from all communicational exchanges."

(b) Languages alone are not enough: there is an entire communications infrastructure that must be localized in order to enable each individual to use the information superhighway.

"As a first step standards can be developed, but then we must be sure that these standards become part of the development of software, of applications, of hardware… (probably) we have enough standards nowadays, let's focus on developing applications, on the entire material chain," Adel El Zaïm added. Therefore, focusing on protocols must not block content policy, nor should it mask the question of the domination of English-speaking cultural products.

By way of a conclusion to this discussion, a case study was presented by Jean-Michel Cornu: "Let's get back to the problem of the interaction between infrastructure and society. About a decade ago, the Tuareg people were fighting, not for independence, but for schools and roads. Their cause advanced, since they got schools and a beginning of road infrastructure. Today, many children attend schools that are less than three days' travel from their homes. I was supposed to discuss the possibility of using Internet, of using Wiki, and especially Wikipedia, which is a platform for sharing knowledge that among other things has developed a textbook project. The Tuareg are of course very interested in this type of structure. But they have a problem; their language is Tamashek. And today, this language does not exist on the Internet, simply because it does not have a digital code. Therefore, an entire cultural system that could benefit from the information society is paralyzed. Of course, these schoolchildren do speak Arabic, French, etc. But the knowledge of their language is the foundation of the development of their autonomous cultural identity. They should not have to go through content transmitted in a language that is foreign to them and that risks changing the way they apprehend themselves."

Local language(s) and global knowledge-based society

Another aspect of the discussion involved the place of national research in the global context of knowledge and growth. In a context of increased interdependence, a nation's place greatly depends on its capacity to support the development of its local research. Nevertheless, international exchanges rely on the dominant languages and cultures (primarily Anglo-Saxon). A dilemma exists between the desire to develop one's own culture and knowledge and the necessity of being fully integrated into the paths by which knowledge is spread internationally if one is to benefit from it. Beyond this dilemma, if priority is given to local research, a policy of investment in research and a determinate involvement by the State are imperative if the level of research is to be maintained.

Adel El Zaïm tells the experience of one Arabic-speaking country in these terms: "Syria decided to arabize all of its scientific production twenty or thirty years ago. A Syrian professor who wishes nowadays to travel abroad realizes quickly that he is ten or fifteen years behind on the questions he is studying. The problem is not the Arabization of the culture, but in the knowledge economy of the countries involved, if they choose to enter into a specific linguistic domain. Arabized Syria stopped producing knowledge at the beginning of the 1980s. There we see a problem of production and access to knowledge according to cultural spheres."

The chances of maintaining an adequate international level therefore seem slim if one is cut off from the major international languages of exchange. English, like the dollar, seems to have become the undisputed currency for the international exchange of knowledge. Developing one's own national or local language absolutely necessitates a larger investment in local knowledge, as well as a costly system of translation and importation of extra-local knowledge. But in a time when the largest investments are being made on the American continent, how relevant is such a choice? Or rather, what level of investment is needed in order not to be merely a satellite in the alliance of erudite nations? Two areas for reflection are to be distinguished. On one hand, an international challenge faced by nations committed to developing their knowledge and asking themselves about the dilemma of an international language. And, on the other hand, the great majority of the population is excluded from accessing this global knowledge because it is limited to its own language.

According to Louis Pouzin, "The question of international languages, of one language that would allow each individual to communicate with everyone, is a utopian project that does not have much meaning. Certainly, there exist a few languages that have this status; today, English, and tomorrow it will maybe be Chinese. So there are indeed two points of view: That of international knowledge, which relies on these languages and which concerns very few people or very specific practices. And that of the local language, which concerns most practices. The vast majority of the population is concerned by local communication, within the framework of the community. Does this challenge not merit being placed at the forefront?

Nevertheless, the relationship between the international knowledge economy and the internal circulation of knowledge cannot be so clearly discerned since the relationship between the two spaces is so interdependent. "Translation" (not reduced to its strictly linguistic sense) appears without a doubt as one of the major challenges of multiculturalism.[17]

Multilingualism and levels of normalization

The current development of protocols does not appear to take into consideration local specificities. Out of numerous failures, shortcomings and divisions, there seem to emerge current power stakes involving the normalization of languages, for commercial reasons among others. As Adel El Zaïm reminds us, "IDN is also a sales strategy for those who sell domain names; by greatly increasing the possibilities, the market of potential resources is also greatly increased. The domain name is after all a limited resource that begs the question of the extension of this economy. Today this first wave is stopped because it poses enormous problems of interoperability."

The risks that these standards might spark off an international battle or a form of ghettoization were also emphasized during the discussion: "One of the challenges of

[17] See, among others, the Franco-Canadian TRANSLATIO project: http://translatio.ens.fr/

infrastructure governance is perhaps establishing a set of ever more complex standards that keep ever greater numbers of people from gaining access to a free exchange of information. Rather than placing myself in a position where I want absolutely to be able to adopt the standards and infrastructures of communication from my specific point of view, from my cultural point of view, I prefer a position where each culture asks to participate in the rebuilding of a common infrastructure, by having a say in the drafting of universal standards. This means drafting a system of collective and common signs in a veritable democratic co-construction."

In place of an internationalization of governance by standards, we could suggest an incremental development from the local to the global level, which would assure an acknowledgement of the user's concerns at the closest level, while still assuring a common standard. As Olivier Guillard indicates, the process is complex in the absence of coordination and a precise work plan: "The only path is a path towards international normalization, but shouldn't international normalization within the framework of local issues be thought out on the local level? This would then be both a local co-production and an international recognition. It is indeed a question of decentralizing decision-making according to its zone of influence. For in fact, normalizing on the global level leads to very strong restrictions and depressions and makes it difficult to work out satisfactory solutions for the local actors."

Hence the envisaged opportunity to organize a migration of the current system towards technical gateways and versions of references and identifiers enhanced on the continental, national, regional and local levels.

Adjacent paths are open, such as the possibility of creating an interlanguage for identifiers and references on the Internet. Taking the example of archeological reconstructions, where it cannot be claimed that one scientific interpretation is the only truth, Kim Veltman, for example, thinks that with meta-data and dense classifications on the web (such as the MIME system), access could be given to various interpretations and structures of digital applications that would enrich the content made available online.[18] In many respects, a new moment in the evolution of the Internet has thus become necessary.

Conclusion: diverse rights and uses, universal principles

At the end of these reflections, it is confirmed that the dialectal process of technical infrastructure as the bedrock of the political and social space must be explored through multi-disciplinary research. Throughout history, cities and territories, but also invasions and the conquest of peoples, have been shaped by the means of exchange and spread by languages. Today, the media and the virtual organize our mental landscapes. Within this process, the Internet is the figure of the global synchronization that calls forth, as Peter Sloterdijk says, "A routine of expansion… that produces globes." There are nevertheless cracks in this global representation: the great majority of States that compose the current international community are not yet forty years old and did not exist when the Universal Declaration of Human Rights was adopted in 1948. Yet the populations of China, Brazil, India and, more generally, the developing world already make up the majority of Internet users.

Thus, the need to think in a fixed manner about the stakes of linguistic and cultural recognition has been raised. Recognizing local specificities involves first and foremost a survey of the spatial, temporal and social framework of a policy of multilingual

[18] For Professor Kim Veltman's work, see:
http://www.mmi.unimaas.nl/people/veltman.html

development. A new stratum is emerging in the issues surrounding the Internet: that of the size of the population, of covered cultural spheres. The new variable is making the questions of public policy more complex: deciding the legal status of a minority language, integrating a large part of the population.

The second variable is of a spatial, or more precisely geographic, nature. It is important to invest in research on the geographic distribution of the flow of communication.[19] A mapping approach closer to human and strategic geography would allow for a better understanding of the core of the issue at the international scale. Furthermore, inside one sphere, there exists a social differentiation that works as a cultural differentiation determining customs. Shouldn't a reflection on the question of languages and cultures in the knowledge society have the users and their particularities as its starting point?

While establishing a consensus on the knowledge society as a shared process of learning and a pluralistic reality, the role and place of languages in the world cannot be ignored. We realize that some very important languages are still excluded. What can be said then of the thousands of African and Asian languages that run the risk of becoming even more marginalized?

The World Summit on the Information Society (WSIS) opened the way to new developments with the Internet through its Declaration of Principles and Action Plan approved in Geneva in December 2003. Article 4 of the Declaration of Principles reaffirms what is said in Article 19 of the Universal Declaration of Human Rights: "That everyone has the right to freedom of opinion and expression; […] and to seek, receive and impart information and ideas through any media and regardless of frontiers. […] Everyone, everywhere should have the opportunity to participate and no one should be excluded from the benefits the Information Society offers." Part 8 of the Declaration of Principles and Part C8 of the Action Plan are specifically dedicated to cultural diversity and identity, linguistic diversity and local content.[20]

On the European level, in the Charter of Fundamental Rights of the European Union, an integral part of the new Constitution, several principles have to do with the access and use of information infrastructures like the Internet: Article 8 on the protection of personal data, the freedom of thought, conscience and religion, expression and information; Article 34 on access to services of general economic interest; Article 36 on the protection of consumers.

Finally, it is appropriate to emphasize that the weight of the Internet on the naming of the subjects and objects of the world is worth analyzing and mastering. Our identity, our name and our image, the activities of each of us individually and collectively, are all our own. The names identified in digital space are indeed the attributes of the person and of each group, the guarantee of its rights and freedoms, and not simply free marks of exchange and enrichment. The power to name, in one's own language, on the Internet, should be fair and shared.

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[19] Certain paths have been explored. See, for France, the work *Mesures de l'Internet*, Eric Guichard (ed.), Les Canadiens en Europe/INRIA, Paris, 2004 and for the United Kingdom, the work led by Martin Dodge at University College in London: http://www.cybergeography.org

[20] Following the 2001 adoption of the Universal Declaration on Cultural Diversity, UNESCO is currently drafting a "Convention on the protection of cultural contents and artistic expressions." See www.unesco.org.

To this end, the skills of French researchers can be supported in a certain number of areas that are determinant for the future of Internet technology and its uses:

- Works on internationally normalizing the different protocols and coding of natural languages (UNICODE [ISO 10646, UCS], HTML, XML, etc.). Analysis of the correlations and complementarities between the codes IETF, ISO and W3C with regard to identifiers and indexes on the Internet;
- Works on the ergonomics of terminals in terms of the available scripts and keyboards, as well as learning how to use the appropriate software and computer tools;
- Cartography works and "cyber-geography" of the Internet associated, insofar as possible, with metrology and measures of traffic. The graphs relative to the Internet necessitate cross-analyses across several disciplines (geography, mathematics, statistics, economics, etc.);
- Works on computational linguistics and computer-assisted translation. These works should be combined with those on terminology, indexing and classifying computer resources. The research projects on the semantic web and meta-data should be a useful complement to these approaches.

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Appendix: Proposal of an operational framework for handling multilingualism

Beneficiaries	Areas	Actions
Countries Legislators Workgroups and international organizations	4- Policy, strategy and legislation This area can be seen as running parallel to all the others. There is a need for policies and strategies at all levels.	Intervention at the highest level: ICANN, Working Group on Internet Governance of the WSIS, other national and international commissions, committees and groups Assisting countries in developing policies and strategies on the national and regional levels Assisting organizations in civil society to exercise the necessary pressure on politicians and decision-makers, commenting on the policies proposed, and taking part in drafting them
Users	**3- Content and services** - Using the software developed in section 2 - Demonstrating software and its uses - Encouraging content production and promotion - Increasing the amount of content and number of local services on the web	Creating, diffusing and promoting Translation Training and special actions on the production of content and services, on preserving cultural heritage Demonstrating the possibilities and creating service pilots
Users Content and service developers Content and service distributors	**2.a- Software applications** - Access: web, search tools (crawlers, search engines, etc.) - Communication: email, URLs - Transfer: IDN, URLs, etc. - Producing and managing content and services: CMS	Surveying (what really exists) Promoting, distributing what exists Developing, testing, distributing, promoting, using new software applications for local languages

	- Archiving and indexing content - Translating: automated and human - Language software: analyzers, grammar references, corpus, etc. **2.b- Equipment and input/output devices** - Keyboards - Printers - Information-access machines - Appliances, etc.	Prioritizing certain languages for their symbolic value, the potential number of users, the potential for innovation, etc. Software training
Experts and specialists Organizations (ISO, Unicode, etc.) Governments Software companies, developers of norms and freeware	**1- Norms and standards** - Development - Implementation - Distribution/diffusion - Adoption/promotion (Unicode, algorithms for processing speech synthesis, speech recognition, text analysis, etc.)	Surveying and analyzing needs Information on what exists, what is available, being developed for handling languages, what is feasible and what is not Funding for projects in certain sectors of norms, standards, etc., for the languages and regions in priority

Chapter 2
Users and consumers on the Internet: redefining supply and demand?

Cécile Méadel

Introduction

How does the Internet redefine, or is it capable of redefining the relations between supply and demand, user and service, within a commercial or non-commercial framework? The question here is to test the hypothesis that certain Internet systems lead or can lead to a modification in the way that the relations between supply and demand are established, from the earliest phases of design of these systems through the eventual use of an object or a service.

To answer these two questions, two field studies were chosen; these are two innovative applications from a technical point of view, one not belonging to the commercial sector and the other yes: peer-to-peer (P2P) and online auctions, focusing in particular on the highly developed case of the services proposed by the leader in this domain, eBay. The two systems define themselves as intermediaries because their objective is to bring the supplier and the demander together, without getting involved in questions of content. The entire system is supposed to organize the meeting between the two parties and optimize their satisfaction. Hence these are intermediaries that do indeed modify the traditional chain of the circulation of goods and services, or even their production, by shortening it in some cases, or lengthening it sometimes. This circuit of goods and services is modified following completion of a large work of interface design that, in return, modifies the identity of the products exchanged: the goods no longer have any predefined price and are valued according to the desire of the other users of the service. The contents are defined by the quality of the users' connections, the number of people downloading simultaneously, the critiques that come with the content, etc.

This modification in the chain of intermediaries can allow individualized relationships between the supplier and the demander to develop by leaving a wide autonomy to both parties. On this subject, we will notice the inadequacy of the notion of interactivity insofar as this notion refers to systems where the returns on demand are largely defined by the needs of the supply. On the contrary, for certain Internet applications, and especially the two applications studied here in detail, we see a veritable co-construction of the exchange.

The two systems have in common a narrow capacity of following what their users or clients propose, the capacity of technology and the modification in the different actors' competences; developing the services proposed by transforming them; reaching a very wide audience. Both are part of a highly equipped universe, where they are in competition with established systems, the recording industry on one hand, auction houses and merchants on the other. Of course, one does spark a debate that has only helped the other to flourish, since the professionals specialized in second-hand goods have now become active users of these online sales venues, whereas for the time being the major recording labels are merely using the legal system to fight against P2P.

The question of price alone would not be enough to make these two applications impossible to compare: economists have showed for a long time that auctions are not strictly guided by prices and that a number of elements have an effect on the transaction. As

for P2P, the hypothesis can also be made that the transactions do not take place only because they are free. Its users do not exhibit purely opportunistic behavior, as economists define it; the monetary value of the good is not the only thing at stake. They are susceptible to the form of communication used: the exchange.

The two systems function using sophisticated applications that are constantly being transformed, following a model of use that is nevertheless very simple and accessible. These systems are extremely simple insofar as they allow very different kinds of users to take part: from the expert, skilled at mastering all the complexities of the exchange, down to the ignoramus who just wants to sell something without knowing anything about the platform or how the exchange is organized. Thus there are two "markets" that function and format their supply by very close interaction with the demand, each with its role of mediator, but the process is different: eBay exists only through its mediation interface, whereas P2P develops by removing the intermediaries, emphasizing only the exchange platforms.

Without going further in comparing a company that has grown to international status and a technological system designed collaboratively, decentralized, non-appropriable and made available in a series of different platforms, we will nevertheless make the hypothesis that, by deciding to present these two very distinct services together, certain questions can be asked to each of them, and these questions would allow the stakes of the mutation of uses on the Internet to be explored more deeply:

- On the systems that allow supply and demand to be adapted: How does the intermediary collect information on use and consumption, and what forms does this information take?
- On the formats of possible uses: Which models of consumers/users and which types of learning are called for? Which possibilities are open, what are the rigid points of the system, can these systems be misappropriated? What implicit competences are expected or necessary?
- On the forms of distribution and advertising of the systems: How do these systems win over new consumers/users? How is confidence in the intermediary built? With what type of contract (implicit or explicit)?
- On the possibilities for controlling or regulating these activities, via the technical architecture, the acquired or established uses, the law, the economy, etc.: How are conflicts resolved? Is there intervention by a third party and if so, in what cases?

Of course, a single seminar session was not enough to sketch an answer to these questions, but it did in part shift or deepen them.[21] Two guest speakers introduced the discussion:

- Fabienne Weibel, lawyer and member of the eBay legal team;
- Fabrice Rochelandet, assistant professor of economics at University of Paris XI-Orsay, member of the ADIS laboratory (Analyzes of social and industrial dynamics).

[21] It must be emphasized that the summary presented here is the sole responsibility of the session's organizer.

Online auctions with eBay

Description

In France, eBay opened in September 2000 and today employs forty people.[22] There are currently 114 million users in the world and 3.5 million "unique visitors " per month in France, equal to 18.5% of the households with Internet access. eBay does not intervene in the transactions and does not participate in the payment process; everything takes place between the buyer and seller. eBay supervises the transaction through a set of rules or incentives (for example, photos of objects are often requested, the confidence system, insurance on small purchases, automated bidding, etc.); the intermediary aims at guaranteeing its growth by increasing the reliability of the service through a series of guides: the User Agreement (which mentions the applicable legislation and rules according to the type of object), guides for learning how to buy and sell effectively. The company specifies that it is not an auction house; it does not verify the authenticity of the goods, nor does it intervene in fixing the prices. On the other hand, eBay charges a Final Value Fee, or commission, on each transaction.

eBay's strategic resource is its community of buyers and sellers, because this is the very basis for its activity (and for the web site); the auction site must both reach sufficient critical mass in terms of the number of objects being sold and attract enough potential buyers so that sellers will continue to supply the site with items. A wide range of techniques, promotional tools, advertising tools, etc., is deployed to assist the "community" and purposely mixes together buyers and sellers, in order to help this community to live and grow:

- An eBay "university" that allows buyers and sellers to meet;
- Discussion Boards to follow current events in the community;
- The possibility of corresponding with any member of the community (for example, to ask a seller's past clients if they had any problems with him);
- A Feedback Forum where each member, whether a buyer or a seller, both gives and receives feedback;
- A client service that allows users to point out any problems (a system resembling Community Watch) and a protection program for buyers that reimburses them for small transactions (under 200 euros, or about $250) in case of problems, which encourages the parties to complete their transaction via the web site (beyond this sum, the parties are urged to use an e-solicitor service, which is not specific to eBay);
- A Resolution Center dedicated to solving disagreements and encouraging mediation "to make communication between buyers and sellers easier";
- The Verified Rights Owner program, or VeRO, for copyright holders who believe that an ad violates their rights;
- etc.

eBay makes money from the seller, who pays both insertion fees and a commission on the transaction, if the object is sold. These fees depend on the value (initial and final) of the object and its category. "Professionals" (those who also sell off-line) do not have any additional special fees to pay.

[22] Literature on online auctions is abundant, especially in the field of economics. For example, see the works of David Lucking-Reiley, "Auctions on the internet: what's being auctioned and how?" *The Journal of Industrial Economics*, 2000, XLVIII, 3, pp. 227-52.

The online auction service is typically a matter of confidence: how can you believe that the person who bought your object with a simple mouse click and who is only known by an email address will stick to his commitment and send the payment? Conversely, how can you agree to send a check to an unknown seller who assures you that, once he has received the money, he will send you the object? The two parties' positions are not symmetrical: the risk run by the seller is only an opportunity risk, whereas the buyer risks losing money. Thus the guarantees provided on sides are also asymmetrical: the seller must be registered with eBay, which verifies his identity and physical address, whereas the buyer only provides an email address. Therefore, the service itself is indeed what produces the confidence and guarantees the exchange.

Control is ensured by each trading partner's reputation, which is in the hands of the community - in other words, in the hands of each buyer or seller who has dealt with him. Therefore, the Feedback Score of a particular trading partner is so important that some people hesitate to trade with users who have no Feedback Score, asking them to offer additional guarantees (likewise, those who have only conducted a few transactions are reputed to be less reliable). Complaints about bad behavior lower the score of that particular user, which can have damaging effects for his future transactions. He has the right to respond, and this response will be displayed underneath the negative opinion, but he still may suffer consequences. On the contrary, users leave a written trace of their complaints and could also be designated as "risky trading partners" if they have numerous negative or contested judgments. Each user's history can thus be retraced by anyone using the service: what he has bought, what he has sold, the feedback he has given and received.

Questions on this model:

The company's temporary or indefinite suspension of a user (for example, after the protection program has been implemented) raises questions of respect for consumer rights: Who guarantees these rights? What are the possible forms of recourse? What visibility does the consumer have on the system of progressive forms of punishment the company has established? Even scoring among users can be questioned.

The intermediary company falls under the status of a hoster for classified advertisements and is not subject to commercial law. Is this status of hoster adequate for performing this activity on the Internet?

Peer-to-peer

The stakes

Economists' interest in peer-to-peer goes back to the lawsuit filed against Napster, which pushed them to think about piracy, copyright violations, and threats to intellectual property. Then, other reflections raised even more interesting questions on the economy of networks. The stakes are three-fold:

- Explain how P2P works: Beyond the numerous technical systems, how can these networks be characterized?
- Can viable economic models be designed? Two problems are emerging. The first, unique to how P2P networks function, is perhaps in the process of being resolved: How can "free riding" and other non-cooperative behavior be eliminated? The second, more structural, concerns the economic effects on the content industry: Is eliminating these practices desirable? Does this use – piracy – in fact play a determinant role in the distribution crisis facing the major labels today?

- How should optimal regulation be designed? Should intellectual property rights be reinforced? What is the role of ISPs[23]? Are usage taxes, parafiscal taxes, etc., needed?

Some characteristics of peer-to-peer networks

P2P existed well before Napster: since 1981, in fact, and the creation of Usenet. This system is widely anchored in the mindset of computer scientists. The technique shot ahead in 1999 with the success of Napster, which in one year went from thirty users to 25 million.

In their current forms, the networks constitute a technology system enabling a community of users to share not only digital products, but also other resources such as data processing capability or digital storage space. P2P is not a client/server model, but rather a number of applications that enable exchanges between interconnected machines. The networks can be differentiated according to two criteria:

- The type of resources being shared: These can be copyrighted works but also data processing capabilities, professional information (NextPage), long-distance project collaboration, anti-spam systems (which allow spam to be neutralized rather quickly), data storage or archiving, legal content distribution, etc.; in short, very diversified applications;
- Their architecture: With or without a central server; proprietary software (like Kazaa) or open-source (eDonkey); models allowing opportunistic behavior or requiring voluntary participation by everyone; stored contents or, more and more common, circulating content, which poses even more problems with respect to intellectual property. This is a field with a high rate of innovation.

The cost of P2P is not equally divided. Some professional users may find it worthwhile because they save on bandwidth by passing the transmission costs on to their users. At the same time, P2P represents a substantial cost for others, in particular for ISPs and operators whose bandwidth is both blocked and in an inefficient way (traffic is unpredictable). Copyright holders also claim that P2P is costly for them. The benefits can be direct or indirect.

Several questions are broached:

- What is the nature of the goods circulating via P2P?

P2P cannot be assimilated to a collective service for two reasons. On one hand, a user can be excluded from it. On the other hand, the roles of supplier and demander are mixed.

- How can uncooperative behavior among users be managed?

Transfers between users are not monetary and the resources used are immaterial and temporal. Users are not faced with any budgetary restrictions, but rather with the maximum time they wish to dedicate to the network. The behavior of those who never contribute makes the network less worthwhile, slows downloads and could have dangerous "disincentive" effects on the network's other members. This "free-riding" is not a small proportion (on Gnutella, it has been calculated that 70% of all users only consume resources without contributing anything); the free-rider has access to all the resources without supporting the costs (i.e., the highly unlikely risk of being caught). How can this uncooperative behavior be eliminated? In theory, pricing systems or reputation-based

[23] Internet Service Providers

models can be devised to tax the polluters (the individuals have a score, the higher their score, the more they can download).

- How can the users' cooperation be explained, since the probability of being caught free-riding is low or even null?

In fact, cooperation can be rational: if it is in one's interest that this technology grows, when the shared cost is quite low (for example, at the workplace), or if one shares the community's values, especially P2P's values of cooperation. Cooperation can be differentiated, with some who always cooperate and others, more opportunistic, who only contribute when they wish to benefit from the system.

- Lastly, how can the legitimate interests of copyright holders and the users' interests be reconciled?

Copyright holders may also have some interest in P2P's survival. But how can collective systems be built on a private basis? P2P could also be conceived as a way to promote entertainment.

These questions must also be asked with respect to the development of the physical communications networks. These networks, in the hands of telecommunications operators, already favor certain kinds of uses, and in particular asymmetric exchanges, which use less bandwidth, are less complex and more easily controlled. However, the distribution of bandwidth is not (or will probably be less and less) a scarce resource and the regulations considered must take into account the extraordinarily rapid evolution of network capacity.

In conclusion, we see that P2P casts doubt upon the chain of intermediaries and therefore the building of markets in all their components. We are forced to recognize that to date, no consensus has been found concerning the diagnosis or the means that should be deployed. This is equally true in the practical field as in the field of economics.[24] Lawsuits signal the failure of earlier attempts at regulation. Rather significantly, in the current indecisiveness the public powers are falling back on rather weak instruments such as pedagogy (explaining to schoolchildren that downloading is wrong; it is easy to see why ISPs turn this suggestion to their advantage) or advertising (with testimonials by a few artists).

What routes should be explored in terms of regulating P2P?

One solution would be prohibition. This is not very realistic, if only because of the number of people involved and the lack of consensus on the question, but should nevertheless be mentioned as the extreme position promulgated by certain parties. It would mean deploying a series of legal and technical restrictions aimed at dismantling this exchange model. A policy of prohibition would aim to marginalize P2P by associating it

[24] The bibliography is vast; we would cite, among others, elements on the recent debate that took place in France: Olivier Bomsel's report (with collaboration from Jérémie Charbonnel, Gilles Le Blanc and Abakar Zakaria) entitled "Enjeux économiques de contenu"; Study conducted as part of the "Contango" project, funded by the RIAM and piloted by the CNC, Cerna, 2004 (http://www.cerna.ensmp.fr/prog/fr01_publication.html); the response of Marc Bourreau, Michel Gensollen, Laurent Gille and Nicolas Curien, published on www.fing.org/index.php?num=4864,2; we could also cite *La Société de l'information*, a report by the Conseil d'analyse économique, Nicolas Curien and Pierre-Alain Muet, La Documentation française, Paris, 2004 (http://www.ladocumentationfrancaise.fr/brp/notices/044000180.shtml), Elie Cohen's comments following this report, and an article by Pierre-Noël Giraud published in *Le Monde*, "Un spectre hante le capitalisme, la gratuité", 6 May 2004.

with criminal behavior. This is the purpose of the lawsuits filed by the recording industry in early 2005.

Other means have been envisaged:

- An upload tax. Aside from the problems of legality and deployment, this tax seems rather unsuited to the architecture of exchanges on the Internet; such a proposal is mostly interesting due to its strategic character, insofar as it has allowed the different parties to express their viewpoints;
- Compensation through taxation. The French Government was considering taxing the revenues of ISPs. This tax would be passed on to subscribers. But what is the legality of such a tax that associates P2P with pollution?
- Compensation models based on a give-and-take system. The artists make a gift in kind and, in return, users decide on the payment that they are willing to offer (this model has worked in the case of open-source software that grew from voluntary and free exchanges);
- Laissez-faire. Applying a quasi-Darwinist approach, it would be considered that we are in a period of destructive innovation. If the intermediary role played by the major labels is no longer suitable, these labels will become extinct. Or they will be forced to innovate. The State should not get involved; it should not support them artificially through subsidies if they are not suited to their environment. Numerous evolutions are considered: repositioning the major labels on other cultural goods, transforming the production chain, a shortage of mass contents or the production of small series suited to niche markets, enriching the products, etc.
- Subsidies. In this case, should the public policies exert their influence on the Internet or on the content producers?
- New applications that would reshuffle the cards by offering new billable services?

A few lessons to draw from the debates

If we focus on the possibility of regulating through the courts, what is the legality of a law that contradicts behavioral norms? Whether we make the hypothesis that Internet pirates are aware of the unethical nature of their acts or whether we suppose a certain ignorance on their part changes nothing in the fact that such a wide-spread practice cannot simply be restricted by a technical system or a legal text if the reality of the phenomenon is neglected.

- The situations differ according to the country, the conception of copyrights, the media coverage given to the problem by record producers, the availability of broadband and the courts' jurisprudence…
- Users' behavior should not be seen as purely opportunistic; P2P offers them a means to go beyond the purchasing and consumption of cultural goods. These users build a more fluid relationship with the cultural good (the product is defined by the circulation that affects and characterizes it – its source, the hands it passes through, the number of people interested in it…) that is also less "object-oriented" (consumption is certainly not the unique end to downloading).
- Users' behavior is differentiated and plural, mixing herd behavior that targets mass consumption and dominance (as demonstrated by the ranking tools proposed by P2P software) with specific community or individualistic uses (demonstrated by highly specialized exchange platforms).

The community component of P2P exchanges is central and therefore must be taken into account by regulators. Research work is needed on the uses of P2P and on their

cooperative format, based not only on the content, but also on the technical platforms, the exchange formats and the types of users. More globally, it can be said that any regulation of P2P that stops with intellectual property rights or, worse, penalizes P2P users, would miss the more general evolution of the content industry, which is faced with the splintering of markets and their growing complexity, greater and greater segmentation with a multiplication of genres, labels, targets, etc. This could be analyzed as a form of substitution in consumption: the collapse of certain markets segments (records) and the appearance or explosion of others (such as the second-hand market). There still remain to be explored new markets that take into account the specifics of uses, but that also propose new options, enriched services, differentiated formats of consumption, while respecting the legitimate interests of the different parties.

The lesson that can be drawn from a brief look at history is that the answer cannot be fully technological or fully judicial. Instead, the answer will structure these two aspects with a dimension of innovation in terms of economic models and the supply of goods and services. The economy of the sector will be redefined, along with its legal aspects.

For their part, the online auction activities are not attracting any particular attention from the public policies due to the current absence of controversy or marked conflict, along with a prosperous economic context. We would nevertheless expect that the questions of consumers' rights and the protection of personal privacy would both be clarified. The dominant model of the market leader should not obscure the variety of situations. Again, case studies need to be carried out, focusing on an exploration of the different online sales platforms.

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Chapter 3

The economics of networks

Jean-Michel Cornu

Introduction

In order to understand the different issues affecting the economics of networks, we need to situate ourselves within the large periods that punctuate the short history of the Internet. Each of these phases has had its own issues and has forced telecom operators to call into question their role. We will speak quickly about the beginnings of the Internet as a network built between research centers and about its expansion phase, using primarily the Public Switched Telephone Network as its medium. We will then examine in more detail the current phase of building a high-speed global network dedicated to the Internet, basing our analysis on Godefroy Dang N'Guyen's presentation. Finally, with Rafi Haladjian's contribution, an entirely new phase will be mentioned, still to come: pervasive networks.

The Internet's underlying infrastructures are set up and maintained by operators who either sell access to the network directly or lease this capacity to other Internet Service Providers (ISPs). To understand the current situation, one must focus on the different phases of the infrastructure of the Internet.

An already distant past

The university phase

At the very beginning, the Internet was reserved to academics and a few large companies that could finance their own infrastructures to link their institutions to the rest of the Internet (primarily via leased lines). At this time, the Internet was made up of networks of users' networks. During this first period, the financial means necessary for becoming part of the network excluded individuals and reserved access to universities, research laboratories and companies.

Access via telephone modem

In the 1990s, the "network of networks" grew primarily by using the Public Switched Telephone Network (PSTN). Internet access occurred through the intermediary of ISPs. These ISPs connected their access equipment (as well as equipment for authentication and billing) to the Internet network on one end and to the telephone network on the other. It then became possible to access the Internet from any place connected to the telephone network, without any additional equipment other than a simple modem plugged into the computer and the telephone network.

Although this change extended Internet access to most people, it had several consequences:

- Internet data was transferred across a network designed for speech using a binary modulation of 0s and 1s. The transfer speed was limited, however. Technological

evolution enabled this speed to reach a (theoretical) 56 Kbps. Companies that needed higher transfer speed continued to use specialized links as long as the advantages of accessing the network quickly and securely outweighed the additional costs.

- In almost all countries, the network allowing most people to access the Internet belonged to a single operator in a monopoly situation, before deregulation (effective in Europe from 1st January 1998) allowed new operators to introduce competition, first for long-distance links. The "last mile," which links the telephone network to the end user, has only been open to competitors for a short time.
- ISPs became the intermediaries between users and the Internet, thus creating a multi-level network: the users were connected to the ISPs, which were linked together through Global Internet eXchange points (GIX).
- The exponential increase in the number of Internet users created some difficulties, for example, a shortage of available addresses. This led to a two-tier Internet: those who had one of these valuable permanent addresses could be reached at any moment (this is a necessary condition for a server, for instance), while the vast majority of users only had temporary addresses, which changed with each connection.
- Differentiation among ISPs was low because their services, first reserved to their own clientele (as was the case for the online services of AOL, Compuserve or MSN in the beginning), were being made available more and more often to the entire community of Internet users, due to pressure exerted by content providers and stand-alone service providers.

The arrival of broadband

The limited capacities of the CTN made it necessary to set up a network truly dedicated to data transfer. We can break the current architecture of the network down into three large layers that each have not only their own issues, but also their own time scales:

- backbones and network cores
- distribution networks
- local loops

Backbones, network cores and ruinous competition

At the very top of the hierarchy, backbones and network cores were deployed at an extraordinary speed during the "Internet bubble." There was a very powerful phenomenon of anticipation regarding network capacity. These networks were primarily financed by the financial bubble and its mechanisms. During this period, operators anticipated that traffic would explode and therefore invested massively in backbone infrastructure. It was a race with the idea that the one who could mobilize the sufficient financial capacity quickly enough would have a greater chance of winning the competitive battle. With the support of the financial community and a certain number of industrials who found this inflation of network capacity to be in their own interest, backbone managers were able to install a very high-speed fiber optic network quite quickly. Today, we have excess capacity in terms of speed at the backbone level.

In this highly speculative market, the excess capacity, accelerated by the anticipation of risks and confronted with a demand that did not increase as was expected, set off a commercial war and a very fast drop in prices, leaving only a few large operators on the

different levels of the network hierarchy. This phenomenon, known as "ruinous competition," is found in highly speculative markets. Under these circumstances, the actors do not include their fixed costs when setting their prices (in particular the amortization of their investments), but only their variable costs. In so doing, they hope to gain a large market share that will allow them eventually to reinvest in their infrastructures. However, to make such a strategy profitable in the long term, one must be able to guarantee the longevity of the acquired market share. This is not the case in the world of the Internet because long-term contracts are extremely rare.

One solution would have been to develop complete offers from the backbone to the end user. But the time scales of the different types of network are highly variable. Their development cycles are extremely different and this desynchronization generates great financial risks. ISPs, whether operators or not, are a fragile business model. The cost of changing providers is rather low for the end user, whereas the fixed costs of the ISP are high.[25] This situation does not facilitate long-term strategies and ISPs tend to focus on locations that have good connectivity. The digital revolution therefore may worsen the territorial divide once Internet infrastructures begin adopting the new broadband paradigm.

Distribution networks, the intermediate level

A distribution network links the backbone to the local loop that reaches the end user. Distribution networks are therefore at the juncture of the two issues. Until recently, the distribution networks and most local loops (with the exception of certain specialized links) belonged to the historic operator. The distribution network was the first to be opened up to competition, before the local loop. Wishing to control their network, alternative operators extended their network cores down to the level of the telephone commutator. Quite recently, local authorities grasped the strategic value of developing high-speed distribution networks. If operators have a vertical view of their network, starting with backbones and network cores at the top and going down distribution networks and local loops to reach the end user, local authorities have a more horizontal view. Thus we have recently seen the emergence of municipal, departmental or regional networks, each proposing transport services for any operator or ISP interested.

The problem faced by distribution networks is therefore halfway between the ruinous competition that threatens backbones because the supply is far superior to the demand, and the difficulties of extending broadband to all subscribers, with incentives from national and local governments.

The "last mile" issue

Increasing the user's available bit rate made it necessary to stop using the telephone signal for data transfer. This does not mean that the telephone line running into most households is no longer useful for Internet access. With a few adaptations, the same telephone line can be used to transmit a second signal dedicated to broadband data transfer (xDSL technology, the best-known form of which is ADSL, requires two modems: one for the subscriber and one located in the telephone exchange). To be viable, this solution requires new equipment (DSLAMs) to be installed at the exchange and above all the subscriber must not be located too far from the telephone exchange (typically less than 3 km) to prevent the

[25] Godefroy Dang N'guyen and Thierry Pénard, "La gratuité à la croisée des nouveaux modèles d'affaires sur internet" in *Réseaux* no. 124, FT R&D / Hermès - Lavoisier, 2004

weakening of the signal from reducing the bit rate to that of a simple 56 Kbps modem. In other words, even if all the exchanges in France were equipped, a percentage of the French population would still not have high-speed access. However, other alternative technologies have been developed, including satellite access, wireless networks or access via power lines.

Competition exists between the different operators that had developed networks for gathering data in the earlier phase. To keep the arrival of broadband from cutting the country in two (those who can and those who cannot have access to broadband), the main challenge surrounds what telecommunications operators call the "last mile" (or local loop), and what more and more local authorities and users' associations call the "first mile," reflecting a bottom-up view.

A two-speed Internet?

Real determination is required to bring broadband access to the most remote locations because the returns on investments in distribution networks and local loops are not short-term. This determination could come from several actors:

- France Telecom has launched a one billion euro investment plan to "bring broadband to France." Increased competition has forced the historic operator to stay ahead, even if this means only turning a profit on these new infrastructures in the long term.
- Local authorities are seeking mutualization, or sharing the expense of setting up local infrastructures by means of the new levers provided by the recent Law for Confidence in the Digital Economy (*Loi pour la Confiance dans l'Économie Numérique*, or LCEN). Indeed, in the past local governments could only become involved in the implementation of passive infrastructures, and had to turn over their operation to a single operator. The new law also allows a local government to fund the active devices that enable "virtual sharing" of the network among the different local operators.

Developing these new infrastructures for broadband most often requires resources to be mutualized among the various operators. Setting up an average departmental distribution network represents an investment of 60 million euros, plus an annual operating budget of three or four million euros to be shared among the various operators… or to be supported by a single participant if there is no mutualization.

Which architectural model?

The process of mutualization has allowed new architectural models to be implemented. These models have economic impacts for the operators:

- Metropolitan Information Exchanges (MIXs) enable local traffic (which represents 80% of all traffic) not to be rerouted through a GIX if it comes from different operators.
- Neutral networks are managed by a neutral operator that agrees not to provide any services. The other operators are simply interconnected on the periphery of the network to offer competitive services (Internet, telephone, television). This allows them to share new prospective clients without any initial investment.
- The different models authorized in the LCEN (delegating public service, forming public-private partnerships, etc.) facilitate private investment by providing public guarantees. In return, local authorities remain in control (on neutrality, rates and the field of action). The operator who obtains a public service delegation is nevertheless in

competition because other operators could choose to set up their own networks (contrary to other types of networks with public service delegation, such as water).

Which economic models?

The diversity of time scales between the different types of networks poses problems of economic viability for both operators and ISPs.

The billing system used by broadband networks is mainly a set fee for unlimited access. This set fee must fund the networks' large hardware investments. The economics of services (discussed in Chapter 5) also has an impact on the economics of networks. There exists a hierarchy: the services (above IP layer) finance the development of the networks (below IP layer), the investments of which are financed by the operators or nowadays by the local authorities. But the economic models are made complex by the very slow take-off of micropayment on the Internet and by the difficulty of measuring, at an acceptable cost, the collective use and traffic generated with the "tribe" model. No model should be excluded from the outset because each may or may not prove to be relevant, depending on a number of variables. The operators and ISPs are placing their hopes on an increase in the demand for bandwidth, mainly due to the development of sound and video, rather than on an extension of broadband access into areas that are not yet covered; such an extension would require additional investments at a time when the previous investments have not yet been paid back.

The rise of broadband (and permanent Internet connections) has had great consequences on the economy of those involved in infrastructures. The limitations of the voice telephone network and the need to create a new network reaching the end user have made the invention of new models necessary and pushed for legislative change. The available bit rate should continue to grow. The last *Comité Interministériel à l'Aménagement du Territoire* set an objective for the year 2007 of 2 Mbps at home in the cities, 100 Mbps in the two thousand economic activity zones in France and at least three access points for small towns.

The next phase?

But the history of technology does not stop there. Faster Internet access and the permanent connection are not the only changes that affect the network infrastructures.

The arrival of "smart, communicating objects"

Since 2002, the number of micro-controllers (the chips that make up a complete tiny computer and enable the creation of "smart" objects) is higher than the number of human beings on the planet. At the same time, the arrival of "smart" RFID (Radio Frequency Identification) tags in 2004 has allowed objects to be enriched with communication features at a very low price. The fusion of these two approaches should lead to a strong growth in "smart, communicating objects." The Internet, which is today mainly centered around exchanges between people using computerized means (including asynchronous exchanges, as on the web), should quickly be completed by exchanges between people and objects and especially by exchanges among objects.

The history of computer science shows that we have gone from a model in which each computer had several users to the personal computer model, and now today to a model in which each user has several "smart" units. However, even if users are already surrounded by "smart" objects in their cars and daily life, they continue to think in a way inherited from the personal computer era.

Objects have different needs than computers

To apply the image used by Rafi Haladjian, the user today is surrounded by an "archipelago" of objects and not by a network of objects. Just as the Internet allowed computers to no longer be isolated and made them the cells of an information ecosystem, there now appears a new kind of network that allows this archipelago of objects to no longer be isolated, to be linked together. In this case, we speak of "pervasive networks."

The arrival of objects should have as much effect on the network structure as the last phase did, when available bit rate had to go beyond that of the existing telephone network. Objects do not need much available bit rate to be able to "communicate" with one another (but this is not necessarily true in the case of communication between people and objects). However, the object must be accessible from anywhere without a wire connection. In this case, wireless networks are interesting less for the mobility they allow than for the global coverage they provide, allowing the object to be constantly connected to the network, no matter where it is located.

The pervasive network

A pervasive network is a network that functions anywhere and at any time. Such a network must be agnostic: in other words, it is not up to a operator to decide what kinds of object will be connected. In a pervasive network, it is up to the ecosystem of uses, in a quasi-Darwinian model, to determine the objects that will be used, as well as their types of use. To enable the very large number of objects surrounding us to be connected, the pervasive network must not cost very much, must function on the basis of a set fee and must have enough bandwidth to transport the information of our "Personal Area Network" (PAN).

Under these conditions, the operator's role changes once again. In such a network, the connection must take place as transparently as possible. It would be impossible to manage a subscription and a specific configuration for each one of our objects. What's more, the operator's value lies not only with the connection service, but also with filtering links in order to ensure the privacy of certain links between the objects of a PAN. It is not a question of choosing one technology that is better than the others (for example, choosing between Wi-Fi and UMTS), but of being able to choose the best technology at the right time.

The first Wi-Fi pervasive networks

Nevertheless, the Wi-Fi wireless network technology inspires a real fascination. According to the pioneers in pervasive networks, these networks can be set up so simply that users themselves can create access networks. Today, for very little money, it is possible to connect a house to the neighbor's house across the street. There is a real "freshness" in users adopting this model easily in a sincere desire to take part in building the network. This is a return to the philosophy of the early days of the Internet, when users themselves were building the network to interconnect. However, Wi-Fi is not a comprehensive technical solution for pervasive networks. It was invented with the extremely modest ambition of linking peripheral devices together in a local network inside a building. But everyone has been taking this easy-to-use technology and using it to build both community networks and "tribes." This enthusiasm has been so intense that everyone has "got on Wi-Fi." The economy of scale has permitted large cost decreases for the hardware. This is why the first pervasive networks are emerging in Wi-Fi, even if other

technologies (such as Zigbee or UWB) will no doubt soon appear. In its early days, the Internet was in a similar situation: it was a network of lower quality than the professional proprietary networks, but it won out because of its flexibility and because most people began using it.

Ambient intelligence

The notion of pervasive network leads to that of "ambient intelligence": from the moment when objects become "smart" and are permanently interconnected via a pervasive network, why not have them do something other than their initial purpose? All these "smart objects" could have addresses allowing them to be identified and to receive information so that they could broadcast alerts. Indeed, no matter how much bandwidth increases, the user's attention is irremediably limited.

Today, following the model proposed by the company Ozone, building a general pervasive network would permit all these "smart machines" to be interconnected, thereby opening up a communication sphere able to alert and inform at any time. Experiments are being conducted, including the Wi-Fi lamp made by the company Violet. This lamp transmits an SMS through a change in colors – this can be a message from a loved one or a rise in a company's stock price…

What economic models for pervasive networks?

The economic models of such wireless pervasive networks have yet to be invented. Each phase of the Internet has called into question the models used in previous phases without replacing them entirely. The technical architecture developed for the Internet has been able to adapt through the years with each change, despite radically different needs: going from a network of symmetric exchanges to a client/server network with the arrival of the web, a guaranteed bit rate across a best-effort IP network designed for voice, etc. New uses (peer-to-peer but also pervasive networks, etc.) mean new architectural challenges that are already being studied by laboratories.

However, will the regulations established for networks leave the necessary space for inventing new models that do not yet exist for the future phases of the Internet?

A few directions for further research

At the end of this description, it is clear that the knowledge society draws on infrastructures that the economy should enable to develop quickly without mortgaging the future. We are forced to observe that the earliest phases of the development of these networks represented a considerable innovative force. Today, we are confronted with two major challenges: enabling a network development that is not restricted by prior network architectures and opening this network up to the needs not only of people but also of objects.

Three directions could facilitate the emergence of broadband and pervasive networks:

- The architectural aspects, even more than the technologies, have an impact on the economics of networks. The decision-makers within local authorities have a major responsibility during the development phases of the network. It is important to cast light on the architectural debates and their stakes, in order to allow the public authorities to draft relevant actions for planning and development.

- Infrastructure set-up requires large investments that are made in a short time in a highly innovative context. New questions are raised by ruinous competition or the disparities in the profitability of developing different geographic areas. It is urgent to reflect on new economic models that would allow those involved to go along with these changes, while taking into consideration the problems posed by the quick obsolescence of the chosen solutions.
- Furthermore, the Internet is a marvelous example of an architecture that has been able to adapt to needs that were undefined in the beginning. Beyond simply taking users' needs into account, the network of networks has been able to give users the means to appropriate it and to shape it according to those needs. This "plasticity" of the network is a fundamental factor of the innovation in its uses. We need to understand what the criteria are that enable this flexibility in order to orient our future choices, not towards what seems *a priori* to be the best solution today, but rather towards the solution that will allow the network and the people who use it to adapt to a world that is continually evolving and innovating.

If Internet governance is to preserve the interests of those involved, it must not hold back the future. Even the regulatory modes must be innovative to meet this two-fold challenge: maintaining balance as well as possible while encouraging the development of innovations.

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Chapter 4
Architecture of the Internet

Louis Pouzin

Is the architecture of the Internet a technical imperative, or is it only a set of choices made among other possibilities? Are the political aims not subjacent to the technical choices? Has innovation made way for conservatism today? These are the underlying questions for the session of the seminar dedicated to this topic that network users, as well as regulators, know little about.

Architecture of the Internet: principles and development

The Internet is made up of tens of thousands of networks. Some are large networks, the size of a nation or continent, such as those that are managed by the historic telephone operators. Others are small networks, located in a city or a company. Still others are private, set up in a house, an exhibit or a meeting. The technologies used, the management modes and the uses are independent. Therefore one might think that no architecture of the Internet exists in global terms.

The notion of architecture depends in fact on the level of perception, whether we are talking about physical components, immaterial components or even the uses of the Internet. While physical components are geographically located, and largely independent, immaterial components (addresses, domain names, protocols) constitute an ensemble that ensures the interoperability of all networks.

The basic tool of interoperability is TCP-IP, a set of rules enabling two devices or applications to exchange data without loss or duplication. The data, regardless of its use or size, is cut into fragments called packets. These packets transit across the networks using a technique known as datagram. This consists in transmitting packets from one place to the next across the networks via switches (also known as routers) without predefining the path to be followed. Each datagram contains the address of its destination, which the routers use to transmit it in the right direction. The datagram technique was initially developed in the French Cyclades network – but the national operator (PTT) did not choose to use this technique at the time.

If the TCP-IP protocol enables reliable data exchange, it does not go any further. In order to offer users more complete services that better meet their needs, other protocols have been designed over the past three decades of the Internet's lifespan. Among the best known are email protocols (SMTP, MIME), file transfer protocol (FTP) and hypertext used for web pages (HTTP). However, hundreds of others exist for specific technical needs, for example, image transfer, videoconferencing, telephony, user authentication and securing transactions.

The Internet protocols are defined by technical committees open to anyone who speaks fluent English and has the necessary resources to take part in international meetings. These committees make up IETF (Internet Engineering Task Force). It can be noted that the protocols issued by IETF are not usually validated by international standardization organisms such as ISO (International Organization for Standardization) and ITU (International

Telecommunications Union). Due to the practical conditions required to participate in IETF, its activities are dominated by U.S. industry.

Common resources (a): addresses

Data transit across networks uses a destination address. This address must be unique for all networks. The protocol TCP-IP (initially in the IPv4 version) uses 32-bit addresses, with a maximum of around four billion available addresses. Addresses are allocated by ICANN (Internet Corporation for Assigned Names & Numbers), a U.S. organism controlled by the DOC (Department of Commerce). ICANN distributes addresses to RIRs (Regional Internet Registries), which distribute them to network operators, which in turn distribute them to ISPs (Internet Service Providers), etc.

In the past, these addresses were allocated on a first-come, first-serve basis, without concern for rationing. Today, about 80% of all allocated addresses are held by entities based in the United States. This results in a definite shortage elsewhere in the world. In Europe, a technical artifice known as NAT (Network Address Translation) is often used to compensate for this shortage. In short, the networks use private addresses internally and assign an Internet address temporarily for exchanges outside the network. These technical workarounds lead to additional costs and restrictions on use (no peer-to-peer traffic, for instance). For carriers and ISPs, legally required to keep a record of all communications, putting together these records across networks is problematic because of the lack of a unique identifier.

The Asian countries, notably China and Japan, were especially disadvantaged when these addresses were initially allocated and have opted for a determinate state policy: IPv6. Version 6 of TCP-IP, abbreviated IPv6, uses 128-bit addresses. Therefore, there is no shortage for the moment. These countries are developing networks exclusively in IPv6, which is simpler than the so-called dual-stack protocol (implementing both IPv4 and IPv6). It is therefore likely that in the not-so-distant future, the primary manufacturers of routers will no longer be the American Cisco, but Chinese, Japanese or Taiwanese.

Common resources (b): domain names

People do not usually use IP addresses to identify the recipient of an email or a web site, although this is in fact possible. From the very beginning, in 1972, alphabetic names were given to IP addresses because they were easier (at least in theory) to memorize and recognize. For about a decade, these names designated a server directly. Once the multiplication of servers and the absence of a naming organism made this unmanageable, a directory system called DNS (Domain Name System) was put in service around 1985. It is based on a strict hierarchy. A global directory, called the "root server," lists the addresses of the primary directories, which list the addresses of the secondary directories, and so on. The full server name is therefore the concatenation of the directory names at each level that a request must be routed through to reach an email address or web site (e.g., doris.med.campus.sfo.edu, or industrie.gouv.fr).

Each component of the name is called a domain. *.edu* and *.fr* are top-level domains, or TLDs, located nearly at the top of the hierarchy, just below the root.

However, datagram transmission across networks makes no use whatsoever of domain names, but only uses 32-bit IPv4 addresses. Therefore, the domain name must be replaced by an IP address to reach a correspondent. This is the role of the directory, called DNS, that web software and email software use systematically.

As anyone can see, there are no domain names in Greek, Arabic, Armenian or even French. Only the digits and letters of the English alphabet are currently authorized.[26]

Top-level domain names are created by ICANN. Country-code top-level domains (ccTLDs, including *.de*, *.fr*, *.uk*) are defined by an ISO norm. However, their presence in the directory requires approval from the U.S. Government. The latter can also decide to delete a ccTLD from the directory, as was once the case with Iraq.

Common resources (c): DNS roots

The root directory is managed by VeriSign, a U.S. firm under contract with the U.S. Department of Commerce. The same company also manages the *.com* domain name, which is the largest TLD in terms of the number of names. One of VeriSign's important shareholders is SAIC, a Pentagon satellite company.

The information in the root directory is replicated onto a certain number of mirror servers. These are intended to compensate for any disruptions in service. All the servers of the DNS directory are managed by a variety of institutions under contract with ICANN. Like the root directory, the secondary name servers also have mirrors.

This array of servers constitutes a geographically distributed system that is nevertheless subject to central control by VeriSign. It is easy to imagine processes that, with help from the DNS, would allow certain users' exchanges to be monitored and the information therein to be modified or misappropriated. This could explain the continued existence of this somewhat antiquated system.

The existence of a central root has always been presented by IETF and ICANN as an obvious necessity for the directory to function properly. On the contrary, we could bear in mind that another directory, the GSM (Global System for Mobiles), manages almost ten times as many users as the DNS. And whereas cellular phone users are highly mobile, Internet servers are stationary. Furthermore, GSM has no central root.

Internet architecture: innovation and immobility

If we define the Internet in a limited way as only the basic services (transmitting datagrams, email or files), not a single innovation has appeared in twenty-five years. IPv6 is not an innovation, for it is only an improvement on an existing protocol. There are notable innovations linked to the increase in technological performance and to the new uses that this sparks, but no innovation in architecture.[27]

The increase in bandwidth, by wire or radio, set off a series of uses including IP telephony and swapping music, video or movies. And this is only the beginning. The reproduction of 3D environments, already commonplace in simulation systems, should appear next. Mobility and ambient access (from anywhere) resemble a societal phenomenon, triggered mostly by the availability of high-performance, low-cost radio equipment (Wi-Fi, WIMAX).[28] The miniaturization of sensors of all sorts (motion, sound, image or odor) may lead to uses that are still somewhat primitive, but rich in potential – both beneficial and frightening.

These new uses, like multiplayer gaming, music swapping and communicating objects, do not even try to cast themselves into the existing protocols: they create their own

[26] See Chapter 1 above.

[27] See, among others, the works by Kavé Salamatian at LIP6, University of Paris VII.

[28] See the preceding chapter.

protocol architecture, outside IETF, using functions that are already available in older applications. This is a significant clue as to the lag between the needs perceived by the younger generation and the older generation, more concerned with preserving what has already been developed, what already exists, and at the same time its own power.

The freeze on architecture research, partly caused by the organization and the obstacles of standardization, is now being followed by a fast expansion in new uses within a Darwinian setting, more motivated by discovery than coherence. As at the beginning of the Internet, the doing comes before the thinking. This results in entire patches of the Internet resting fallow, especially since they require a rigorous reflection and generate conflicts of interests.

Thus the Internet remains an undiscovered country. At the very least, our knowledge of this global entity made up of thousands of networks is rudimentary. It requires a large research effort to observe, model and understand traffic phenomena. Without this effort, new services will pile up empirically, with no guarantee of quality.

Furthermore, the Internet is poorly protected. As in many other contexts, the Internet was developed without concern for security. The latter is handled after the fact by avoiding touching the foundations of an architecture that is certainly open, but overly so. The lax access controls and meager tracing tools lead to massively undesirable practices, such as spam. Security policies and secured services are hampered by the absence of protection mechanisms on the network level, or network fragment level. There again, lacking a serious research program, empiricism with all its faults and excesses will become the rule.

Lastly, the Internet is biased. The security shortfalls are only one example of a more general behavior. For diverse technical pretexts presented as unavoidable, the Internet carries a vision of the world and of society that fits with that of the United States. The laws, languages and customs of other countries are obstacles perceived as being unsuited to the Internet, which has a status close to that of the proverbial "sacred cow." An architecture that incorporated protection against intruders would have the effect of contradicting this mystique of globalization as a great leveling.

Transition strategies

One strategy, if we can call it that, is laissez-faire. This does not suit the spirit of the times. The WSIS (World Summit on the Information Society) revealed that the vast majority of States are determined to master the Internet as an essential tool for their development. Developing countries, or already-developed countries, are trying to redefine the global organization for Internet governance within the framework of the United Nations. The western countries would also like to increase their influence in the decision-making mechanisms of governance, without commenting for the time being on the desirable organizational form. Furthermore, most of them have launched national efforts to promote the Internet (infrastructures, uses, legislation).

If efforts on a national level do of course serve a purpose, multinational efforts are more appropriate in the field of research, especially if they target architectural evolutions on the Internet, as these do not have much impact from a strictly national viewpoint.

One field these days is that of economic models threatened by the Internet. The revenues of industries like the telephone or music evaporate when a substantial part of their

value chain tends towards zero. The effects can be rapid and brutal, with costly social and financial consequences. This problem is general and requires a multinational approach.[29]

In a field closer to technology, the market has a demand for security, quality service, traceability and accountability. On the international level, the European strategy can hardly be distinguished from laissez-faire. If research programs exist, the industrial effects are not yet present.[30] However, the market is already in search of solutions. If European industry does not respond right away, the orders will go to the United States, American firms will introduce their proprietary norms, and the cards will be dealt.

It is possible that the European Internet industry is "softer" than that of GSM or Galileo. This would be precisely the reason to help it to move forward through pilot system contracts carried out in cooperation with research laboratories. These research laboratories already have an internationally renowned quality.

But the European strategy seems very different. The following few examples demonstrate this:

- EAN (European Association for Numbering) signed a contract with VeriSign (cited above) in 2004 to manage RFID tags;
- The deployment of the domain *.eu*, announced as a trusted space, open to multilingualism, could have been, but was not, an excellent opportunity to demonstrate the existence of a European strategy;
- About sixty EU institutions have signed a contract for a DOI (Document Object Identifier) system with the British foundation IDF (International DOI Foundation). IDF was founded in 1998 to promote the DOI system, which is in fact a particular application of the Handle system, owned by a U.S. company, CNRI;
- mEDRA (Multilingual European DOI Registration Agency) is the new European DOI registrar accredited by IDF in July 2003. mEDRA is a project promoted in the European Commission's eContent program;
- Sometime around March 2005, the OECD signed a contract with TSO for digital identification numbers. TSO is the largest British editor in terms of the number of titles, and is the only DOI registrar in the UK.

Themes for research and pilot projects

The following is a summary of the points already mentioned above.

- Analysis, modeling, instrumentation of Internet traffic.
- Analysis and models of Internet routing.
- Security models: infrastructure, traffic, access, transactions, digital objects.
- Pilots of applications with communicating objects.
- Models and pilots of traceability architectures.

It goes without saying – although it is better to say it – that the tools or developments in the list above absolutely must use open-source software. Furthermore, they must be usable in all the languages of the European Union.

[29] See Chapters 2 and 3 above.

[30] See Louis Pouzin and Jean-Yves Gresser's contribution in the Appendix.

The legal questions related to the architecture of the Internet also need to be examined, but legal specialists would be in a better position to do so.

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Chapter 5
The Internet, the economy and economic theory

Alain Moscowitz

The issue at hand

In 1996, *Business Week* published one of the first articles about the "triumph of the new economy." Nevertheless, American Nobel Prize Winner Robert Solow raised the following paradox: " computers age could be seen every where except in the productivity statistics." In 1990, Paul Strassman had already shown that there was no real correlation between a company's productivity, its efficiency and the amount of its IT expenditure.
The impact of computers/computerization within companies can be broken down into three phases:

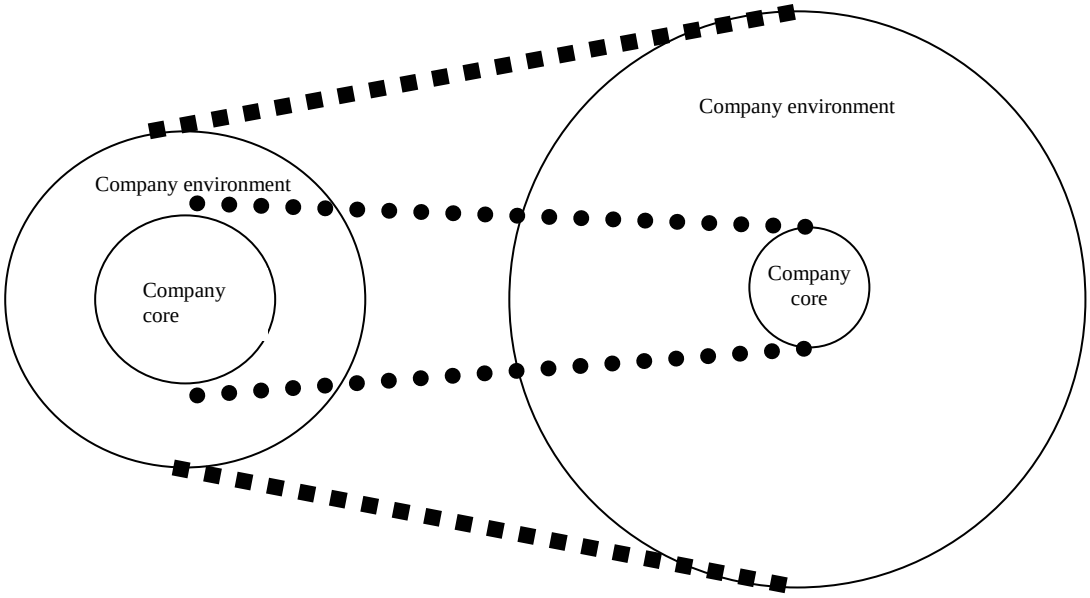
- 1960 – 1980: In a ratio of 1 computer for n users, the development of computers and calculators allows productivity gains in scientific calculation and tertiary activities. The concepts behind the earliest computers (Alan Turing's machine, Von Neumann's theory) allow human manpower to be replaced by machines, thus increasing human power tenfold through the speed of processing and storage. This use of information technology is similar to that of steam in the nineteenth century, which simplified the moving of objects by replacing human or animal traction.
- 1980 – 2000: The PC (Personal Computer) and the network PC births increases individual power tenfold. The individual capacities of memory and calculation of social and economic actors become almost unlimited. For example, a machine can beat the world's best chess player. Video games simulate virtual reality, notably with surprisingly realistic battle scenes. At the same time, companies rationalize their back-offices, notably by setting up ERP[31] and call centers.
- 2000 – …: With the birth and development of the web and especially the generalization of email (open to the whole world and no longer restricted to the enclosed space of the company), there is a real densification of exchanges. The principles of unity of time, place and action have disappeared, even though these principles were and are the basis not only of classical theatre but also of the work contract. The company expands in a global environment. The actors are numerous, from the era of the *shareholder* to the era of the *stakeholder* (or somebody with multiple stakes: shareholder, employee, member of civil society, regulator, etc.).

The developments that underlie ICT have been following Moore's Law for many years (meaning their capacity doubles every eighteen months). This impressive development lets us imagine a relation between the individual *homo sapiens* and his or her technical "computer" environment in a ratio of 1 to n, where n is almost infinite. Consequently, in just a few years, the Individual/Computer ratio has been inverted (from n to 1 towards 1 to n). Therefore, the issue has changed from managing scarcity to understanding abundance and using it adroitly. Now humankind, at the heart of the technical process, must apprehend its environment and the field of possibilities. This field of possibilities, as a result of new technological developments and notably nano-technology, is being broadened day by day. Nevertheless, and in parallel, certain invariables – cultural, sociological, learning processes, cybernetics – remain quite present.

Technological innovation is continuous, with its economic successes and failures

[31] Enterprise Resource Planning.

(electronic marketplaces, online auctions, P2P, among other examples[32]). The corporation has also evolved in interaction with its environment. The corporation becomes more powerful once it begins to interact on a wider, more global plane. ICT then become a means for action and for integration within the environment. The corporation's boundaries become blurred. And beyond, the modern corporation moves in a continuous context of competitive alliances with its partners/competitors; these alliances and confrontations are conditioned by the circumstances and markets. There are no oligopolies or monopolies, only alliances of circumstance. For example, isn't IBM one of the greatest defenders of free and opensource software in this beginning of the twenty-first century? It is being rediscovered that competition is not the only motor of the economy; cooperation also plays an enormous role.



The current debate is on the place of France and Europe in the world economy, in other words, productivity and competitiveness improvements along with sustainable development within a European social model. Reports and declarations come one after the other (Michel Camdessus, Wim Kok, the Lisbon Declaration, the PricewaterhouseCooper report[33]). Europe has an ambitious objective: to be the first-ranked power based on a knowledge society by 2010. This ambition, analyzed at the half-way point in Wim Kok's report, underlines the weight of ICT and research in economic and social development as well as what accompanies it.

Just a few years after the fall of the Berlin Wall and the end of the bipolar world, the bursting of the Internet bubble (the "immaterial balloon" popping) and the shock of 11 September 2001, it would seem that so-called "emerging" actors have grown powerful in the very realm of technological excellence (China, India, or even South Africa or Brazil). Isn't this the logical continuation of the phenomenon of power-building in Japan or among the Asian "tigers" a few years earlier, but this time with a force and effect of scale that has

[32] See Chapter 2 above.
[33] "Rethinking the European ICT Agenda" (2004), see www.pwc.org.

probably never been equaled, especially because of the geographic, historic, and demographic impact? The Internet has contributed to the globalization of exchanges (economic and non-economic). Retroactively, the globalization of exchanges has led to the development of the Internet and its success, following the old expression *self-fulfilling prophecy*. The growth in the past ten years has been stunning.

Therefore, reaching the objectives outlined in the Lisbon Declaration infers that the entire economy and all its players take action within this new context, which has been optimized on the global level with the near-instantaneous exchange of information. This context is also local insofar as the majority of physical economic exchanges occur locally. This is one of the fundamental challenges that must be resolved in the next few years and that can be summarized, in this field too, as "thinking globally, acting locally." For example, it so happens that today we have a surplus in long-distance telecommunications infrastructure (deployed in the expectation of a very high volume of interactive video exchanges), while the "last mile" linking up the end user is still inadequately equipped. The debates on degrouping, or even alternative or pervasive solutions, illustrate this global/local paradox rather well: the solution linking up the user economically can only be local.[34]

As for global economic objectives, it is a question of (re)positioning Europe on the world economic scene, so as to disprove the maxim "design in the U.S., manufacture in Asia (or in China), and consume in Europe."

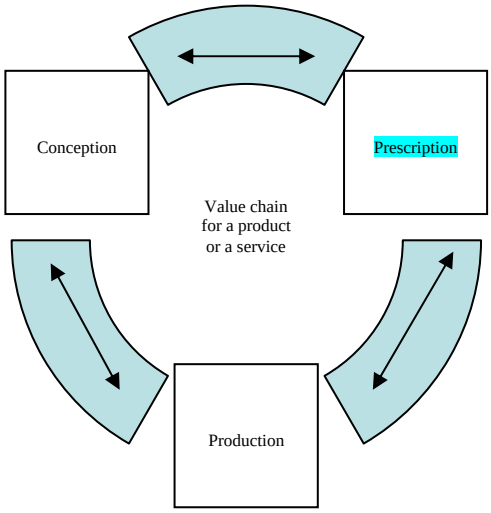
In the current context, are there still dominant players on all markets, or is anything possible for those who dare and know how to be enterprising? If the latter assertion is correct, what must we think of our European model and of the positions acquired with difficulty over the years? The concerns and the fears about outsourcing, whether in material or immaterial fields, are justifiable but also herald substantial opportunities for those who know how to seize upon them boldly. Hasn't the Cartesian way of thinking, based on considering actions disconnectedly, become a stumbling block for the adaptation that is needed? After implementing Taylor, would it not be the right moment to read Henri Fayol again?[35]

It has often been said that new developments in ICT make up a key positioning factor and catalyzer for growth and productivity gains. As a result, what are the perspectives for companies in a networked society and how can rigidity be overcome, or the socio-economic model be rethought, so as to bring progress and growth?

The analysis of the value chain and its segmentation into the notions of conception, prescriptions and production can offer a path for repositioning globally, enabling a few routes to be laid out. The prescription field is that of the interaction between use, user and consumer. It is by nature local, whereas the model is global.

[34] See Chapter 3 above.

[35] See Michel Weill, *Le management, la pensée, les concepts, les faits* (Armand Colin, 1994).



To conclude this introduction, we will suppose that Solow's Paradox lies in the coexistence of two worlds that are by nature contradictory and complementary:

- Atomic man, partaking in nature and part of nature. In this real world, nature and the economy are marked by the seal of scarcity (the economy of raw materials, Pareto efficiency, sustainable development…);
- Digital man, partaking in abundance where development results from cross-fertilization, complementarity and multi-disciplinarity. The transmitted information is enriched if it is (re)contextualized after transmission.

The Internet bubble gave the illusion that the virtual world had become the real world. Does economic and social development not come out of a capacity to develop synergies between these two worlds?

Towards an industrial, economic and social modernity

This approach was developed during the fifth session of the Vox Internet seminar by Philippe Lemoine, co-president of Galeries Lafayette and president of Laser (his words are quoted in italics). As a sort of introduction, he reminded us that it was necessary to radically avoid confusion between data transport infrastructures across an IP network and the web.

"It must be remembered that the web is a very minority use of the Internet, which we evaluate at about a third of all information circulating on the network, and whose eventual perspectives would be 10% to 12% of exchanges."

The center of gravity and the impact of ICT have progressively moved according to their development, first in production, then in management and today in communication and user services. As a result, the issue of the economic reflection surrounding IT has also moved.

"The reflection on productivity has reached a high level of maturity in the developed societies, but the reflection on exchange and on its organization is far from very enlightening and advanced within the circle of economic actors."

Development of the Internet and social modernity

The use of ICT in administering people and goods assumes *"a direct link between the development of the Internet, the developments of social usages and the issue of social modernity."*

The second phase of modernity, such as it has been theorized by authors like Ulrich Beck,[36] is marked by the erosion of institutional reasoning. Between a holistic reasoning, where elements are recognized in comparison to the whole, and an individualistic society that, all in all, is rather traditional, there are today equilibriums and evolutions that must be analyzed if we wish to understand the new ways of governance.
"All Internet governance takes part in this logic of institutional erosion and is used by the institutions themselves as a means to slowing down their own erosion."

The problem of identification appears as one of the great revealers of the use of ICT in society: the evolution in the management of names tends towards laxism and a growing de-institutionalization. Everything leads us to believe that the society and the State have only to take care of the administration of names as a system of identification. Yet to the contrary, the institution of identification of persons, thanks to the use of new ICT, is more and more solid and works on the basis of biometric identifiers that are extremely accurate and secure.
"There is a double movement both of certain social phenomena being de-institutionalized, which gives an impression of great freedom and social fluidity, and in parallel technical systems are becoming highly institutionalized, they are developing more and more precise powers in the administrative functions of a community."

A social pressure for the return of institutions

This reflection is inevitably accompanied by a question on law.

"We observe that the large public institutions, constantly afraid of seeming obsolete, have thrown themselves into a veritable legislative race by producing laws, quite often badly conceived ones, and often a compromise between politicians who wish to seem modern in their legislative function and lobbies that are directly concerned by the modification of the law according to their own interests. What is being done for copyrights and intellectual property in new legislation today is staggering."

Legislation and the power of the State were based on centralized Information System Architecture and on a centralized computer system, in which a few private firms and administrations issued regulations to set up extremely unwieldy and costly information systems. Authorities like the CNIL (the French *Commission Nationale de l'Informatique et des Libertés*), an independent administrative authority, were in contact with certain high-level persons with a background in an information economy based on major powers on the national level. This resulted in these authorities developing regulatory modes that are today out of step with the changes in the information society.

The explosion of networks allowed the number of micro-actors managing complex information systems to be multiplied. Therefore, a great uncertainty has been created, and this led to social pressure for more security. The complexity of the systems leads to an increase in the power of control and surveillance, and authorities such as the CNIL are unsettled both in their mission and in their powers. The explosion in smart, mobile interfaces leads to a potential for control and surveillance of the society and individuals. This appears, to say the least, problematic.

[36] *Pouvoir et contre-pouvoir à l'ère de la mondialisation* (Paris, Aubier, Collection Alto, 2003).

Applying ICT to measure the mutation of economic models

Innovation and the retention model for productivity gains

Here it is a question of developing an analysis of the information economy based on the question of exchange and strongly linked to the issues of organizational change.
"During the reflection on the Nora-Minc report, the CEGOS [French professional training organization] survey showed that the impact of IT on accountancy had led to an increase in the number of accountants. It was realized that the impact of the social power of accountancy within the organization had allowed the arrival of new technologies to be transformed into something very different from productivity, which would have reduced the amount of work and number of jobs. Somehow, on the macro-economic level, we have experienced the same thing."

As long as information systems were being developed without interacting with other fields, company strategy, traditionally oriented towards value retention, managed to use technical power to the companies' advantage, for their own growth. In more general terms, as long as information systems are not thought of as elements for organizational exchange, openness and integration, we will not experience a true "externality of productivity gains."

On the organizational level, the logic is rather similar. "This logic is the organizational basis for numerous economic, administrative and social sectors. Conversely, the French telecommunications industries preferred X25 to TCP/IP for a long time, simply because X25 ate up more bandwidth and therefore generated more consumption artificially. This is not at all in the logic of externalizing productivity through technology."

Reasoning on a social, economic and power basis must be considered if one is to understand the development of ICT inside organizations and its relation to productivity. A logic of value retention within an organization, so as to avoid a reduction in sales, is an attitude that is quite common – and to a certain degree, rational – in economic actors' strategies. There is a preference for investing the increased productivity into the R&D and marketing departments, responsible for continuously inventing new product features, in order to justify the stable sales price.

But this logic reaches its limits when innovation is purely a marketing artifice with no social interest. This is especially visible with brands such as Intel, for example, whose productivity increases according to Moore's Law, where we observe a continuous drop in processor prices but a proportional increase in the price of client loyalty. The development of "Intel Inside" marketing is a perfect example of a value retention strategy.
"This is the reasoning of the economic universe we were in at the end of the 1990s when new technologies were being deployed. The economic strategy clearly was not to redistribute productivity gains and therefore to develop ever more artificial strategies for client loyalty, having lost sight of the usefulness of the service or product."

We experienced an explosion in the reflection on the immaterial value of the brand and spent billions to hold onto this brand value, as well as its power to increase client fidelity.

Internet: a radical break in the economic model

With the development of Internet infrastructures, the economy is plunged into a logic of exchange, where value is indexed on the ability of goods and consumers to circulate. This heralds the end of closed distribution systems linking providers and clients in a chain that results in catching the end user. Today, we are in a network system where producers and clients communicate much more quickly, in an exchange market. This generates a model radically different from the traditional system of production chains.

At first, companies experienced growth allowing them to surpass their competitors' services of innovation and marketing by focusing on a very detailed study of their clientele, the expression of its needs, emerging uses. For example, detecting the need to save time, to simplify interfaces, to have information on offers and price comparisons... All these needs created new forms of intermediation. Consequently, there was upstream pressure, due to the growth of competitiveness and the development of services based on users' real needs. Doesn't this paradigm represent the deep structure of the development of a new economy?

The growth of intermediaries, who were able to unite phenomenal buying power, exerted upstream pressure to get part of the productivity gains of goods production and distribution. By concentrating demand and encouraging much faster asset rotation, the intermediaries developed radically different economic bases, giving economic actors incentives to abandon a strategy of information and value retention, to adopt much quicker adaptation strategies more in phase with market evolutions. By influencing the exchange economy and intermediation models, technology really forced private firms, and even societies, to enter into a race towards flexibility and adaptation.

A good example of this is the way Dell crushed the computer industry greats, on both the real and the financial markets. Pure brokering models were seen developing, where anyone could put a bid out on the market to get the product he or she was looking for. As the founder of Autobytel said, "The automobile industry is organized to sell a client a car that he doesn't want." We begin with a producer, which distributes its products to a number of captive dealers, who are charged with convincing a buyer that the vehicle is intended for him. The distribution model, due to the development of exchange, radically turns this reasoning around. We begin with the client's desire, distributed to all sellers, who are charged with acquiring the good from the best performing, most reactive suppliers. The winning product supplier is the one that, at the end of this chain, manages to answer the demand at the lowest cost and in the shortest delay.

Three paths for a renewal of economic analysis

The development of circulation

The criteria for reflection and analysis of economic development are destined to be modified. We must be interested not only in the productivity of work, but also in the sector's global productivity. What criterion should be used? The simplest criterion is the formula NE/CE (net earnings/capital employed). Increasing stock and asset rotation reduces the denominator and therefore increases the company's overall economic profitability. The benchmarking studies that are circulating are too often interested only in the margin.

Today, we observe an investment differential in ICT between the U.S. and Europe. We know that about 1.2 percentage points of growth are primarily linked to the use of ICT. The services of intermediation and exchange are indeed those that have enabled overall production gains. Wholesale, retail, the sale of airline tickets, tourism, etc. – these are at the heart of growth in the U.S. Two questions are derived from this:

- Which analytical model underlies this evolution?

- Which model of action should be observed?

In this regard, the Wal-Mart[37] model is one of the best performing and most useful to observe. The quality of service increases exponentially to allow for faster stock rotation, by accelerating client rotation. The clients must continuously increase in number and must return to the store as often as possible, so they need more and more reasons to return. Therefore they must be offered a range of services that enable them to be more and more loyal to the organization. Paradoxically, we observe that the arrival of new technologies has actually increased the number of employees on the sales floor, while indisputably enabling the company's overall productivity to increase.

The reactivity model, based on continuous reengineering

The reactivity factor is the heart of this new economy. The example of Dell and its director is quite characteristic in this regard. Beyond all doubt, the most essential property of this organizational model is curiosity. How can these new technologies be used and how can new services, new relationships with the user, be invented? Above all, this is a model based on computerized communication that must increase the circulation of information at the heart of the organization and accentuate the quick decision-making ability that is at the heart of environmental changes. This inclination towards the continuous reengineering of production systems is seldom, if ever, cited in European or French organizations.

The innovation model, based on the imagination

There exists a third model based on the degree of development of the entrepreneurial imagination, relying on ICT to network the actors.

"People invent P2P, radically different exchange modes such as eBay or Skype, that rely on an innovation model in services and on the networking of entrepreneurs. With eBay, or previously with General Magic and its smart agent, we have before us an entrepreneurial imagination based on intermediation, which opens new perspectives on exchanges and services. We are not in a knowledge economy but first and foremost in an imagination economy…"

What kind of investment and organization are needed to favor the development of experiments that result in new economic models, profitable in the medium or long term, but especially innovative? There are many examples, from the web to eBay, of highly imaginative ideas that have been completely unable to grow in Europe and have been developed mostly in the United States.

A theory of the knowledge economy is not without risk if it is translated into the French habit of applying research, scientific development and engineering to traditional production models.

"France is a country that tries to get rid of uncertainty, whereas this is the contrary of what should be done: imagining models for integrating innovation, for imagination and for transformation; integrating the disruptive capabilities of imagination and reorganization into the strengths of the organizations to accelerate reactivity and intermediation. A place for that is needed, as are topics and meeting modes that encourage the emergence of the unknown."

MIT (the Massachusetts Institute of Technology) is a well-known example of this. Its function as an incubator and catalyzer for encounters between the actors of research and the economy, along with administrative and political incentives, relies on the idea of a forum of the imagination where innovations can be exchanged and bubble forth well beyond the traditional boundaries. Teaching staff put their course and research materials

[37] The American hyper-store chain.

online for free, which allows these materials to be broadcast and the exchange of information to be maximized, so that they can attract interest and increase encounters. The very idea that knowledge and training have a value proportional to their free distribution and the multiplicity of connections is truly a shockwave in the knowledge economy as it is thought of in France and more generally in Europe.[38]

"The more actors and social worlds there are that can interconnect and exchange upstream, at the very moment when the imagination is working on innovation, the more we increase the possibility that knowledge objects will emerge that can lead to new economic objects and models."

The possibility of a forum for a plurality of actors to interact has always been the foundation for reliable innovations that can be transformed into concrete economic innovations. It is not a matter of simply transferring knowledge or patents, but of really interconnecting imaginative energies, fictions that at a given moment enable new elements to appear in the social or economic system. Therefore, the knowledge economy would only be a part of this global system of knowledge exchange. On the European level, the theme of the knowledge economy *"is a term that is simultaneously ambiguous, ambitious and perhaps even utopic, but this corresponds to the ambition of putting together different disciplines and technologies so as to be able to produce different models of knowledge, power and social organization."*

The industrial economy at the cradle of the Internet

Jacques Crémer's contribution aimed at explaining how the instruments for analyzing the traditional economy were able to get hold of this innovation known as the Internet. He was especially interested in the industrial economy and the analysis of organizational models.

Economic theory as an axis for analyzing the Internet phenomenon

The industrial economy divided the field of study into three fundamental elements: the study of firms' market behavior, all the determinants of an economic sector, and lastly the study of the internal organization of companies.

In the 1980s, economists attempted to reflect on the influence of ICT on organization, but these reflections entered into relation with other sectors of economic analysis such as the international economy, public economy analysis (for example, regulatory questions) and an entire series of questions shared with other social sciences. Before that, at the beginning of the 1970s, great advances transformed the science of economics: first, the development of game theory, in other words the analysis of strategic behavior in general, and in particular the behavior of companies and of agents within companies; next, the analysis of the strategic use of information within organizations; lastly, the analysis of network phenomena in the circuits of exchange. These analyses emphasized for instance the question of standards in the Internet or innovation phenomena.

We must add to this field the relevance of analyzing transaction costs as a key to analyzing networks, which falls within the study of organizations. The analysis of strategic relations is thus to be considered in a political dimension. For example, in his analysis of contracts, Mintzberg gives the keys to the company's external relations with its suppliers and clients. Lastly, the dynamic of Forrester's systems seems quite relevant in the study of the choices of change and transition.

[38] It is in this sense that Philippe Lemoine is promoting the Échangeur initiative (see www.lechangeur.org).

The economic aspects of the Internet

The Internet set off an upheaval by drastically reducing transaction costs, in other words, the costs specifically related to the act of buying and selling. In particular, the "distance" variable practically became non-existent in this transaction process. This does not mean that it disappeared completely, but its penalty was greatly reduced. Still, it is very difficult to predict the factors that will truly diminish and what the consequences of this transactions drop could be.

In parallel, market size has notably increased. In the short term, the buyer has seen a considerable increase in choice. From the companies' point of view, the effects are more ambiguous. "If you have a product that is competitive, of better quality, the value of which is clearly superior to that of your competitors, it is obviously in your interest that your product's visibility should increase. On the contrary, if your only comparative advantage consisted in being nearby to your clients, then the market's growth becomes a penalty for you." The Internet thus appears to redistribute the acquired positions, increasing competition among actors. Globally, economic analysis reveals that, with the arrival of the Internet, the global social surplus of a country is positive: the sum of the winners is higher than the sum of the losers thanks to the opening of the market. But one of the major questions involves transition costs that result in large productivity losses for a time.

We therefore need a reflection on conducting change, its speed and its reach. Change that comes too quickly generates a real loss in value. The theory of free exchange is not in opposition to regulating innovation. What matters is the relation between the production levels of different countries in a commercial economy. A strategy that would aim not only at blindly improving all production capacities, but also relatively improving certain parts of production capacities, would increase a country's export capacity on certain markets.

The analysis of backbones[39] on the European level is also very interesting. The question asked was to find out if the emergence of a dominant backbone carried the risk of favoring a strategy of a degraded interconnection with other competitive backbones, by generating a phenomenon of catching clients by relative advantage. Indeed, statistically, the clients of the largest network are the ones who have the best access to the most services. If this network sufficiently degrades the interconnection with other networks, the clients of these networks will lose the most in service quality and will have a tendency to change to the dominant network. Moreover, if a backbone surfaces in a dominant position, it can return to a proprietary protocol strategy. In network phenomena, once one of them wins over the most clients, it has the means to offer a more valuable service than any of its competitors.

However, we have observed extremely new phenomena in peering and transit strategies, with regard to the strategic and economic behavior of backbones. With the Internet, we are seeing the emergence of an extremely integrated market, entirely managed by bilateral understandings. Lacking an economic theory on overlapping contracts and on the optimum of commutative network models, we are nevertheless observing quite empirically that these contracts and networks are organizing themselves according to a certain hierarchical structure, which is difficult to analyze. Currently, data packets follow relatively organized paths according to a hierarchical structure linked to the very organization of the economic actors.[40] So we are seeing a hierarchical, concentrated model impose itself progressively, to the detriment of an early model that hoped to manage network cores in a shared fashion... Therefore, we must distinguish the networking of

[39] See Chapter 3 above.
[40] This is not at all the image of neuronal actors connected to numerous other neuronal actors.

services from end to end, the concentration and the ranking of communication infrastructures.

The analysis of organizations reveals that we are experiencing a dual phenomenon of concentration of information systems and division/decentralization of the units inside the system. Numerous empirical works have been done to verify the existence of this phenomenon. Globally, the results show that the most decentralized companies are those that have the most technological capital. Servers are the minimal requirement for the decentralization of large organizations, whereas the number of PCs has no direct correlation with the decentralization or centralization of companies. A centralized IT architecture becomes the core for communication. The more extended the network is, the more it supports change and communication and the more it enables a decentralization that leads to an increase in productivity. In this sense, we believe that the less the work takes place in a controlled, hierarchical universe, the more productive individuals are.

There also exist both empirical and theoretical works on the economy of free software. To this can be added a number of studies on the notion of encouraging actors to take part in the production of free software. Here we find the entire signal strategy that aims to reveal the inner quality of a given society. We also notice the questions on the relation between altruistic and selfish incentives and the balance between them.

With regard to standards, the economy of networks described the issues related to the distribution open-source standards or proprietary standards. We should be looking for new aspects in the area of the mix of multiple standards and their capacity to create cocktails of services for each type of use. We have witnessed the appearance of mixed strategies of proprietary standards made available to the Internet community, and which have imposed themselves as universal standards. More politically, we will mention that private institutions such as the W3C (World Wide Web Consortium) use their monopoly on producing standards to promote a political vision that is not open for discussion. Thus we find ourselves before a certain sovereignty of private authorities imposed on the rest of the world.

Consequences for Internet governance

Notably, the Internet has unsettled exchanges; there is a crossed relation between the technological development of the Internet (which should not be limited to the web or even less to DNS) and its economic impact.

As Philippe Lemoine, Jacques Crémer and all the other participants have indicated, it would seem suitable from now on to go beyond the ideas associated with the notion of a knowledge and information economy. Indeed, this notion is associated and induced directly by IT and the economy of networks. Traditionally and simplistically, we consider: the rural or primary economy based on the economy of the soil (agriculture and extracting raw materials); the industrial or secondary economy based on the economy of transforming matter and using energy (the Industrial Revolution in the nineteenth century) – this is the economy of scarcity and of the balance between supply and demand, the original product being naturally limited and transformed; the information and knowledge economy with the media and content economy in all its forms (audiovisual, computer networks, etc.) – *a priori*, this is an economy of abundance, omnipresence and broad distribution.

Practice has shown that there is now a juxtaposition and complementarity among the three models. This leads to an economy that might be called the economy of modernity, relying on exchanges, continuous reactivity and imagination. If this model encompasses and integrates the three preceding models, it is a meta-model that still needs to be

discovered to discern factors for growth, improving competitiveness and productivity, and social progress.

Therefore the Internet, as a vehicle and infrastructure for transport, cannot leave the various economic, political and social actors indifferent. Internet governance goes well beyond the technological challenges, notably when societal topics such as identity, confidence and security are dealt with at the heart of the economic reflection.

Paths for further research

1 – Develop economic models of abundance compared to the classic theories of scarcity;
2 – Focus on the consequences and paradoxes induced by a two-fold "real world/virtual world" approach, on the frontier between economics, sociology of organizations and ethnology;
3 – Pursue three paths for a renewal of economic analysis: the development of circulation and exchange, the reactivity model based on continuous reengineering, and the innovation model based on imagination;
4 – Work closely to the ETPs (European Technology Platforms[41]), systematically associating a research and uses section to the offer's platform;
5 – Study the conditions and terms under which economic development and the notion of territory are compatible in a "digital" economy.

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[41] This approach no doubt allowed the industrial economy and the Lisbon strategy to be broached in a concrete, applied fashion: *"European Technology Platforms address strategically important research issues with high societal relevance, bringing together companies, research institutions, the financial world, regulatory authorities and other stakeholders at the European level. The objective is to define a common research agenda, pursued by the ETP under the active guidance of the stakeholders. The 'Scout' – Service Oriented Utility for the Knowledge Economy – is proposed to ETP and has its origins in the experience gained from customers and how they wish to see ICT evolve in the future. Its key themes are: 1) Business flexibility, 2) ICT simplification, 3) Open Service provisioning and 4) An open eco-system to support a broad range of enterprises which, importantly, is affordable and accessible for SMEs. The technology domains addressed are Infrastructure, Service Platforms and Semantics, while Trust and Security, Services and Management, and Interoperability are cross-domain aspects that pervade the whole exercise."*

Chapter 6
The Internet: public good, private good, common good

Georges Châtillon

The questions related to creating, managing or even owning domain names and IP addresses have become primordial on a political, as well as a judicial, level.

Domain names are common public goods

There is no consensus, or even the start of a common definition, as to the legal nature of the polymorph space known as the Internet, made up of a set of connections made possible by using TCP/IP. The same goes for the domain names, which, although not representative of property rights, could benefit from trademark protection and fall under intellectual property, while allowing their beneficiaries to enjoy exclusive use.

Holding a domain name certainly authorizes data to be received passively, but two domain names must be interconnected for the Internet space to appear and reach its goals of interactivity and uninterrupted data transmission, no matter what kind of data is involved.

Since nobody owns a domain name, it would be judicious to consider this object to be a common public good, capable of a specific use that enables it to be localized, or even allows its holder to be identified so that the chain of exchanges can include several actors. Without domain names, Internet navigation would be an illusion. Stated otherwise, without domain names, the Internet would remain an invention defining a "non-communication space." It is logical to suppose that the Internet assumes the legal nature of the domain names which guarantee its existence; therefore, the Internet is also a common public good.

As sovereign States have appropriated the right to regulate the Internet's communication space located inside their borders and sometimes beyond, as well as computerized operations, in the space made up of Internet domain names, the material operations of domain name allocation and use should be considered a common good of a public nature, because the judicial activity of States is oriented towards satisfying the general interest of people and organizations. If this space were not a common public good, any State or other entity could appropriate it, thus confiscating the right to circulate and communicate on the Internet, without any prohibitions.

The very nature of a common public good grows out of the so-called "free" legal nature of the software used for naming and using domain names, reinforced by the so-called "free" legal nature of the software used for data transmission in TCP/IP norms.

The space made up of two or more domain names must be considered a common good made available to the public, which the State cannot appropriate or incorporate it into its private state domain, in such a way that each Internet user, identified by a machine's localization, can privately enjoy use of the domain name without being able to appropriate it in the sense of ownership.

The common public good made up of the interconnection of two or more domain names is governed by the laws of each State in which the domain name is located, with the obligation to respect the principles described in the conventions that govern international telecommunications:

- No State may unilaterally cut off an interconnection, except for a cause that has been decided in the courts and permitted by international law;
- No State may delete a category of domain names, thus depriving the international community of Internet users of its right to access domain names;

- Any modification in technical norms that might affect the regularly admitted functioning of relations between domain names must be proposed beforehand to the community of domain name users (we will return later to this notion of domain name users, a category that does not exist today and that could only be recognized by international public law with changes in this fundamental law).

  International public law governing domain names must contain and defend the principle that no public or private entity, national or international, possesses the unilateral right to deprive a person or corporate body of the use of a domain name, and/or to access the international system of domain names, such as this system should be set up through means of an international convention.

The permanent right to access the address designated by a domain name is arranged in such a way that domain name holders enjoy certain protections. For example, those who send unsolicited advertising should be held legally responsible. But no State or private entity has the right to restrict the number of domain names or to grant itself such a number of domain names as would be prejudicial and harmful to others in terms of equality or free competition.

The use of domain names makes them common public goods

A domain name allows a network location (i.e., a computer) to be located and identified. Naming means all the rules and principles on the functioning, allocation or regulation of domain names. It quickly became necessary to create a system that would automatically correlate a domain name and the corresponding IP address, as the number of computers was increasing considerably. This system, known as Domain Name System (DNS), automatically "translates" a domain name into an IP address. DNS was invented in June 1983 by Paul Mockapetris and Jon Postel, researchers at the University of Southern California.

Domain names have become the only way to "go" from one site to another, and the only means for email software to know how to find an email's recipient. The DNS system is the Internet's key element. Without it, a user would have to type long series of IP addresses. The links with domain names would become inactive because they would no longer correspond to anything at all. In order to make memorization easier and improve user friendliness, numbers were replaced by letters.

The 13 "root" servers and the American "a" server

Specialized servers store all these correspondences in their memory and implement the DNS system. Thirteen of them constitute the "reference" that all other servers conform to when replying to a DNS request. These thirteen servers, called "root servers," all contain the same version of a file known also as the "root." This file is updated daily via a network made up of all domain name providers.

These thirteen machines, or rather these thirteen networks of machines, are spread out across the globe (ten are in the U.S., one in Great Britain, one in Japan and one in Sweden). From a geographic point of view, DNS is a system that decentralizes the repartition of the root servers. However, one of these thirteen servers takes precedence over the other twelve. This is the "a" server. Although the twelve other servers duplicate the "a" server's database daily, it is still the Internet's epicenter. If a modification corresponding to the creation of a domain name is not recorded on the "a" server, the domain name will not exist in the eyes of the thousands of servers that implement DNS every day.

The "international" management of domain names and ICANN

Domains are managed on the international level by a non-profit company incorporated under California law, the Internet Corporation for Assigned Names and Numbers (ICANN), which is legally autonomous but which comes under the control of the U.S.

Government, or more precisely, the National Telecommunications Information Administration (NTIA), that is part of the Department of Commerce (DoC).

ICANN took charge of the activities that had been exercised by Jon Postel while he represented the University of Southern California/Institute of Information Sciences (USC/ISI), by informal delegation from the U.S. Government. ICANN creates and allocates domain names, and also delegates their management to any of the "registries." Registries manage the database corresponding to the names registered in the domain that they are in charge of, as well as creating all additional sub-domains. Registries delegate the activity of allocating domain names to other organisms known as "registrars." The term "allocation" is used because a domain name does not belong to anyone; rather, the right to use it is allocated.

Thus, to ensure the coherence of the central database, a hierarchical system was organized. The "root" of the Internet is constituted along the following lines: Top Level Domains, or TLDs, constitute the simplest point of the network. There are two types of TLDs: generic Top Level Domains, or gTLDs, and country code Top Level Domains, or ccTLDs. At the level immediately below TLDs, there are sub-domains. For instance, in France, "asso.fr" is a sub-domain.

The ccTLDs

The ccTLDs, or country domains, are zones that should have corresponded to States in accordance with public international law. However, when the decision was made to create this type of domain, it was agreed to use the country codes in the ISO 3166-1 standard established by the International Standardization Organization. This standard includes international codes used to represent geographic entities, not sovereign States. Thus Western Sahara, Gibraltar or Saint Pierre and Miquelon all have their own ccTLD. Consequently, there are many more ccTLDs than States. For example, France has eleven different ccTLDs, corresponding to territories such as Martinique, Mayotte, Wallis and Futuna or New Caledonia.

The management and allocation of ccTLDs are the task of an organization integrated into ICANN, the Internet Assigned Numbers Authority (IANA), which delegates the management of each ccTLD to a legal representative. IANA also officially manages the allocation of IP addresses.

Certain ccTLDs offer high visibility due to their consonance. This is the case of *.tv*, like television, which corresponds to the Tuvalu islands, a micro-State located in the South Pacific, or *.tm*, abbreviation of *trademark*, which is the ccTLD of Turkmenistan.
By selling their domain name to the highest bidder, the Tuvalu Islands have made nearly twelve million dollars, more than their 1998 gross GDP. In this context, there is no naming policy at all, because the goal is to make as much money as possible from the sale of domain names. Conversely, other countries strive to have a coherent naming policy that respects everyone's interests, and establish a "naming plan" or "naming charter" to this effect. These documents generally outline what can or cannot be done with an extension, create certain restrictions of a public nature for some names (pedophilia, murder...), or even create sub-domains reserved for certain categories.

The ccTLD registries have various legal characters: private firms, as in the U.S., Japan, Ukraine and Gambia; associations, as in ten EU countries (EU of 15) including France; independent state institutions, as in Switzerland and Colombia; or organisms fully integrated into the public sector, as in India, Spain, Argentina and Finland.

The ties between a ccTLD registry and the country involved vary in their degree of formality: specific legislation, a state contract, a simple memorandum of understanding or direct government involvement in management. The government may designate its representative on the registry's board of directors. This representative may be granted only the

right to observe, may have the power to approve decisions, or may hold a veto right in certain special cases. Currently, very few ccTLD registries have formal ties to IANA through ICANN, due to problems caused by claims of sovereignty, arguments related to international law or special interests within the Internet community.

In the beginning, Jon Postel alone managed IANA and delegated the management of the ccTLDs to computer scientists, without asking for any input from the governments concerned by the use of this attribute which could be linked to prerogatives of national sovereignty. This was the case, for example, in Japan, Hong Kong and Australia. In Germany, 6,400,000 names have been registered under the *.de* domain, 4,100,000 names have been registered under the *.uk* domain in the UK. The domains *.it* (Italy), *.nl* (the Netherlands), and *.ar* (Argentina) include from 600,000 to 800,000 names.

The influence of ccTLDs in the world naming space has been constantly increasing for the past few years. The portion of country code names in the overall total of domain names went from 32.1% to 37.7% in 2002. One out of every two domain names is registered in a "country zone."

It has been estimated that eight hundred billion DNS requests are carried out each day. DNS is therefore the "software" that guarantees the IP address/domain name correspondence, and inversely.

The political, economic and legal importance of domain names

ICANN, in relation with World Intellectual Property Organization, has established a policy to resolve conflicts related to domain name use and intellectual property rights. The domain name is an important factor of Internet "visibility" for companies, which rely more and more on electronic commerce for part of their sales.

The registrar's activity, in other words the "sale" of domain names, is exceptionally profitable once the registration system's base has been installed. Indeed, the online registration system is fully automated for the larger domain names like *.com*. Thus, once the infrastructures are paid for, the registrar's activity has low operating costs, because registering a domain name consists in just adding a line to a database.

From a political point of view, domain names are important because the naming zone corresponding to a certain country is an attribute of its national sovereignty. Yet the creation of geographic domain names is dependent upon a corporate body from the United States that is in turn dependent upon the American Government, which has full veto rights. Furthermore, some countries cannot use their extension because it has been delegated to a company without even consulting them.

Practices vary from one TLD to another. For example, in the *.com* zone, which is completely unregulated, it would be possible to register "terrorisme.com" as a domain name, but this is not the case in the *.fr* zone, where a list of prohibited names has been drawn up. This list includes expressions such as "murder," but also generic names (lawyer, doctor or institutional names (government, parliament).

More fundamentally, domain names also present a challenge related to individual persons. The Internet is a place of personal pages, which are evolving and becoming easier and easier to create. The holder of a personal page must not be dispossessed of it arbitrarily because he or she would lose the usage rights and contents attached to his or her own name.

The "nerve of the war"

Communicating via the Internet, downloading, surfing on the web, visiting web sites open to the public, sending multimedia objects, email, images, sound files, etc.: all these tasks basically involve linking two or more computers together so that they can exchange data accurately. Domain names correspond to a computer's geographic location. Therefore it is

essential to have a directory system that recognizes computer domain names that have been pre-registered and that points data towards the right recipient. It is also necessary for the directory manager not to register any erroneous addresses, to avoid duplicated address and to make these address-lists available for Internet users and/or their intermediaries: ISPs, telecommunications operators, or domain name providers.

During the Internet's development, in the 1990s, it was unlikely that anyone could have foreseen its exponential growth, except for the government and companies in the U.S. that had carefully prepared the mechanisms, and for a few European researchers, who had written the protocols that made the web so successful.

Due to a lack of lucid analysis and forecasts, States other than the U.S., and companies other than American firms, were left behind and did not understand the stakes quickly enough. The Americans acted in a logical, determined manner for everything involving the political, sales, financial and legal aspects of information technology and the Internet. Aware of their near-monopoly on software technology (and aware of the technological and financial power of their patents), hard drives and microprocessors, telecommunications cables and satellites, American entrepreneurs and engineers could consider that the world of computers was a virgin territory, a *terra incognita,* which they had the absolute right to explore, to take over, to appropriate and to manage, in the same way as the Europeans of the fourteenth and fifteenth centuries had considered the world and its inhabitants outside of their native lands.

Much more than the others, the Americans had invested in every possible way in every possible aspect of digital technology since the beginning of World War II. They had developed favorable areas within U.S. territory by encouraging telecommunications competition and a focus on the industries of office software and factory-manufactured PCs. The only thing left to be done was to run a communications network across the planet, using financial means supplied by others.

The Internet was the Trojan horse of American political, economic, financial and commercial culture. It was enough to invent and widely distribute protocols that were compatible with the good old telephone, which States had patiently extended across their territories. To accomplish this, one unbeatable method: doing it for free. The software that make up the Internet's architecture is free, in the legal sense of free and open-source software. Therefore, the Americans pour in and the partisans of "Old Europe" are unaware of the danger… Even better, the Americans have invented a new unknown right: the right of *free*. Meanwhile, this notion is still seldom legalized in most European States and is not admissible as such by the current French civil code.

But why would they have hesitated? The world of trade is governed by the sacrosanct principle of free trade and industry, and Internet was not considered a weapon but a means for people to communicate about science, peacefully and in a spirit of fellowship. And, in any case, academics and researchers needed the Internet to transmit the astronomical quantities of mathematical data used for calculations and modern machines. No other model of any sort could be offered as an alternative to American machines, software and communications systems, including the Internet. Even better, the Americans successfully requested that States not legislate on the Internet and related areas. While they got the time needed for the Internet to grow, communication on the net had to be free of taxes and fees. The Internet enables the circulation of computer services, software, contracts, merchandise orders and money. Electronic commerce was able to develop freely, at first without fees or taxes. Internet users were able to download and exchange any text, image or music, almost for free, without the copyright holders balking – or at least not very much.

There has been a change of tone since the Europeans have transposed directives concerning electronic signatures, electronic commerce, electronic communications, the

protection of personal data and copyrights. From now on, any commerce, even electronic, should be taxed; all data circulating on the network should be verified to make sure that its legal owner has not been wronged.

And the emerging powers, along with the less advanced countries, are protesting more and more fiercely against the rule of "first come, first serve."

Washington's Trojan horse

Washington's Trojan horse consists in turning the task of creating and managing domain names and IP addresses to what was initially a nearly insignificant entity, a small non-for-profit company ruled under Californian law. But inside the belly of this machine for governing worldwide Internet communications, there was the U.S. Department of Commerce, in other words, the most formidable and powerful trade war weapon ever invented since World War II.

Their tremendous astuteness consisted in not launching a frontal attack on other States. The American Government could not decide unilaterally to create and manage domain names without stirring up growing opposition from the target States. ICANN's goal, and thus the goal of the Department of Commerce, was to weave a global web, a network of networks, apparently open to anyone without conditions or restrictions, free but not protected from the “big ears” and other Echelon networks.

It was necessary to quickly overtake the States before they divided, segmented, and controlled the web. To do so, there was one winning strategy: catching States in the web woven by domain names. One means: using a geographic norm and giving territorial entities the signs of this norm's geographic markers, without taking into account the territories and borders managed by States – for example, *.fr*.

No territory with a government and a population would dare to demand recognition as a sovereign State by other sovereign States while claiming the proper name of another State recognized as such. A State's name belongs to it entirely, as part of its legal category of statehood. The proposal of making up a directory of domain names using a geographic norm not based on States recognized as such by international public law could only come from a group of scientists unaware of the law. However, it cannot be claimed that the U.S. Government is unaware of the law, whether private law or international public law. So how can we interpret the fact that the U.S. Department of Commerce supported this proposal to use country names without first consulting the sovereign States?

In France, we have seen how local authorities launched an attack on domain names in order to have priority on their use so that individuals or companies could not create any confusion in the minds of Internet users between a public web site and any private site. In France and elsewhere, we have seen how companies have used trademark law to register and protect domain names, so that competitors or jokesters could not use their company's name and so that Internet users visit their site rather than the site corresponding to a counterfeit name. A company can register its name as a trademark. However, nobody has the right to register a name corresponding to this company's name or trademarks as a domain name.

All laws prohibit any person or corporate body from using the name of a government or State to pass for the said government or State. It would be interesting to observe the U.S. Government's reaction if such a case should occur. However, certain companies have acquired a domain name corresponding to the initials of certain micro-States and neither ICANN nor the U.S. Government has made any remark about this practice that amounts to "erasing" the said State from the web by confusing it with a private company!

This situation would not be compromising if everything was equal before the law. But the oldest legal tradition states that nothing is equal to the power of a sovereign State and that each sovereign State must respect the rights of its fellow States. The rules governing

relations between States are set by international public law, the first credo of which is the rule of equality among States. The public international space is occupied almost entirely by the territories of sovereign States. No one owns the oceans or outer space. States can agree, through international conventions, on the use of "unclaimed" territories (such as Antarctica).

For international public law, only States can be considered actors on the international level. Individuals and other entities have no direct rights to assert. States set the rules governing the relations that they wish to maintain reciprocally and the forms that persons and entities must follow in their relations with States. We have never seen a case where a private company, even a non-profit one, was able to set the rules for States to follow! This is obviously the problem with ICANN. It is also the responsibility of the States, and especially the United States.

Let us imagine – and this remains to be proven – that States did not foresee the arrival of the phenomenon of the Internet, domain names and the question of the correspondence between domain names and countries, the ccTLDs. Could it be asserted that the U.S. Government, using all its world power to support the domain name system established by its own creation ICANN, did not foresee that the norm used carried the risk of causing prejudice to the other States' own interests? The very simple *a priori* rule of allocating a domain name is "first come, first serve," as if it were a simple treasure hunt (with the constant misuse that has been witnessed). This rule allowed investors to acquire domain names corresponding to the real names of certain companies or brands. At first, the American courts accepted this lucrative little game and approved the sale of domain names, allowing the "speedy smart guys" to earn a lot of money due to others' slowness in reacting. But the courts quickly realized that this maneuver's only objective was to blackmail the legitimate holders of company names, usually along with brands identical to trademarks and registered as such.

The French courts were not deaf to this legitimate request by companies and domain names are easily considered legal objects that trademark law is supposed to protect.

The non-respect of the principles of loyalty, good faith and equality between States

Offering its full support to the American organism charged with creating and managing domain names, the U.S. Government should never have let ICANN choose and use a geographic location norm so that domain names representing territory or territories belonging to sovereign States could be turned over, for a price, to private companies.

The principle of loyalty of the U.S. Government towards its allies, partners and fellow countries in the United Nations means that it should have discussed the question of domain names and management and maintenance solutions within the usual framework for international diplomatic relations: either inter-governmental meetings or international conferences.

The principle of good faith means that the U.S. Government should have warned other States that the ccTLDs were intended to designate geographic entities and that their allocation could lead to confusion with the initials of certain territories corresponding to States or portions of foreign territories, so that the States could exercise their sovereign right to regulate the designations that concern them, with all the consequences that this might have on domain names.

The principle of equality between States means that international public law cannot tolerate certain States not being designated by domain names (with all the harm caused to a State by it not being present on the Internet), and that one State among others cannot monopolize the creation and management of domain names, a common public good, above and in the place of the other States.

The fact that the U.S. Government has supported, and vigorously continues to support a company that undermines three fundamental principles of public international law makes the declarations of ICANN and other institutions suspect with regard to the use and management of domain names.

It is fundamental that sovereign States recover the reality of their rights on the common public good that domain names are. All the more so as they have never relinquished these rights, nor have they consented to share sovereignty, as is the case in most international conventions.

Managing domain names realistically and with legal integrity

The myth of a network of networks is nowadays out of place. Aside from the large worldwide military and diplomatic telecommunications networks, which are confidential or top-secret for reasons of national security, the large companies created the first large private networks and it was child's play to convert these to TCP/IP norms. Of course, the data circulating across these networks is encoded and is not open to the public, in a wide or narrow sense.

We see that in the natural order of things two sorts of closed networks are deployed, except in certain points, and these are equipped with particular techniques: government networks and company networks, designed and created to satisfy typical, exclusive needs - government activity and commercial company needs. But individuals also have their own needs and it is to satisfy these that the strange networks known as "peer-to-peer" have been created.

The reality of the Internet reveals the coexistence of three types of primordial networks, using the same protocols diversely: the networks of government entities, those of commercial companies and those of individuals.

A great number of domain names has not been disclosed and the common face of the Internet is a heterogeneous set formed by electronic commerce web sites and personal web sites. But not just anyone can enter; you must know the login and password. What the legend of the Internet wished to reveal is the strange necessity of preserving the myth of the network of networks and the universal right to access a domain name. It would be politically and legally prudent for representatives of States, NGOs, companies and individuals to negotiate, within an open framework, so as to observe the current reality of the aforementioned rights concerning domain names.

Thus it could be said that three networks of networks coexist: that of States and NGOs, that of companies and that of individuals. Each of these networks must use universal protocols to maintain the rights to interoperability and interconnection that everyone – whether individuals or corporate bodies – holds as a cornerstone of the universal right to communication, a human right revealed by the Internet.

As rights are never upheld without a means for recourse and mediation, an international organization made up of members who use domain names, representing States and NGOs, commercial companies and individuals, would have the objective of upholding these new human rights, ensuring the interoperability and interconnection of the three large network systems and also resolving any conflicts.

This is the price to pay for the Internet and domain names to keep their status of common public goods.

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Chapter 7
Internet regulation and governance

Françoise Massit-Folléa

Introduction

Only rather recently did the question of Internet governance come to the forefront of the international political agenda. Several studies[42] have shown that its appearance as the priority during the first stage of the World Summit on the Information Society (WSIS), held in Geneva in December 2003, was as unexpected as it was decisive for the orientation of the debates. There are two large families of explanation for this: on one hand, the risk that the conventional rights of sovereign States would be "run over" by marginal regulations or criminal practices, both of which take place outside their territories;[43] on the other hand, a growing awareness about the numerous regimes and the heterogeneous mechanisms in the ground rules necessary for this new socio-technical system – the Internet – to work properly. By making the Internet the motor of the post-industrial society and by vigorously promoting its use, governments have entered into a game that had not previously involved them much, since regulating the Internet involved mostly private experts, companies and the netiquette of network users.

This technological, industrial and social innovation has risen to the very top of the major public policy priorities.[44] As a result, the desire to correct certain inconsistencies, gaps or dangers in the current situation has become part of the international political agenda. A certain number of tensions have also resulted.[45] Due to its UN framework, the Summit had as prerequisites the plurality of the actors and the equal acceptability of their viewpoints. The debates that resulted, whether formal or informal, whether included in the official program or led in parallel, emphasize the need to coordinate, if not harmonize, complex balances of power.

The third part of the UN Working Group on Internet Governance's mandate (see the introductory chapter) calls for it “to investigate and make proposals for action as appropriate”. The keywords of this mission are "open and inclusive process," "internationalization" and "multistakeholderism." These terms presuppose a regulatory ambition that resolves controversy – if not open conflicts – between the territorial levels (whether national, regional or international) and sector interests (States, market, civil society, all of which are heterogeneous in their expectations and capabilities), in the name of an agreement on a concept of general interest. The problem would then be going from the implicitness of values to the explicitness of a series of agreements.

At this stage in preparing the Tunis Summit, is describing Internet governance as a de facto state (or even attempts to model it) sufficient to get close to it? We seem to be reaching the limits of a generous geo-strategic utopia mixed with a procedural vision of the

[42] See for example Claudia Padovani and Arjuna Tuzzi, "Changing modes of participation and communication in an international political environment. Looking at the World Summit on the Information Society as a communicative process," Communication at the IPSA Congress (International Political Science Association), Durban, July 2003.

[43] See Françoise Massit-Folléa, "De la régulation à la gouvernance de l’internet, quel rôle pour les usagers-citoyens ?" in "La gouvernance d’Internet" (Richard Delmas and Françoise Massit-Folléa, dir.), *Les Cahiers du numérique*, vol. 3 no. 2 (Paris, Hermès-Lavoisier, 2002).

[44] Chris Marsden's presentation showed how much "the synergy between the two issues of innovation and democratization" has until now been seldom addressed.

[45] Which the events of 11 September 2001 have focused on the notion of "national security."

management of public affairs and an instrumental approach to communication that skips over the question of the reality of power.

As mentioned above, the last session of the Vox Internet seminar, dedicated to the formal approaches to governance, felt the temptation of drifting towards Global ICT Policy several times, if not towards "world governance" in the larger sense.[46] But this session did allow two essential questions to be answered:

- The distinction between "governance of the Internet" and "governance via the Internet"[47] enables a narrow definition (the management of technical resources) and a broader view (regulating contents and the role of public policy) to be opposed; but the validity of this distinction does not withstand either the test of reality or the search for legitimacy: the technical-political pairing is indissociable;
- Examination of the principles and methods of self-regulation and co-regulation applied to the Internet casts doubt on the very notion of governance in favor of questioning how powers are constituted; today it is rather a matter of re-regulation the foundations of which are masked, ignored or even denied.

Inside the nebulous "Internet governance" there coexist different regulatory models, more or less founded in the law, more or less specialized, more or less effective. We will not return to the particular, and in many respects emblematic, case of ICANN: the controversies over its legitimacy, its ability to operate and its future have fueled the greater part of research work on Internet governance in the past years and still provide the essential fuel for debates within the WSIS regarding the management of the technical resources of the Internet, international relations and the place of users in governance. We are only touching on the legislative effervescence, more or less coordinated, among sovereign States. Thus we leave aside the examination of all the contracts, conventions, rules and agreements, both public and private, national and international, which make up the background of the daily functioning of the Internet; an exhaustive study of this topic remains to be conducted.

However, we are first interested in the shape of self-regulation, then in the co-regulation of the Internet, using the examples of the French Internet Rights Forum[48] (presented to us by Jean Gonié) and the Belgium Internet Rights Observatory[49] (presented by Katia Bodart). Both are conceived as alternatives to the classic legislative approach exercised within a national or intergovernmental framework.

The self-regulatory model

As Christopher T. Marsden mentioned during the seventh session of the seminar, the self-regulatory model presided over the birth and earliest developments of the network, in the context of collaborative peer research involving computer scientists and engineers, public laboratories and innovative industrials.[50] This model was maintained during the expansion phase of the Internet, both for the creation of protocols and standards (devolved to informal associations of experts) and for technical resource management (the creation of ICANN in 1998). It evolved progressively as the functionalities of the Internet grew exponentially and its

[46] "We do not have a problem with cyberspace governance, we have a problem with governance in general," is a favorite phrase by Lawrence Lessig, author of *Code and other Laws of Cyberspace* (Basic Books, 1999) and *The Future of Ideas: the Fate of the Commons* (Random House, 2002).
[47] The English term "Internet governance" is effectively ambiguous.
[48] See www.foruminternet.org
[49] See www.internet-observatory.be
[50] See for example Patrice Flichy, "La République des informaticiens," *Champs culturels* no. 11, June 2000; Pierre Mounier, "Les maîtres du réseau" (La Découverte, 2002).

use became widespread,[51] especially due to the hopes placed in the "information society" in terms of economic growth and revitalization of social links.

Today the notion of self-regulation has several contours. It means keeping State intervention at a distance (by means of the market and civil society), exclusive confidence in the rationality of the market, and producing a new mode of governing general affairs based on shared responsibilities. The deepest elements of understanding come to us from Belgium, with the works of Jacques Berleur's research team on the relations between computer science and ethics and Jacques Lenoble's on the sources and arrangements of normativity. Their primary interest consists in taking into account the dual technical and socio-political basis for the behavior of actors on the networks.

We can identify two forms of self-regulation: spontaneous and delegated. The first covers codes of good conduct and other "ethical" commitments made by the professional sectors (private and public), the second is illustrated by ICANN (or its current layout, in any case). These two forms have in common the fact that they do not resort to the law from the outset, but instead seek collectively to create norms for action by sector, resting on a consensus established around principles and solutions, expressed by private contracts. In the words of Michel Coipel,[52] self-regulation is presented as "a legal technique for the creation of rules… drafted by those the rules apply to or by their representatives."

But self-regulation faces two limits. For industrials, it is often equivalent to a measure of self-defense against possible legal attacks; moreover, the rule is not very strict if the clauses are not respected and may always be broken if it is in the company's interest. For governments, it so results that resorting to professional ethics has the main role of doing away with any obstacles to electronic trade on the Internet, to such an extent that public intervention is asked to limit itself to protecting particular heterogeneous interests.[53]

Concerning the circulation of illicit or harmful contents on the web (racism, child pornography, defamation, etc.), the European Commission has established an "Action Plan for a Safer Internet"[54] since 1999. Among other measures, it specifically encourages ISPs to use self-regulation.[55] But at the same time, the Council of Europe Convention on Cybercrime was being discussed, which includes much more classic sanctioning measures, without the balance between responsibility and freedom being any more clearly founded.[56]

In the realm of intellectual property, where ever more ingenious systems of free circulation and digital data manipulation confront the economic interests of copyright holders,[57] we are seeing the appearance of initiatives close to self-regulation on the side of the users : for instance, the proposals of the Free Software Foundation to agree on "good

[51] At the very least for developed areas and populations with access to the necessary material and cognitive capital.

[52] "Quelques réflexions sur le droit et ses rapports avec d'autres régulations de la vie sociale," in *Gouvernance de la société de l'information* , Cahiers du Centre de recherches Informatique et Droit, no. 22 (Bruylant / Namur UP, 2002).

[53] The users are only consulted and informed on rare occasions, the telecommunications carriers do not behave like content editors, etc. See the recent launch of the "net+sûr" (safer net) label by the French ISPs, sponsored by the Ministry of Industry (http://www.afa-france.com/p_20050208.html).

[54] Safer Internet Action Plan, Decision 276/1999

[55] For an analysis of the question, along with recommendations, see the 30 April 2004 report by the PCMLP (Programme in Comparative Media Law and Policy of the Oxford University Centre for Socio-Legal Studies) entitled "Self-regulation of Digital Media converging on the Internet: Industry Codes of Conducts in Sectoral Analysis."

[56] This was seen in France during discussion surrounding the Loi sur la confiance dans l'économie numérique. Let us add that Internet users in many countries pay with their freedom an anti-democratic definition of cybercrime.

[57] We are speaking of course about peer-to-peer, a form of "piracy" that should not be confused with large-scale industrial espionage.

practices" of free software, or the creation of the Creative Commons license to favor the online distribution of works (this license proposes the choice between several copyright protection systems).[58] This co-construction of regulation between supply and demand, which does not rely on any legal obligation or restriction but on a "horizontal" agreement among users, has a great deal of trouble asserting its legitimacy when faced with the established property right regulations and the dominant players who benefit from them. This reinforces radical positions where the notion of confidence (generated among users) replaces that of security (imposed by the dominant powers) for the future of the network of networks. Thus, in a recent article, it could be read: "The risks involved in an Internet that makes peers accountable to one another are much lower than the risks of empowering any centralized global authority – private or public – to make connection decisions for individuals."[59]

The co-regulatory model

The co-regulation process is distinguished from self-regulation, or rather complementary to it, because it maintains the role of the State "next to and in relation with the forces of Internet and the information society."[60] As an attempt to discern the contours of a new public/private partnership whose normative value is still uncertain, we will examine two authorities that specifically stake a claim to this concept in order to further Internet governance.

Two ad hoc organisms have been created in Europe: in May 2001, in France, the Internet Rights Forum (FDI), an association under the 1901 law supported by the Prime Minister and funded with public money, whose slogan is "Let's build Internet civility together"; in October of the same year, in Belgium, the Internet Rights Observatory (ODI), founded by a royal ordinance and placed under the supervision of the Minister of the Economy, with the slogan "The Internet in full confidence."

These two organisms have similar missions: organizing the cooperation among actors, increasing public awareness and making proposals to the public powers about topics related to the Internet (protecting minors or privacy, electronic government, electronic commerce, among other examples). They have similar organizational and operational modes: a board of directors and multi-partner volunteer working groups (companies, professional associations, users' associations, academia, civil servants), a full-time staff with primarily legal skills, public information and online debating, publishing reports and recommendations intended to define responsibilities and, consequently, to clarify public policy. Their work topics are sometimes designated by public autorities, and sometimes chosen of their own initiatives. Since 2003, a co-investment of the two organisms in the creation of a European Forum of Co-Regulation can be added to this list; to date, this Forum includes eight partners of various statuses.[61]

In the background of these authorities, the building of a network of actors has been developed as a new public policy procedure.

At the end of the 1990s, several scandals involving illicit contents made public via the web cast doubt on the effectiveness of national jurisdictions to confront a new risk: an "outlaw" Internet. In France, a report by the Conseil d'État ("Internet et les réseaux numériques"[62]), followed by a report by National Assembly member Christian Paul ("Du droit

[58] The French version was recently launched; see http://fr. creativecommons.org.
[59] David R. Johnson, Susan P. Crawford and John G. Palfrey, Jr., "The Accountable Internet: Peer Production of Internet Governance," *Virginia Journal of Law & Technology Association*, vol. 9, no. 9 (Summer 2004). Thanks go out to Herbert Burkert for pointing out this article.
[60] In Jacques Berleur and Robert Queck, foreword to *Gouvernance de la société de l'information*, *op. cit.*
[61] See http://network.foruminternet.org
[62] Paris, La Documentation française, 1998.

et des libertés sur l'Internet"[63]) concluded that a new institutional approach was necessary, with regard to the Internet, to make the law enforceable. This is co-regulation, which intends to be "a middle ground between too much State and too much freedom."[64] Promoted by an organism that plays the role of mediator between the public and private actors of the Internet, this form of governance is based on negotiating norms in "a collective adventure" that aims to "maintain a balance between self-regulation and State regulation, through open and pragmatic discussion."[65] This free speech is supposed to lead to both moral and rational efficiency, notwithstanding the limits of willingness of the parties present,[66] the filters of expertise, the uncertain weight of recommendations both on political decision-making and the "labeling" of sales practices. In sum, "It is the deliberative process that must extract public virtue,"[67] at the price of fragmenting public space so as to institutionalize diverging interests in the hope that they will converge under the auspices of security and civility.

Brought down to the territories of Internet deployment, co-regulation, according to its own promoters, "figures among the means to reduce the divide between network space, which is worldwide, and democratic space, which remains national or continental."[68] For the time being, the ambition is limited to the national and European scales, but it seems to follow the contours of *soft law* prevalent in the US. In its dual quest for legitimacy and effectiveness, co-regulation is thus at great risk of being manipulated by politicians or lobbyists. Optimistically assuming equality among the parties present, the experiment of "grafting" ruling power and contractual Internet practices carries the risk of being rejected for many different reasons.

Therefore, our analysis is as follows: these models are not so much alternatives as complements for producing laws, for self-regulation (the first case) can only impose itself if it is relayed by law, and co-regulation (the second case) has the goal of clarifying and reassuring lawmakers.[69] We would add that, in this type of practice, the "technical grammar" of the Internet (protocols and standards, data transfer infrastructures, routers, addressing and naming codes, etc.) seems to be taken into account as an intangible given and not as a certain state of technology and power at a certain time. This gives any of the "arrangements" obtained a temporary aspect and introduces a risk of rapid obsolescence into all legislative production.

Lacking to question the basis for the balance of powers between the law, uses, the *Lex Mercatoria* and the *Lex Informatica*, self-regulation as well as co-regulation cannot resolve the conflicts of norms in the long term; these models come up against the absence of principles that would at least allow norms to be clearly and collectively prioritized, if not harmonized.[70]

The "spam" question

If we leave aside the domain of organisms to touch on the themes of regulation, one example will allow us to complete our comments. The example is that of "spam," or

[63] Paris, La Documentation française, 2000.
[64] Isabelle Falque-Pierrotin, president and founder of FDI, *Le Monde* 27 November 1999, quoted by Amar Lakel in his article "La gouvernance de l'internet : vers un modèle de co-régulation," in Jean Mouchon (dir.), *Les mutations de l'espace public. Des textes fondateurs à l'émergence des nouvelles pratiques* (Paris, Ed. L'esprit du livre, 2005).
[65] Christian Paul, *op. cit.*
[66] When music publishers refuse to attend a working group's meeting on peer-to-peer, the debate is adjourned…
[67] Amar Lakel, *op. cit.*
[68] *idem* footnote 26.
[69] If not of providing them with an alibi of democratic consultation.
[70] See Éric Brousseau's article in "Gouvernance de la société de l'information," *op. cit.*

unsolicited email (usually for sales purposes).[71] Spam has been studied on the European level by Oxford University's Socio-Legal Studies Centre and the question of spam has fueled Chris Marsden's analysis.

This is one of the favorite subjects of public authorities[72] because it is familiar to everyone (spam "annoys" even the average user) and is a concrete example of network dysfunction – and as a result, of the need to regulate the network. Different facts circulate: spam represented on average 65% of all email sent in 2004, 52% of web surfers have clicked at least once on a spam to see its contents, the biggest spammers are in Florida and Russia, spam is the major reason why people in industrialized countries quit using the Internet and also the reason behind the low use of Internet in less developed areas with slower connections, etc. So spam and spammers must be gotten rid of online exchanges to go back to fluidness and confidence.

The Action Plan adopted by the WSIS in Geneva recommends taking "appropriate action on spam at national and international levels" in paragraph C5d. And what else? Although AOL and Microsoft declare that they block millions of spam a day through technical means, although the UK is attempting to promote its London Action Plan on the international level, although the European Union has issued a directive about spam and the ASEM has held a specific seminar about it, although the OECD has made an anti-spam "toolbox" available, and although the G8 debates have seized upon it, spam continues to resist all forms of regulation. Software solutions, laws, company or inter-company charters, public awareness and calls for vigilance by web surfers – none of these approaches[73] has worked. Is this the perfect symbol of the impossibility of Internet governance?

In the list of proposed remedies, the first priority concerns finding out who is responsible. The second, which measures should be adopted. In both cases, governments, service providers and consumers do not have the same obligations or capabilities. And while a difficult international coordination is attempting to be set up, the self-regulation promoted as a lesser evil often leads to proprietary "default" filters used by ISPs, which reduce competition and freedom. We believe that the general focus on this subject works somewhat as a smokescreen.

Chris Marsden’s proposed analysis reveals that, if a practical system for regulating Internet contents can exist, this regulation of a technical nature is in the hands of a limited number of broadband holders.[74] It is independent of public policy and leaves intact the question of maintaining democratic principles while using regulatory powers. Here the problems of the Internet emphasize the alternative introduced by the governance of socio-technical processes: between normative regulation according to democratic procedures, where a new framework must be built, and positive regulation according to market procedures, with a renewed risk of domination.

[71] In a 14 October 1999 report entitled "Le publipostage électronique et la protection des données personnelles," the Commission nationale de l’informatique et des libertés (CNIL) defines spam as "the massive and sometimes repetitive sending of unsolicited email to persons with which the sender has never been in contact and whose email addresses have been collected in an irregular way."

[72] The question of intellectual property rights is the favorite subject for concern, shared with the industrial sector.

[73] Here we find the four “spheres” that make up the social order of the Internet, according to Lawrence Lessig.

[74] At the top of the list appear the historic telecommunications operators and former national monopolies.

A debate to be continued

In 2001, the contemporary crisis in regulation inspired a report entitled "Governance in the European Union"[75] that envisaged paths for reforming the European institutions based on a "procedural rationality" in which "the opinions of the people concerned are not an obstacle to the effectiveness of a decision [but] an essential ingredient." Beyond the question of "how" to govern well, there was the question of finding out " what 'governing well' actually means". Among the answers given, the British contribution mentioned: "Governing thus entails modifying the environment in which social actors move, i.e while not necessarily constraining the players, at least refusing to fetichize the circumstances in which they interact."[76] The new governance should avoid two pitfalls: "formalism pays insufficient attention to the context in which the rule is applied and subjectivism is harmful from the point of view of the security that the various parties will expect."[77] The ambition seems to have failed and, as far as the Internet is concerned, other positions must be envisaged.

The concern for "coordination" among interests emphasized by ICANN, a system closer to the current state of affairs than that of "governance," do not lead to a consensus accepted by all parties. The current system of representation for the actors of the Internet lacks in reflexivity and openness. In this sense, it holds back the expression of a general universal will and benefits the experts and industrial and commercial interests that currently run the network and services. Furthermore, the opinion of experts in the technical organisms concerned (ICANN, IETF, IAB, RiRs) is often biased by their professional association with commercial or industrial stakeholders. The central question of the WSIS is how to structure, represent and regulate flexible, multiple organisms that are charged with defining and deploying Internet norms on the national, regional and international levels. The Vox Internet seminar showed the current state of the debate on the importance but also the limitations of the role of governments in this matter.

Seeing the different and often contrasting positions, or even in direct opposition, it would seem that the decisions of the national and international public authorities concerning the management of the Internet are not sufficiently grounded in the objective and transparent information and facts on industrial and commercial strategy, nor on the reality of the day-to-day and multiple practices of Internet users. Competition is not in fact being regulated at this level, nor is it effectively deployed. Moreover, public decisions are not sufficiently resulting from the technological forecasts for the middle and long-term (the current debates on the "Lisbon strategy" show the European limits in this area). Thus the decisions made by a number of advanced Western and Asian countries tend to hold to the status quo, appealing to notions of security and stability that guarantee the established interests of well-identified countries or companies. But for other countries, especially large countries with emerging economies, the Internet is considered to be a "block of the future," a potential at everyone's disposal. It also constitutes a means for redefining multilateralism for the benefit of new entities and regional blocks.

In terms of public opinion, the actors' positions and forecasts result from a continuous plan of events that the press and media qualify as "Internet policy and economy." The Clinton-Gore years were emblematic for their emphasis on technical progress to justify a political program. However, the political and market decisions linked to the Internet most often interface without sufficient readability, creating a loop of self-referencing cut off from any true democratic control. This shortcoming either fuels a positive effect, a "self-fulfilling

[75] "La gouvernance dans l'Union Européenne," Les Cahiers de la Cellule de Prospective, Commission européenne, 2001.
[76] Introduction, p. 22.
[77] *Idem*, p. 26.

prophecy" (Grand Narrative, Internet Ideology), linked to progress, jobs and growth, or the inverse negative effect, as when the speculative bubble burst. These opinion effects play a non-negligible role in the ongoing debates – hence the importance of clarifying the foundations of the Internet system.

In terms of use, we cannot reason in terms of simple consumption of goods and services (even in a renewed form of consumption). The history of the Internet continues to be made via "bottom-up innovations."[78] These are characterized most often by a mixture of individual and collective uses, but also by the growing integration of developments resulting from free software in commercial applications. Then the network sociability imposes itself over individual use, often encompassing. In so doing, it multiplies the capacity for innovation. This can allow the capacities of resistance to be reinforced or the rise of alternatives to the existing economic and political system. But it can also give the latter new advantages for creating wealth and jobs.

In sum, the lack of a theoretical framework for analysis causes the current debates to be overshadowed. It harms, perhaps purposely, the outcome for a quick and fair international settlement to the question of Internet governance. In this perspective, the preoccupation of creating a lasting corpus of stable and equitable norms, corresponding to the interests of the largest number, runs the risk of being thwarted by the ambiguity of the sought-after political and social agreement. Among stakeholders and governments, much tension results from the parallelism between the equivalence of a system of rules prescribed by treaty or laws, and a system of conventions resulting from flexible agreements among communities of actors.

Therefore, in terms of research, it would be appropriate to reinforce an epistemological, multidisciplinary approach at the point where scientific and normative approaches meet, thus allowing clarification of the possible models for agreement among the parties. To do this, one might imagine establishing the large categories of a collective reference system linked to Internet uses. More than the *a priori* definition of co-regulation or multi-governance, this would be an analysis of the fields of "governmentality" and technical, social and legal regulation. This process might inspire the drafting of an "Internet Chart," which a growing number of actors have been calling for. Its objective would be to enable all viewpoints to converge into a common matrix, while enabling the international community to agree upon the conditions and instruments needed for a technical and political balance of the management and use of the common good that the Internet is.

Paths for further research

In the end, Internet governance seems to be less an "institutional mirage"[79] than a notion and tool that brings fundamental political questions to the forefront for anyone who wishes to address them: How can a society be built on diverse conflicting freedoms? How can the sources of normativity be structured? How can the two requirements of innovation and democracy be guaranteed on a global scale and in the long term?

Within the multiple contributions made to the ad hoc WSIS Working Group, there are descriptive analyses, often very thorough, of the actors, authorities and issues of Internet governance.[80] The official inventory of "public policy issues" alone is rather dizzying due to the number of items and the total lack of ranking (see the list given in the appendix to this chapter). In the WSIS process, the emphasis placed on such an inventory of sometimes contradictory principles concerning the information society may lead to an impasse: Would it be question of establishing a list of priorities between freedom of information, intellectual

[78] This is one of the research topics of the sociologist Dominique Cardon at the France Telecom R&D lab.
[79] The expression comes from Paul Mathias, 12 April 2005 session of his seminar "L'internet : questions de droit," Collège international de Philosophie.
[80] See www.wgig.org and, for a first assessment, www.diplomacy.edu.

property rights, trademarks and copyrights, the fight against piracy and spam, respect of identities, multilingualism, universal access, the war on poverty, etc.? Who would have the legitimacy needed to propose such a list?

Even if they sometimes try their hand at forecasting models or scenarios, these documents are limited by the absence of a theoretical foundation for the term "governance." Yet indeed, if the notion is basically a vague process, it seems that much more necessary to develop a stringent research process, the lines of which are already sketched out. Several of these became apparent during the work of the Vox Internet seminar, and they were worked on by teams that were relatively unaware of one another before their meeting in the Vox Internet seminar.

- The first field of useful studies analyze the notion of the "State as regulator" as an expression and as a technique, somewhere between a principle of social cohesion, an essential instrument of social development or a modest referee in the game of economics.[81]

The notion of "public/private partnership," for example, though quite usaul, merits being questioned independently of the circumstances and actors involved in it. Likewise for the idea of "contract": Could the cascade of private or mixed contracts that organize the way the Internet currently functions become part of a new "social contract" in the Enlightenment sense of the word?

- A second path for research aims to confront the "soft" notion of "governance" with the more complex, but perhaps more fertile, notion of "governmentality."

What is meant by this is a questioning of the relation between power and society, in line with Michel Foucault's contributions, which interest a growing number of political scientists.[82] Broaching Internet governance through this path requires a process that Sylvain Meyet has very much wished to sketch out, in terms of techniques and instruments forming a specific rationality, not exclusively centered on the institutional actors, enabling an understanding of the governing of free actors and the limits of a strictly legal system. This link to Foucault can be found in many research works in English, including for example Annette D. Berensford's research on Internet fraud deterrence.[83] And we could not fail to mention how much the "progress" in biometric identification echoes the body's status in the "bio-power" analyzed by Foucault.

- A third direction has been opened up by the renewed debate between normative regulation and positive regulation and the requestioning of the notion of reflexivity, launched by internationally known Belgian research teams.

"In the domain of Internet regulation, a [certain] form of flexibility is being mobilized on the level of the technical actors in the debates on private life, content regulation and the problems of intellectual property rights. On the other hand, on an institutional level, organizational learning processes are being envisaged through technical projections or the creation of ethical committees within the international professional associations. However, in both cases,

[81] See, among other perspectives, Jacques Chevalier "L'État régulateur," in *Revue française d'administration publique*, no. 111, 2004.

[82] See the recent colloquium organized by the Association française des Sciences politiques and the Centre interdisciplinaire de recherche comparative en sciences sociales: "Le politique vu avec Foucault" (www.asfp.msh-paris.fr/activite/diversasfp/collfoucault05).

[83] "Foucault's theory and the deterrence of Internet fraud," in *Administration & Society*, vol. 35 no. 1, March 2003.

the conditions for acquiring capacity, or even for inferring capacity, are not drafted for themselves."[84]

- These actors' capacities would need to be evaluated, as Herbert Burkert has suggested, according to a benchmarking technique that would require a process leading to "legitimacy and justification."

This would mean relating all problems – even the most technical ones – and all their solutions to the imperatives included in the Declaration of Principles and the Action Plan adopted by the UN at the end of the first World Summit on the Information Society. The Internet would merit being managed on the international level in a "multilateral, transparent and democratic" fashion, and priority could be given to "multi-governance" or "multi-regulations," whether by sector or geographic area. This approach to Internet governance as a "miscellaneous assembly of diverse interconnected circles in which discussions and decisions are made on resolutions that involve the stakeholders of each circle" would be "in tune with the spirit of the Internet and its decentralized topology."[85]

Such an evaluation work would perhaps remove the apolitical aspects of the notion of governance. It might result in actions able to correct the asymmetries, to involve all the actors legitimately and responsibly, and to avoid cordoning off innovation. It would be up to the strategists to agree on the choice of the "dynamic nucleus" necessary for coordination and to shelter it properly.

- Another field is thus tackled: international law.

If there exists no global judicial order, the law is nevertheless in the process of becoming more international through the extension of norms to different scales, with the multiplicity of treaties, systems and conventions. Numerous international and supra-national organizations are confronted with Internet issues in the course of their most ordinary missions: the International Telecommunications Union for communications infrastructure, UNESCO for cultural and linguistic diversity, WIPO for the ownership of online contents, and for domain name rights assimilated to trademarks, to name only a few. However, beyond these institutionalized structures, the perspective of the Internet as a *global facility* breathes new life into the issue of "common goods"[86] and their legal status. If, as Mireille Delmas-Marty has said, some indetermination is necessary at the current stage, it is because between human rights and market rights we have not yet managed to set up pluralism, to redefine power and to agree on a common symbolics.[87]

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[84] According to Tom Dedeurwaerdere's words during the first session of the seminar (FUNDP, 2005-2006) "Raison technique, raison éthique et gouvernance" in homage to Jacques Berleur. See the program on www.info.fundp.ac.be/communication_societe.

[85] Loïc Damilaville, "Vers une multi-gouvernance d'Internet ?" *DNS News* no. 81, January 2005.

[86] See for example "Le bien commun comme réponse politique à la mondialisation," under the direction of Olivier Delas and Christian Deblock (Editions Bruylant, 2003).

[87] Comments excerpted from her inaugural lecture as Chair of Comparative Legal Studies and Internationalization of Law at the Collège de France, "Les forces imaginantes du droit : le relatif et l'universel" (Fayard, 2003).

APPENDIX

Key Issues

(Working Group on Internet Governance – UN, Geneva, April 2005)

1. Issues relating to infrastructural issues and the management of critical Internet resources, including administration of the domain name system and IP addresses, administration of the Root server system, technical standards, peering and inter-connection, telecommunications infrastructure including innovative and converged technologies, as well as multilingualization. These issues are matters of direct relevance to Internet Governance falling within the ambit of existing organisations with responsibility for these matters.

Physical and Secured infrastructure

Telecommunications infrastructure, broadband access
VoIP
Peering and interconnection
Spectrum policy
Technical standards
Logical infrastructure
Administration of Internet names
Administration of IP addresses
Administration of root server system
Multilingualization of Internet naming systems

2. Issues relating to the use of the Internet, including spam, network security, and cybercrime. While these issues are directly related to Internet Governance, the nature of global cooperation required is not well defined.

Spam
Cybersecurity, cybercrime
Security of network and information systems
Critical infrastructure protection
Applicable jurisdiction, cross border coordination
Exemption for ISPs of third party liabilities
National policies & regulations

3. Issues which are relevant to the Internet, but with impact much wider than the Internet, where there are existing organisations responsible for these issues, such as IPR or international trade. The WGIG started examining the extent to which these matters are being handled consistently with the Declaration of Principles.

Competition policy, liberalization, privatization, regulations
Consumer, user protection, privacy
Electronic authentication
Unlawful content and practices
Access protection
Intellectual property rights
Dispute resolution

E-commerce and taxation of e-commerce
E-Government and privacy
Freedom of information and media

4. Issues relating to developmental aspects of Internet governance, in particular capacity building in developing countries, gender issues and other access concerns.

Affordable & universal access
Education, human capacity building
Internet leased line costs
National infrastructure development
Cultural and linguistic diversity
Social dimensions and inclusion
Open-source and free software
Content accessibility

Conclusion

Return to the present day (to break away from it better…)

For many commentators, the WSIS project grows out of an ideological vision – "cyberdemocracy" – born in the Internet euphoria of the 1990s, but nowadays obsolete. To these commentators, the relative "banalization" of the Internet forced the key players to leave their "bubble" and return to the reality of market forces. Once again, the utopia did not take root. The Vox Internet seminar has aimed at developing an approach based on analysis of the "real" Internet with respect to its promises.

Like preceding UN summits, the Geneva session of the WSIS brought to light a dual institutional problem. On one hand, the managerial capacities of States are limited at a time when capital and data are transferred across borders instantly, as this capital and data flow occurs without governmental oversight inside a broadly distributed technical organization that governments can hardly get hold of. On the other hand, there is a political difficulty in imagining new systems for "living together better." The challenge of Internet governance, as interpreted by public and private players, is emblematic in this respect:

- On one hand, content regulation raises difficult questions in terms of public policy, going beyond the foundations of criminal law and civil law: at a time when families surf the web together and when citizens' daily actions (administration, commerce, social relations) assume an electronic form, confidence and security are lacking;
- On the other hand, the management of technical resources, conceived at the beginning of the network of networks as a restrained configuration, is reaching the limits of its stability, nevertheless without fulfilling the demand for greater transparency and equity.

Numerous more or less official authorities strive to influence the debates publicized by the WSIS. But to this day the progress is disappointing. Unable to structure the three principles of complexity, completeness and coherence, the analyses remain marked by the power of "experts" (captains of industry, technocrats or self-proclaimed "representatives" of civil society). Still absent is one vital partner: the Internet users, who make the network live and grow in the day-to-day in many innovative, unpredictable ways. Hence there is no answer to this recurrent concern: how can the generalization of the Internet benefit the citizens of all parts of the world in a globalized politico-economic environment?[88]

Here we hit upon the very general problems of identity and freedom, of responsibility and security, of private property and general interest. Yet too often these challenges are grouped into antagonistic pairs whereas a pragmatic, concrete approach can, if we so desire, be structured using a normative approach. Insofar as Internet governance is not a formalized concept but a tool, a process and a continuous development of interactions, the research community is invited to take hold of this object, to reflect on its limits and possibilities, outside of any narrow agenda. The Vox Internet seminar has thus worked to reinsert some of the corpus of Internet issues into the field of theoretical research, focusing less on the *how* of Internet governance and more on the *why*.

The process that we have undertaken aims at linking together thematic approaches both by discipline (law, economics, communication science, computer science, political science) and by sector (industry, administration, associations). Through the diversity of the

[88] See Françoise Massit-Folléa and Serge Proulx (ed.), Actes du colloque COMMINT/Canadiens en Europe "Internet, nouvel espace public mondialisé ?," to be published online, summer 2005.

styles and topics included in this report, and in the production process itself, we have been able to isolate a first set of key issues.

Method questions

The Vox Internet seminar has attempted to experiment with an organizational and meeting mode based on a rationale of an active network built around a community of knowledge. This is intended to provide a balance between an open network of researchers and experts, meeting together on a purely voluntary basis, together with a collaborative management of work, motivated by a project (a report) framed by a tight calendar.

The participants represent a wide range of origins and statuses (professionals, officials, researchers, consultants, doctoral candidates, NGO members, etc.), even though this diversity was not a criterion for being accepted in the working groups. However, a totally open network would not have been fully suited to reflection. The invitation process (albeit informal) followed a rhizomic pattern that included anyone whose work, intellectual efforts or daily commitment showed an interest for the challenges selected by the piloting committee. It was therefore not a question of bringing together a large group, but progressively throughout the seminars, of bringing together the participants freely in a "community of knowledge." The delicate equilibrium between cooptation (were it carried out along intellectual criteria) and open forum requires a continual back-and-forth between making the debates public and accepting members. The progressive constitution of an open community allowed participants engaged in a collaborative project to have their efforts evaluated in real time.

Due to the declared goal of applying a multidisciplinary, multi-sector approach involving many players to objects that are complex but nevertheless commonplace, the panelists and participants had to give simultaneous translation to their opinions and analysis. Thus, within a pre-constructed thematic framework, with no claims to legitimacy or comprehensiveness, a series of localized issues were communicated in order to elaborate a series of shared concepts. Faced with these very contemporary challenges, the multidisciplinary and multi-sector "dispute" allowed a new dynamic to be born between research on one side and socio-political issues on the other. This new dynamic maintains the integrity of knowledge and its effect on the practical field.

The decision to give equal weight to the presentations and discussions enabled summaries of the debates to be drafted. Made available via a distribution list, these constituted the second section of the reflection. Far from wanting to reach a consensus, it was a question of seeing a mosaic of comments and documents or complementary references, all related to the theses or hypotheses being put forward.

The third step of the process was the drafting of the report by the piloting committee. The moderator for each session was assigned the task of proposing a new reflection, based on both a subject area (law, economics, political science, etc.), and presentations or deliberations, to translate the diversity of viewpoints, the multiple questions and the tensions persisting between competitive theses. The "state of knowledge" presented here does not hide its transient nature, but only asks to be completed. If for this it is useful to institutionalize the process further, then this institutionalization must nevertheless maintain the criteria that have allowed the first step to be accomplished successfully.

Lastly, the Vox Internet seminar intended to demonstrate the European scope of its work from the first phase onwards. This is obvious in the piloting committee make-up, the choice of the panelists for the closing session and the tone for all the sessions. It was confirmed by the regular participation of doctoral candidates (in law, communication

science, political science, geography, etc.) from fifteen different nationalities. It is reinforced by the presentation of the elements of this report in various European academic and non-academic meetings.

Definition questions

At this stage in the work of the WSIS and the WGIG, there is no common agreement among stakeholders as to the definitions of the terms Internet, governance and moreover the notion of "Internet governance." However, these terms correspond to empirical arrangements and agreements concerning the relationships among numerous players. It has thus been observed that the structure of the Internet itself and its effects have been inadequately clarified.

The term governance itself tells of a crisis in public authority. It is strongly connoted with principles of private management, numerous parties and the contractualization of the law, following the principles of Anglo-Saxon common law. Can it be applied to the management of a network that is described more and more as a "public resource" and a "common good"? These notions go beyond the categories of national or international public law. This legal debate is part of a more general crisis of social normativity, fueled by the public power's withdrawal from its ruling duties, and by the lack of democracy in the consultation procedures. In line with Michel Foucault's thoughts, the strategic relations among many players could also be analyzed in terms of "governability," thus, using the technologies of power.

Framework questions

The general observation that the current Internet management organs were lacking in equity and representativity led to considering that the UN framework was appropriate for opening a debate and making recommendations. However, at the same time, the UN system is itself criticized for its management, decision-making and organizational modes. Therefore, we are seeing an attempt to establish a new form of international cooperation, making wide use of the concept of *multi-stakeholders*, even within a system that is seeking deep-reaching reform. Moreover, it is not easy to establish the coherence between the functions of international organisms established by treaty, such as the ITU, WIPO, OECD, UNESCO, and the de facto functions exercised by the organizations of technical coordination of Internet such as ICANN, IETF or W3C.

The sentiment shared by the international community is that the Internet landscape is vast but not universally, or equitably, shared. It remains segmented from both the economic and geographic point of view. Without being able to measure or interpret it precisely, we have noticed that the north-south divide, the disparities within a given are (cities, countryside, islands, etc.) and within a given population (age groups, sexes, occupations, education levels, lifestyle, etc.) have sometimes been reduced, and sometimes been made worse by the rise of digital technology.

On the level of the "historical" representation of the bodies that manage the Internet, the paradigm that has been arbitrarily adopted is either two-part (supply-demand) or three-part, between the private sector (the telecommunications industry, IT services and cultural industries), governments and civil society.[89] This second paradigm was used for the WSIS, but this classification tends to minimize certain legitimate interests, including those of academia and research, individual users, civil servants, the non-commercial sector, etc.

[89] On this notion, see the corresponding articles in "La société de l'information, glossaire critique," French Commission for UNESCO (La Documentation française, Paris, 2005).

However, at the same time, the potential for network innovation cannot be denied and the daily practices of Internet uses are continually upsetting the established framework.

Regulatory questions

In this regard, it was pointed out that the current relations among those involved in the Internet are the translation of informal rules established by associations in the 1980s and '90s, going against the weighty procedures of the organisms that dictated computer and telecommunications norms. Today, it would appear that these same players are defending the status quo, while others are pursuing an open tradition of free expression of diversity and demand – this is the example of peer-to-peer and free software.

Furthermore, numerous asymmetries have appeared and are reinforced by the continuous deployment of the network on an international scale: limited and geographically concentrated root-servers, the "associative" allocation of IP addresses, backbone managers organized as North American oligopolies, interconnection costs without reciprocity agreements, search engines in a nearly monopolistic position, etc. We could add to this list of asymmetries the domain name system's quasi-monolingual Anglo-Saxon scripts and the general power to name the categories of the Internet that is in the hands of ICANN, which decides on the quantity and quality of top-level domain names, even for country codes. Thus the notion of network neutrality is called into doubt and merits being studied and assessed.

In parallel, the debates of the Vox Internet seminar have brought to light the expression of a radical tension between the principle of creation and the principle of conservation. Certain experts consider the system to be stable, needing conservational measures in order to increase its security, resilience, reliability and integrity. Others support the idea of moving ahead while guaranteeing the current interoperability and functions of the network (Next Generation Network's project). Still others emphasize the fact that a growing number of Internet exchanges are already taking place outside of the domain name system. This situation could constitute the premises for redefining the dominant Internet paradigm, hence innovation would again take on its full meaning.

The phenomena of delocalization and virtualization linked to the deployment of the Internet lead to economic and societal effects that are poorly identified and poorly measured. The interrelations of the notions of space (real and virtual) and communities (of web surfers, clients and users) lead to new forms of reasoning in the exchange of goods and services. The distribution modes and the sharing of value create effects for opportunities and externalities that have not been sufficiently studied. We are witnessing the emergence of compensation models representing modes of consumption that are not founded on commercial exchange. Furthermore, technology is not accepted in the same way by different social groups, communities or individuals, depending on the society in question.

New bases for Internet governance

If the heart of the Internet is characterized by a unified protocol governing how two or more entities interrelate (addresses, machines or people), we are forced to recognize that the number of data packets, routes for data transfer, ways to access this infrastructure, contents transmitted and regulatory modes are all increasing. The Internet, approaching its fortieth birthday, is a source of political, social and commercial tensions, due to the incongruity of a nearly monopolistic infrastructure for a platform of innovations that are just as abundant as they are unpredictable.

The Vox Internet research program chose to trace backwards from the uses towards the tools and institutions. Three large domains provided a first field for observing the

mutations introduced by the Internet: technology, economics, law. After eight seminar sessions, a few modifications have occurred in the vocabulary of Internet governance:

- Confidence rather than security,
- Adaptability rather than performance,
- Correcting asymmetries rather than achieving equity,
- Responsibility instead of transparence,
- The right to diversity rather than inclusiveness,
- Exchange economy instead of information or knowledge economy.

This new terminology opens the way to more conceptual breaking points, giving priority to:

- Identities (not identity),
- Maintaining the technical architecture as an open system (otherwise we would be condemned to continually filling in the gaps of a system limited to what has already been acquired),
- The socio-political formatting of the network (more determinant for the future than a mythical technical neutrality),
- The right to an interactive international existence (respecting sovereignty),
- The plurality of the actors' capabilities (which is the basis for the pluralism of powers).

From a functional angle, the issue of governance thus gets rid of an undefined and uncontrollable extension of its subject. The Internet functions first and foremost following a principle of voluntary cooperation, of the desire to interrelate. The issue of governance is also protected from legislative inflation that quickly becomes obsolete: "good usage" based on the notion of a common good encompasses the contractual relations of private law, multilateral agreements, and the freely consented governing of conduct.

The notion of Internet governance therefore calls for supporting diversity and reinforcing legal competition, and for the advancement of new instruments of political deliberation. In short, it calls for a renewed conception of the old pairing of the technological and the social in the public realm. This paradigm, which could aim towards proposing a new "social contract" for the digital world, is still vague. Consequently, the task that falls to researchers is three-fold: to clarify, to experiment and model, to debate. The Vox Internet research program intends to follow this path, opening up to other disciplines, to new partnerships and to new working methods.

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Appendix 2 - Adaptive Internet Governance - Basics

Louis Pouzin - EUROLINC

Present situation

A single government decides what is good for itself, thus for the others. As this practice is not acceptable by the entire world, it is predictable that various countries will organize the internet governance (IG) in their own way, like China already did.

Fundamental principles

The IG shall be organized in a framework designed to last longer than the time frame needed to make it operational, that is a minimum of ten years.

Differences in development level, languages, cultures, jurisdictions, political systems, and morever conflicts of interests frequently resorting to wars, make unviable a monolithic and centralized structure.

The IG framework can only be multilateral, and rooted to subsidiarity.

Implications

The worldwide internet is composed of millions of autonomous systems. Consistency and interoperability are achieved by using common standards, and by the orderly allocation of common resources.

Standards shall be defined for the needs of users of the whole world. Standardization structures shall adjust to regional and local needs. Some standards are necessary at world level, while others should address more localized uses.

The allocation of common non material resources (e.g. identifiers) shall be defined by legitimate institutions belonging to the United Nations (UN) system.

The stable operation of the internet shall result from the interconnection of a multiplicity of autonomous cooperating systems (as is the case of telephony), and shall not depend on a unique and centralized system (as is the case of DNS).

Models

By necessity there will be a plurality of IG models. A matrix of scenarii has already been proposed [1]. Roles distribution between the public sector, the civil society and the private sector lends itself to a diversity of blendings pertaining to national choices.

The worldwide IG model is basically a system of cooperation and interoperability between diverse IG models chosen by UN member States, with the involvement of other stakeholders.

Excessive model diversity would certainly be too complex for being efficient. It would be desirable to achieve interests aggregation so as to make up one or two dozens models at most.

Organisation

In a first phase, and taking account of the UN organization, a certain number of member States adopting the same model constitute an IG domain (IGD). There is no reason to introduce constraints of geographical proximity, which may make no sense in the present world.

The IG organization in an IGD pertains to constituent States. Hence, it shall not be addressed in this document.

In a second phase, it would be interesting to explore the creation of stateless IGD's, composed of non profit, industrial, academic, trade, or other structures. Some experience is needed to insure the coexistence of States and stateless IGD's.

Interoperability

Basic technical interoperability, defined by numerous documents (RFC), is a necessary common platform, but it is restrictive and lacking with regard to many needs perceived by users and operators. Some examples:

- use of alphabets other than the ASCII subset,
- peer-to-peer communications,
- traffic instrumentation,
- mobility of users, contents, network elements,
- identification and authentication of partners,
- spam elimination,
- protection against software attacks.

The implementation of trusted domains, as it had been announced for dot EU, implies the IGD concept, in which technical and jurisdictional arrangements may be deployed to achieve specific objectives.

Technical aspects, as complex as they may be, are only a minor component of interoperability. Other aspects, which may be little or non technical, are just as essential. Some examples:

- tariff agreements for user and transit traffic,
- jurisdictional agreements for spam, illicit contents, advertising and sale of dangerous materials (weapons, drugs, medicine), information theft, misuse of personal data, defamation,

- monitoring of some sensitive traffic, alarm criteria,
- coordination of police interventions or others.

These issues are not new in the telephone system context, and acquired experience would be very helpful for transposition in the IG context. Furthermore, telephony evolves unavoidably toward voice over IP (VoIP), which in time will make rather thin a distinction between internet and telephony.

Common resources

Internet common resources are:

- IP addresses,
- domain names.

Only IP addresses are technically bounded. Their allocation at world level could be delegated to ITU, which already allocates diverse common resources for radio and telephony. Address blocks could be allocated by ITU to IGD's or to countries. These two options are not exclusive. The procedure is to be agreed between ITU and IGD's.

Domain names belong to two types: ccTLD and gTLD.

ccTLD's (ch, fr, uk, etc.) are domain names corresponding to country names. They are defined by the UN and the ISO 3166 standard. The WSIS Declaration of Principles assigns to States the sovereign right of managing these domains.

Generic gTLD's (com, edu, biz, info, etc.) are a resource artificially limited for reasons of merchandising, and their management is under ICANN control. It may be impractical to change substantially the existing status. However, IGD's can introduce new gTLD's in their domain, as well as multi-IGD gTLD's by mutual agreement.

At world level the management of this type of common resource, the value of which is essentially a brand name, should be handled in the framework of an institution in the UN system dealing primarily with commerce.

Reference

[1] - An Analysis of Internet Governance Aspects, Feb. 2004, by Loïc Damilaville & Louis Pouzin
http://www.itu.int/osg/spu/forum/intgov04/contributions/govern_analysis_1.4.pdf

Appendix 3 - Identity Management & Security: Key Issues

Louis Pouzin (Eurolinc)[90]
J.-Yves Gresser (Black Forest Group Inc.)[91]

Foreword

Trust and confidence on the internet are key concerns for individuals and enterprises, who are now using it for a growing number of applications with either private or government entities, locally or around the world. Authentication is the foundation of any security scheme. Setting up a robust and "healthy" scheme for identity and habilitation management is paramount. This scheme must be universal, i.e. applicable to every sector and across sectors– "Interoperability" is a key issue.

Today the core technology products and services originate mostly from the US. The current offer is very limited and expensive. The few vendors lock up their customers with proprietary technology that is far from inter-operable. Thus security rarely goes beyond the perimeter of a given entity, be it a company or a government office. The most advanced applications only deal with bilateral transactions (payment order, tax declaration) while in the real world even the simplest commercial transaction involves multiple participants.

Naturally, the control of the technical components is extending to the control of identity repertories. There are many reasons why "foreign entities" should not be eligible to manage wide or even small-scale identity repertories. The least being that they bear no liability what so ever:

The banks have shared their risks for many years. They are an exception. Today, outside the banks, there is still only one exchange system in the world, which transaction risks over the internet are insured. A closer look at the letters, which technology vendors send sometimes to their customers, show that they do not commit to financial compensation if anything goes wrong in their systems. The same applies to any so-called "trusted third parties" whether a registry or a certification authority.

Digital Security, Keys & Certificates

The level of trust and confidence will depend on the type of information that circulates over networks. Security devices and set up will have to provide an adequate and proportionate response to the value, to the confidentiality of the information and to the potential threats. This field is largely underdeveloped, unexplored, partitioned and almost entirely left to a few number of technology providers, which are often ignoring or even acting against the interests of the end-users.

The Paper Check

This is an example among others. It illustrates the need for identities in commercial transactions.

The paper check is largely used in many countries. It bears the name and address of a bank, a serial number, an amount (in digits and letters), a date, the name, address and signature of the payor. It is possible to forge a paper check, to draw money from a stolen or an unfunded check. In order to limit his/her risks the person receiving the check will ask the payor to prove that she or he is the real person. This is usually done with an official document

[90] European Languages Internet Conference
[91] The BFG is a professional association incorporated in the State of New York. Its members are C-level executives from North American, European and Asian very large IT-user enterprises.

(identity card or driving license) bearing the person's name and a picture. If the amount is large, the payee will ask for additional guarantees like a bank check. Specific risks may be covered by the banks or even by insurance, if the payee chooses to. If he/she does not, he/she will have to go to litigation if the payment is not finalized.

The Internet "Check"

When paying on the internet, the payor will have to provide information about him/herself and how he/she intends to pay. It may be different from the data listed on a check. A transaction number will be added at the time of the payment registration. The question is: Who or which elements will prove the validity of the data provided and used remotely?

Digital Certificates

Digital identities need to be "certified", i.e. one or several entities (called certifiers), approved by all participants in a transaction will guarantee the validity of the identity as they move across networks. This will be done via a digital certificate, containing information on the identity "subject" of the certificate and on the issuer itself. This information is ciphered in such a way as to prevent alteration.

Certificate Management Services

Ciphering is a strong barrier against accidental or malicious alterations. The participants in the exchange process must be able to use the certificate they receive and transmit along the chain. This is why the "certifiers" give them digital keys, which will enable them to access part of the information embedded in the digital certificates. This information will enable the recipient to validate or to add data, to acknowledge or to perform specific operations, for example:

The payor will add an amount, a date, reference information etc. sign, and crypt his message and send it to his/her bank or to the payee.

The "certifiers" (registries or certificate authorities- RAs, CAs) met with the e-commerce players a few years ago. They are still taken as new players. They may come from the public or from the private sector. They are themselves certified by experts and have to fulfil a set of criteria, which were defined in the interest of the end-user. Lately the French government published a certification procedure applying to the so-called "Prestataires de Services de Certification Electronique" (PSCE). A company can be its own RA or CA if large enough.

In addition to cryptographic and to identity information a digital certificate may include quality attributes. A quality attribute may reflect the degree of confidence to be placed in the certifier. The degree will be derived from an analysis of the organisation put in place, from its production tools. It may also reflect:

- The confidentiality and the "unguessability" of the key generation used for the key of the certificate, and
- The constraints imposed upon the subject of the certificate (could be an employee) by the certificate issuer (could be a registry acting on behalf of the human resources department of an enterprise).

Codes & Ciphers

A code is a finite set of characters. There is no code that could not be broken, in theory: an attacker could try every possible combination if granted enough time. A code is said to be unbreakable if the time it would take to break it is longer than the life-time of the

information it is protecting. With the increasing processing power of computers this is an endless game. The length of digital keys is steadily growing.

Actually a code breaker will use every weakness or "fault" in the key generation algorithms or in the key generation process itself. The robustness of a security system will first depend on the key generation and on the keys themselves. It should be noted that keys are frequently managed along key hierarchies where a key of level 2 is derived from a key of level 1. At the top of the hierarchy is a "root key", which was selected after a complex analytical process. From the root key a family of keys will be created to be used in a large variety of contexts: a specific application, in a specific industry sector, company-wide or even in a whole economical area like the European Union. The root key holds the whole system.
It should be noted that cryptology and cryptography rely entirely on highly skilled experts. Are the experts themselves reliable?

Business & Political Issues at Stake

E-Applications can only grow in a secure and trusted environment. For many reasons, there cannot be a global one-fit-for-all system. In the public and commercial worlds different systems will coexist. These systems need some degree of "interoperability".

Proprietary and "secret" schemes will not even allow for a proper evaluation of the security level that is actually provided. The management of identities and certificates by third parties enable them to overlook what their customers do. Without actual control from the users it is opening the door to conflicts of interest, market-dominance abuse and misuse of confidential information. On a large scale it may reinforce the predatory attitude of "foreign" entities.

More on The Needs

As already stated the security must provide a response proportionate to the actual needs. These may differ between the trade (and finance) applications and the others.

Electronic trade (and finance)

In a commercial transaction, the buyer wants to get the right service or the right product, at the right time and for the agreed price. On his side the seller wants to be paid according to the agreed conditions. Both the guarantee of delivery and the guarantee of payment imply clear, recognizable and auditable features, which can be regrouped under liability allocation, distributed validation and user accountability.

Three Key Business Requirements

Liability Allocation

- Limitation of Responsibility to Actions Taken
- Business Liable for Representations Made
- Sufficient Resources for Damage Recovery
- Must Reflect Level of Platform Vulnerabilities

Distributed Validation (Interoperability)

- Explicit Reliable Information In Certificate
- Informed, Local Decisions by Relying Parties
- Adaptable to Needs of Business Processes

User Accountability

- Ability to Constrain What Is Delegated

(Source 1998 - 2000 BFG surveys[92])

In a nutshell, the first requirement is the "proof of presence" of the participants in the transaction. Next, every participant should be able to the deal with other parties' personnel with the adequate knowledge of their accountability, in the context of the transaction.

Other Services

Outside trading, delivering to the right person is even more important than the right product or the right service. Let us take the healthcare sector as an example:

You cannot prescribe nor deliver the right drug to the right person without having access to medical records of the person. At the same time access to these records needs to be restricted. The "proof of presence" of the patient as well as of the doctor or of the chemist becomes paramount. You need the right person not a substitute or a forger[93]. Furthermore the whole care process needs to be "inspectable".

The Key Issues

The Lack of Interoperability

Beyond manual change or cash purchase, any transaction implies more than two participants, for example:

A money transfer will involve at least the originator, the originator's bank, the recipient and the recipient's bank.

Nowadays the originator may issue an order to his bank via the internet. The bilateral link will be secured to some extent. The originator will be authenticated via an ID code and a

[92] Other professional associations like TWIST and the FBF (Fédération française de banques) expressed the same needs since the early 2000's;

[93] This may also be true in the trade or finance area.

password. Once the order ”signed”, he will receive an acknowledgement that his order was indeed received. That is all. The bank is normally committed to transmit the order but no additional information is provided until the originator sees a debit from his account. Finality is not guaranteed. No feed back information is provided from the receiving end.

Most security systems are centralised. With the currently available and predominant technologies, the validation of identities and operations calls for a central repository. In an open world this cannot work on a very large scale. If the current trend goes on, whole sectors or even players of the same sector will still be unable to communicate in a safe and secure way.

Permeability to Intrusions

With the exception of overflowing techniques to create a denial of service intrusion is the starting point of any kind of digital fraud, attack etc. Damages may be caused directly or indirectly via platforms, which were previously infected and invested. The nature of these damages seems limited by imagination only. Reaching out the IT platforms, they may trigger physical processes that will arm persons, utilities, plants etc. Losses may also be commercial or financial and may endanger the very life of enterprises.

Intrusions are made possible via:

- Security holes of hardware and software platforms, or
- Identity thefts (or losses).

The security holes in the most commonly used hardware and software platforms a lot of security measures will make most delusive and misleading. They may even be counterproductive. It is a full topic in itself and a major issue.[94]

Currently the most realistic approach in this respect seems to come from the « Jericho Forum », a group of IT security managers of European companies. This approach is concentrated in a single word : “deperimetrisation”:

Communicating implies the exchange of information between two ends. Thus trying to set up barriers or walls is delusive. To enable trusted paths between participants is the right approach[95];

Every piece of transmitted data needs to be qualified. The qualification is to be interpreted at the receiving end.

This qualification should apply first to digital identities.

Lack of Control = Loss of Confidentiality in Trade

Relying on a digital certification service provider is only as good as the certification of the provider itself. The “root key” of the provider will be determining. There are actually very few organisations in the world, which are able to create a “global root” sufficiently robust to stand in a widely open environment. One of them is Identrus.

The Identrus case shows that there are other considerations to quality than the technology itself. Identrus was created in 1999 by a consortium of the 12 largest banks in the

[94] Two reasons among others:

- Microsoft is controlling the software platform of most PC on the planet. It is at the same time the cause of many concerns and the solution;
- The privacy implication of the Trusted Computing Platform Alliance (IBM, Microsoft, HP and AMD) put it to a halt in Europe.

[95] Path means “end to end”. This is close to the “straight through processing” of the banks. The BFG actually goes a step further and calls for “trusted sessions”.

World, to be their digital certificate provider and to federate their customers identities world-wide. Its "global root" was produced in the Netherlands under the "control" of US and UK authorities. Also, since its creation its structure evolved and its centre of gravity moved to the US.

These two facts seem to explain, why banks from other countries are reluctant to participate in Identrus. Still many do not seem aware of the danger or do not seem to care e.g. RosettaNet signed an agreement with Identrus at the end of 2004. Let us just remind them that Identrus works centrally, that is the central validation servers are based in Utah. These servers might provide an entry point to those who listen to communications on the Web. There has to be another alternative for those who care.

Quality Criteria for Security

Current solutions, when they are properly implemented, provide a first response to the needs of bilateral transactions, but:

- They are proprietary,
- They do not interoperate,
- They lack key functions,
- Their robustness is questionable,
- They are difficult to implement on scales involving several 100 000s or even several millions of participants.

Most people still find them too expensive and complicated, while the digital certification service providers hardly survive! These providers tend to overcharge and keep from innovating. This is a vicious circle. And the needs remain unfulfilled[96] of solutions, which are:

- Interoperable, distributed instead of centralised,
- Robust (guaranteed, auditable),
- Cost effective, and
- Adaptable, i.e. which can be rolled out quickly and can evolve,

Interoperable

Public Key Infrastructures (PKI) are the most commonly used solutions for large scale applications. The protection of privacy or the confidentiality of business transactions requires a tight control on the design, implementation and management of these infrastructures. At the heart are the creation and the management of digital identities.

Interoperability calls for a global architecture, which will enable security features to perform across systems or platform and information, starting with digital identities, to bridge between sectors safely, in confidence and confidentiality.

Robust

With such certification schemes as the one proposed in France for the " prestataires de services de certification électronique" (PSCE) the days of self-proclamation are almost over.

This implies that a good system must be auditable and inspectable, and that the results must be embedded in such a way as to be interpreted beyond their "perimeter".

[96] Professional associations like the BFG, TWIST and the FBF (Fédération française de banques) recurrently expressed those needs since the end of the '90's;

Cost effective

In the life cycle of the digital certificates, the first step (creation and first distribution) is likely to remain expensive. There are however techniques which can demonstrate economies of scale. The same techniques are fitted for the mass revocation or maintenance of the certificates at a reasonable cost.

Adaptable

The integration into existing applications remains often an obstacle. This is a difficult subject. Security is better dealt with when it was integrated into the original design. When taken as an add-on, it remains often illusive and the cost is dissuasive.

The continuity between internal application and external exchange systems is a growing challenge. So far the banks are among the few players with a vision integrating security.

Any progress will imply the cooperation of IT providers, not necessarily the largest ones, the innovators are more often small companies, the designer and operators of exchange systems and large users, whether governments or large enterprises.

Nowadays it is possible to implement interoperable, robust and cost effective solutions. These solutions are very few and they went so far almost unnoticed; still they do exist. It is our opinion that this should make them more acceptable to the French and the European markets.

*

List of acronysms

ADAE	Agence pour le développement de l'administration électronique
ASCII	American Standard Code for Information Interchange
ASEM	Asia Europe Meeting
ccNSO	country code Names Support Organization
ccTLD	country code Top Level Domain
Centr	Council of European National Top-Level Domains Registries
CNRS	Centre national de la recherche scientifique
CSI	Centre de sociologie de l'innovation (Ecole des Mines de Paris)
DNS	Domain Name System
DoC	Departement of Commerce
DOI	Digital Object Identifier
DSLAM	Digital Subscriber Line Access Multiplexor
ERP	Enterprise Resource Planning
ETP	European Technology Platform
EU	European Union
FAI	Fournisseur d'accès à l'internet
FNSP	Fondation nationale des sciences politiques
GIX	Global Internet Exchange
gTLD	generic Top Level Domain
IANA	Internet Assigned Numbers Authority
ICANN	Internet Corporation for Assigned Names and Numbers
ICT	Information & Communication Technologies
IETF	Internet Engineering Task Force
TCP/IP	Transmission Control Protocol/Internet Protocol
ISO	International Organization for Standardization
MAE	Ministère des affaires étrangères
MoU	Memorandum of Understanding
(N)TIC	(nouvelles) technologies de l'information et de la communication
PAN	Personal Area Network
P2P	(peer to peer) pair à pair
RFC	Request For Comment
RFID	Radio Frequency Identification
RIRs	Regional Internet Registries
SMSI	Sommet mondial sur la société de l'information
UIT	Union Internationale des Télécommunications
URL	Uniform Resource Locator
VoIP	Voice over IP (téléphonie sur l'internet)
WGIG	Groupe de travail sur la gouvernance de l'internet (GTGI)
WSIS	World Summit on Information Society
W3C	World Wide Web Consortium

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