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E-Economy, New Growth Regime and Public Policies

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1-The Rise of the E-Economy

Despite the fact that the press and some policy makers tend to over-assess the impact of the Internet, and to wrongly think that a "New-Economy" will promptly supplant the "old" one, the emergence of the Internet and E-commerce are not anecdotal issues. They have to be linked to two major trends of our modern economies: the rise of an information-and-knowledge based growth and the spread of information technologies. Both phenomena are partly linked.

Initiated by Machlup [1962], Bell [1973], and Lamberton [1974], the thesis of a rise of an information society was more deeply investigated by Porat [1977] and Jonscher [1983, 1994] who studied the evolution of the workforce allocation in the US in the long run. This pioneering work was confirmed by Davis & North's [1986] work on the transaction sector. Jonscher's findings can be summarized as follows:

• In the long run, the growth of information activities has been being much stronger than that of productive activities, and the former became dominant in the US by the end of the 1970's. The ratio of information worker per productive worker rose from 0,22 in 1900 to 1,13 in 1980 i.

• The vast majority of information workers perform coordination activities. Indeed, those activities that can be considered as generating knowledge (R&D, creation and design, education and training) employ less than 20 percent of information workers.

i Castels & Aoyama [1994] tried to confirm this at the G-7 level. They pointed out that despite the observance of the same kind of trend, the phenomenon was significantly different in the other developed countries, especially because the ICT sector did not create as many jobs as in the US. Jonscher's thesis has therefore to be qualified.
• Most of the coordination workforce is dedicated to market coordination. Indeed, Jonscher contrasts those activities that are dedicated to hierarchical coordination (accounting, supervision, etc.), and those jobs that are market oriented (sales agents, marketing, supply management, etc.). He points out that the ratio of the latter over the former jumped from 1 in 1900 to 1.65 to 1970 (Figure 1).

Figure 1
The Growth of Market Coordination Activities in the US Economy
Evolution of the Coordination Workforce in the US

Source: Jonscher [1994]

Taking into consideration these trends enables to get a better understanding of the logic of the Information and Communication Technologies (ICTs) revolution. Indeed, telecommunication systems and computers were invented and implemented within the economic systems to sustain the growth of productivity in coordination activities. Since the end of the eighteenth century, the need to increase productivity has led to two major movements: the substitution of capital for labor and the division of labor. The latter led to the distinction of coordination and productive activities and the former applied only in production activities until the 1960’s-1970’s. For a long time, productivity gains were very low in the coordination activities, and this began to be a major problem by the middle of the twentieth century when these activities became significant, then dominant, in most developed countries. This explains the development of ICTs and their rapid spread in the whole economic system.

Historically however, ICTs were primarily used to support internal (hierarchical) coordination, while, as pointed out in the above quoted data, the bulk of coordination activities is dedicated to market coordination. That is why the development of new means of coordination that can support exchanges among firms, and transactions between producers and the final customers represents potentially tremendous productivity gains. Data networks, and more especially the Internet, are typically efficient means to support market and inter-firm coordination because they are both ubiquitous and flexible (i.e. able to support the exchanges of very different type of information — writings, digital data, images, voice, etc. — according to different communication logics — from mass broadcasting to interactive securized point to point exchanges —).

In addition, when one consider that our economies are shifting toward a growth regime based on information and knowledge (for a survey on this issue see Antonelli [2000]), because services (especially information services) and innovations are two key drivers of growth, the rise of the
Internet seems to be a booster. Indeed, this worldwide multimedia network enables to transfer and
duplicate information and codified knowledge at negligible costs. It is therefore a major driver of the
internationalization and of the development of information and knowledge markets. Second, as
compared to previous data networks, Internet supports more sophisticated and more flexible
communication processes. It then becomes a major input in the production of information and
knowledge. Third, Internet is by itself a major vector of innovation, because its development opens a
lot of technological and business opportunities. Internet sustains a major movement of innovation in
all areas of the social life.

ICTs in general and Internet more specifically are therefore intimately linked to the raise of the new
growth regime. This regime is characterized by a set of original features, which can be recognized,
documented and analyzed through phenomena that are happening around the development of
Internet today. In the following we will concentrate on three major trend — the rise of a modular
economy (§ 2), the development of E-commerce (§ 3) and the emergence of new business models (§
4) — that are essential features of the economics of the Internet and of the economics of the new
growth regime. In each case, I will point out their major characteristics and the question they address
to policy makers, especially in matter of institutional design.

2-A Modular Economy

While Internet is before all a specific network, it is also one of the archetype of the present
organization of our economies. More specifically, when one consider the Internet as a productive
tool, some of its key characteristics can be considered as representative features of the organization
of the productive system. Indeed, like the Internet, the industry is becoming increasingly modular,
decentralized and based on innovation:

• The modularization of the industry is one of the essential replies to the increasing demand for
diversified and customized products. This enable to mass-produce basic components, that are
assembled along different ways to get a wide variety of products and services;

• The decentralization of the industry is another reply to the need for customized products.
Obviously Giant Firms continue to exist and develop, but there is also an increasing number of
smaller specialized assemblers. Moreover, in the context of globalization, each consumer faces a
greater number of assemblers than before. In this sense, there is undoubtedly a multi-
polarization of the industry.

• Innovation is increasingly essential to competition, since the ability to produce new components
or to invent new assembling processes is essential in a world in which imitation is simpler and
faster than before, due to the greater diffusion of information and knowledge.

These explain why the economics of the Internet is insightful both to better understand the IT
revolution and the problems raised by the new growth regime.

The economics of the Internet is specific, because it is both a distribution network (like an electricity
of water distribution network) and a communication network (like a telecommunication network).
This raises very original problems since the economics of those two types of networks are quite
contrasted. Indeed, distribution networks usually require a high level of planing and central
coordination, while communication network's management can be more decentralized, if
standardized interfaces are designed. This shows that two antagonistic logics have to be harmonized.
This lead also to emphasize that the previous institutional environment — especially
telecommunication network regulations — is no longer well adapted to the requirement of the new
economic model.

Another feature of the Internet is its strong decentralization. The Internet relies upon a
communication protocol that enables to interconnect and inter-operate heterogeneous networks.
Moreover, the "intelligence" of the network is decentralized. The diverse terminal equipments
(essentially computers) that are plug into the network generate the various network services. Indeed,
information flows — one should say: information packets — drive themselves within the network
to the various appropriate terminal where they are handled according to specific processes. These
result into tremendously complex coordination problems, because the management of the network is
not any longer performed by one central operator, but by numerous participants (including users)
who can intervene on the command mechanisms of the network. These point out the need for
coordination in order to guarantee the reliability of the network, and in the same time the difficulty to
implement workable solutions.

More generally, Internet is a network in which coordination occurs between operators that are both
complementary and competitors. Indeed, the range of services that are delivered on the network is so
wide that no single firm would be able to provide the whole portfolio of possibly available services.
Nobody has a sufficient level of expertise, financial capabilities and the required assets to provide
these Internet based services on an integrated basis. Consequently, usable services result from the
combination of "basic bricks" provided by specialized suppliers. Problems raise because most
providers of these "basic bricks" are specialized in the provision of a set of "bricks". Since these
various set of "bricks" overlap, "bricks" providers have both to cooperate and to compete. This
generates new types of coordination problems that call for new solutions, both at the inter-firm level
and at the institutional level.

At the inter-firm level, "vertical agreements with a competitive component" have to be settled. They
are complex because, on the one hand, firms have some interest in coordinating efficiently, while on
the other hand, each party can be incited to cheat because it is the other company's competitor.
Moreover, mutual mistrust can occur, because both parties have some interest in capturing the
other's information, consumers, etc. Efficient coordination is then difficult to get.

At the industry level, new types of regulatory frameworks have to be designed because they should
authorize the settlement of efficient coordination agreements, while promoting competition. The two
objectives are partly conflicting. Efficient coordination requires sometimes long-term agreement
implementing specific governance regimes in order to escape the pressure of short-term competition
(to enable innovators to cover their costs and risks), while antitrust policies call for short-term
agreements based on market governance. Reconciling those issues is complex, because they are
conflicting, and because most transactions differs. Indeed, asset specificity, uncertainty and
frequency of transactions (Cf. Williamson [1985]) vary a lot, throughout the productive system. It is
therefore quite impossible to establish the list of optimal practices given each circumstance, and to
use such a list to design an antitrust policy stating ex ante and in details the black list of forbidden
practices. To write down such a list would moreover be useless, because practices are evolving
quickly in a context of permanent innovation. Indeed, marketing and technical innovation generates
new transactions for which new types of inter-firm interactions have to be invented.

The issue of innovation lead to another comment. Innovation requires openness. In order to
stimulate innovation; the existing institutional framework has to be flexible and incomplete to be
able to welcome new practices.

In addition to the re-framing of antitrust policies, the increasing modularity of industry and the
accelerated pace of innovation call for a renewal of current institutional policies. On the one hand,
such policies are indispensable because of coordination needs. This means both that the general
coherence of the system has to be maintained, and that the ability of players to coordinate efficiently
has to be ensured. On the other hand, these policies should be designed in order to maintain
competition and openness that are essential to innovation.

First, coordination policies should rely on the building of efficient institutional frameworks (North
[1990]):

- to better guarantee the consistency of the property rights system, and the enforceability of
contracts. This is essential to enable innovators, that create intangibles, to efficiently exchange
and recombine those intangibles (see Bessy & Brousseau [1998]). These call for strong Intellectual Property Rights (IPRs), more efficient contractual laws, and skilled enforcement institutions.

- to guarantee an efficient interfacing. The development of standards for interfaces has also to be stimulated. It has to be clear, however, that public authorities cannot design most standards, because they have neither the ability, nor the legitimacy to go in the details of technical coordination. Public authorities can, however, stimulate the emergence of standards by supporting standardization institutions, by stimulating efficient standardization processes (e.g. processes in which various parties are really involved), by (legally) recognizing the value of certain standards, by facilitating international coordination among standardization institutions, by stimulating the adoption of specific standards (e.g. public procurement), etc.

Regarding those questions, one essential point is to design international policies and to coordinate consistent national policies.

Second, these coordination policies should rely on a re-design of antitrust policies. In most countries, the current regulatory framework is not well tailored to the new growth regime. Indeed, the question is not to liberalize, but to organize an efficient competition.

- First, a major issue in the coming years will not be to design more precise regulation but to implement efficient regulatory governance mechanisms. Indeed, in an economy characterized by its complexity and its pace of innovation it is impossible to design regulations that will ex-ante precisely state the authorized or forbidden practices. It is therefore more desirable to implement authorities that will state, in case of suit or conflict, if actual behaviors are or not contrary to an efficient competition.

- Second, most of the antitrust regulation will be deeply affected by the increasing networking of the economy. As pointed out above, competition is difficult to organize in a network-based industry because most competitors manage complementary assets. They are both competitors and cooperators.

- Third, the regulation of competition will increasingly interact with other area of regulation. This is because production and growth will increasingly depend upon goods and services that are intensive in information and knowledge. This is also because technological evolutions reach certain boundaries in matters of individual liberty and concerning the very nature of human being (computerization, life sciences, etc.).

Consequently, the rise of the Internet (and of a knowledge-based growth regime) call for a re-design of the institutions responsible for implementing regulations rather than for a design of more precise regulations. Globalization, technological evolutions and new business practices lead to a considerable differentiation of the optimal regulation in the various industries, since the scope of the relevant market, the information-intensity of the products and services, the network externalities among the output of the various suppliers, (etc.), vary. These mainly call for the development of Specialized Regulation Authorities (SRAs) in charge of:

- tailoring the general principles of competition regulation to the specificities of each industry. These authorities shall be able to reduce judicial uncertainty, while enabling the players to innovate and to benefit from a regulatory framework finely tuned to their needs and constraints;

- exercising a specialized supervision in order to make these specific regulations really enforced.

Moreover, these SRAs should preferably be organized on a regional basis because this is increasingly the relevant strategic arena.

However, these SRAs should not be completely independent.
• It is important to maintain some coherence in the regulation of competition among industries. This means that they should be overhang by a general institution that would be responsible for coordinating the various SRAs’ policies to avoid too divergent policies (and the related opportunistic behaviors of economic actors). This general institution will also be an instance of appeal that would limit the discretionary power of SRAs.

• It is also important to establish links between SRAs and authorities responsible for other aspects of public policies (innovation, social cohesion, public health, environment, etc.) to guarantee that potential externalities are taken into account in decision made by SRAs.

3-The Rise of E-Commerce

Internet is becoming a global market place. Indeed, while corporations have been being using inter-firm data networks (since the mid 1970's), and the telephone, the fax and a wide set of other technologies (for several decades), to support inter-firm coordination and market oriented activities, the Internet provides a support for worldwide multi-media communication that can potentially support a wide range of information exchanges. This is why since the mid-90's the notion of E-commerce has been becoming an essential issue for many public and private decision-makers.

ICTs in general, and especially the Internet, are thus supposed to bring about major productivity gains in market coordination. Several (complementary) arguments are put forward:

• ICTs will enable a decrease in distribution costs by enabling a more efficient management of resources (e.g. US Department of Commerce [1998], OECD [1997-1999]):

• Thanks to a better management of information, just-in-time order and delivery processes will enable a substantial decrease in the level of inventories, the volume of unsold and returned goods, etc.

• Many commercial activities will become virtual by limiting their operations to advertising and marketing, site content, establishing relationships with manufacturers or distributors, accounting functions and customer services. Rent and depreciation, store personnel, utilities and other expenses of physical infrastructures will be almost entirely avoided.

• ICTs will enable the substitution of capital for labor in many clerical tasks usually performed by the sales force. Moreover, many decisions (such as ordering, granting a rebate, etc.) will be automated, or at least supported, by means of ICTs.

When the good or service can be fully dematerialized, cost reductions can become dramatic. For instance, one estimates the cost of buying software over the Internet at $0.20-0.50 per transaction, as opposed to $5 for a telephone order, and $15 for a traditional retailer (OCDE [1997])

• ICTs will make the market more transparent, leading to the ousting of inefficient suppliers and intermediaries. Thanks to information networks like the Internet and smart technologies, consumers will be able to search among thousands of merchants for the lowest prices, thereby increasing the downward pressure on prices and leading to a shift in market power from producer to consumer (e.g. Hagel and Armstrong [1997], Yardini [1996], Crane, [1997]);

• ICTs will enable customers to bypass commercial intermediaries because they will be able to get in touch with the suppliers directly, and vice versa. Actual markets will thus replace networks of intermediaries, as has happened at the London Stock Exchange or the Swiss Electronic Exchange when electronic commodity and stock exchanges squeezed some intermediaries out of the trade (Zwass [1999]). Short distribution networks will enable major savings in (supposedly useless) labor costs and rent captures (e.g. Benjamin & Wigand, 1995). It must be recalled that commercial intermediaries account for a significant share of our economies. In France, 1 million
of the 1.8 million companies are retailers, brokers or wholesalers; they account for 10.8 percent of the GDP; and they employ 12.0 percent of the workforce (Source INSEE 1994 & 1998). In the US the retail and wholesale trade account for 15.84 percent of the GDP (Source Survey of Current Business, 1995). Moreover, distribution costs account for up to 60 percent of the price for certain goods such as books and music records (Source EITO 1997).

As reported by Brynjolfson & Smith [1999], who cite several illustrative quotations, these arguments are today widely accepted. The Internet is supposed to bring us a frictionless and intermediary-less economy, based on a ubiquitous information network that will support the performing of an almost perfect Walrasian market. A strong hiatus remains however between this assumption and the actual reality in E-commerce. Indeed, E-commerce is still marginal, the business models it supports have not proved their economic viability, and commercial intermediaries play a major role in E-commerce.

While it is undoubtfull that E-commerce will strongly develop in the coming years, it would be misleading to think that this development will only rely upon the spread of the Internet. Indeed, markets are devices organized by institutions. Moreover, most of the economic relationships are bilateral relationships based on some contractual agreements that require an institutional framework to be designed, settled and enforced.

This is why the rise of the E-commerce implies the development of appropriate institutions. But what do we mean by institutions?

Institutions are made up, on the one hand, of rules that prescribe behaviors to agents in particular circumstances, and on the other hand, of decision-making mechanisms that are responsible for managing and completing these rules (e.g., Courts, standardization committees, parliament, a civil service in charge of implementing the law, etc.). These decision-making devices complete the incompleteness of the rules, design them, and ensure their enforcement. They can be qualified as “Institutional Organizations”. Institutions are therefore a combination of rules and institutional organizations.

Institutions can be either public or private. Public institutions rest on the violence monopoly of the State, and therefore its power of last resort. Public rules and public institutional organization’s decisions are enforceable without caring about the free will of agents because the State is endowed with an unbounded power of constraint over the economic agents that are under its sovereignty. On the other hand, some institutions rely on the freedom to join. This means that individuals or organizations agree to follow the rules designed by the corresponding organizational institutions, or to obey their instructions because they asses that membership and its associated constraints are

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ii “The Internet is a nearly perfect market because information is instantaneous and buyers can compare the offerings of sellers worldwide. The result is fierce price competition, dwindling product differentiation, and vanishing brand loyalty.” Robert Kuttner in Business Week, May 11, 1998 “...industry titans such as Bill Gates, the boss of Microsoft, regale the world’s leaders with the promise of ‘friction-free capitalism.’” The Economist, May 10, 1997 “All of this brings you closer and closer to the efficient market.” Robert MacAvoy, President Eastman Consulting

iii In fact, informal public rules — such has social conventions and customs — do not rely on the State’s power of constraint to become enforceable. They are enforced by agents since they are constitutive of the collective identity of communities. Breaking these rules means (self)expulsion from these communities. Informal public rules are therefore very close to the formal ones in the sense that they are mandatory without requiring the agreement of the agents that have to enforce them.
preferable to other alternatives. Trade associations, pools, trade unions, professional associations, standardization committees, certification bodies, (etc.) are private institutional organizations.

Largely these private institutional organizations resemble the "governance structures" of Transaction Cost Economics (Williamson [1985, 1996]). Their authority follows from the free will of the agents that create them, but they can rely on some public institutions — e.g. the judicial system — to bring the cost of governance down. The main difference between the governance structure (and its associated contracts) and these private institutional organizations is that the former are bilateral while the latter are collective. Although everything is negotiated in a bilateral agreement, many of the components of a collective one are "take it or leave it" clauses, since they have been previously accepted by the community. As a result, everything is not negotiable (and negotiated) in the arrangement that sets up a private institution (while it is for a governance structure).

Institutions (either public or private) are collective governance means in the sense that they govern several economic interactions. They provide economic agents with incomplete coordination solutions — the governance of their economic exchanges cannot be fully performed at the collective level — because of the distinctive characteristic of each transaction. This is why economic agents have to create some private and specific order through the design of inter-individual governance structures (IGSs) that complete the incompleteness of the institutional framework. On the other hand, these IGSs are costly for the agents both because they have to directly bear their costs, and because they do not benefit of any economies of scale and scope while governing a single transaction. To the opposite, the governance of several transactions by a collective device enables agents to decrease the unitary coordination costs. Since economic agents cannot manipulate the public institutions, they create private institutions (that are generally less generic than public ones) to decrease the cost of managing a set of similar transactions.

Since the beginning, private institutions have been the main developers of electronic trade. In many countries Public Institutions did not perceived early the potential of electronic transactions and electronic markets. Moreover, they were often unable to solve the technical problems linked to electronic intermediation because of inadequate knowledge of the technology and of the specificity of the co-ordination in each industry. This led many users or venture service providers to organize electronic trade by designing rules and/or providing coordination services (mainly through the creation of so-called Value Added Services, VAS).

Brousseau [2000] points out that:

- private institutions (or collective governance structures) are created to organize these co-ordination activities. On the one hand, public institutions are often not sufficiently specialized to create rules and electronic systems providing co-ordination services that are adapted to users' needs. On the other hand, it seems that users are interested in the scale and cognitive economies generated by the centralization of the solving of co-ordination problems.

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**iv** Institutions have to be contrasted with intermediaries. Institutions are market organizers, while intermediaries are market players. Indeed, as pointed by Spulber [1996] intermediaries ensure the liquidity of markets by holding inventories and cash. They are actual counterparts in the transaction among economic agents because they temporarily hold the property rights that are transferred between transactors and therefore take risks. This is not the case for institutions. They are neutral within each transaction. Their role is to provide transactors with more transparent and less costly market places. (For an analysis of the role of intermediaries in electronic markets (especially on the Internet), see Brousseau [1999])

**v** For complementary analysis of the economics of private institutions, see Brousseau and Fares [2000] and Bessy & Brousseau [1998].
• these private institutions are very diverse and can generate heterogeneous institutional frameworks to organize and manage electronic interactions. In fact, while there are some types of institution that generate relatively more efficient co-ordination solutions than others, there is no institutional framework that is definitely superior to the others. Therefore, diverse types of institutional framework can organize electronic trade resulting in diverse systems associated with different properties. One of the consequences of this is that various types of institutions are fitted to diverse industries and markets

• the emergence process of these institutions strongly influences their ability to survive. This explains why relatively inefficient institutions and institutional frameworks can emerge and be durable. This suggests that promoting competition is not always the best way to get the most efficient solution. Authorities as well as institutions in charge of economic activities can therefore support institutions that seem to generate the most efficient solutions (i.e. clubs and rule designing associations).

Public institutions have therefore to play a role in the development of an appropriate institutional framework for electronic trade.

• As pointed out above, public institutions can support the private institutions that seem to promote the most efficient solutions. This can be done by financial support. However, the most important point is to publicly and legally recognize the provided solution.

• But public authorities can also act to facilitate electronic trade and electronic transactions. This especially requires the development of a legal framework adapted to the electronic age: legal authentication of electronic documents and signatures, better definition of property rights, encryption authorization, adapted regulation to guarantee the security of telecommunications networks, etc.

• Third, Public Authorities have also to supervise those private institutions that are organizing new markets in order to avoid the capture by private coalitions of the productivity gains linked to E-Commerce. Indeed, private institutions can both generate transaction efficiency, and favor collusion and the exercise of monopoly power.

Thus, to recognize that private institutions could efficiently organize electronic trade does not mean that public institutions should not intervene. The efficiency of the various private institutions relies largely on the behavior of public ones.

4-New Business Models

Internet is a place where new practices establish new relationships between free and fee based services, between commercial and non-commercial activities. The economics of Internet today relies on positive externalities. Non commercial web sites attract the users on the Web, but this is the for-profit business that can finance its development. In the same spirit, only on-line commercial transactions would be able to generate profits, but the completion of those transactions implies the providing of free services to the users (Gensollen [2000]). Consequently, the economic organization of the network has to take into account these interdependencies. Benevolence activities as well as free commercial activities are not viable in the long run if they are not supported by electronic commerce operators, that would never sell if the network does not provide uses value to the users and customers. Redistribution mechanisms have therefore to be invented.

This leads to another feature of Internet based services: the implementation of new links between the supply side and the demand side. Because of its public roots, the network initially implemented coordination principles that were based on the logic of barter or gift, rather than on the logic of commercial transaction. "Peering" agreements, free services, freewares are still alive today while commercial activities is essential on the Internet. Several phenomena explain this. First, due to the costs of protection (imperfect property rights, costs of encryption, costs of tracking and billing, etc.)
as compared to the unit value of many services and information, providing them for free is often more efficient. Second, coordination rules based on ethical rules like those that govern the exchanges of gifts or the diffusion of scientific knowledge are often very efficient (e.g. efficiency of the Linux development model). Third, the diffusion of free information, knowledge and services can be remunerated through by-passing means such as advertising, the provision of joint fee-based services, the providing by users of private information, etc.

However, more generally these practices are linked to the invention of new "business models" that enable to differently manage innovation efforts or the diffusion of knowledge and information. These models are based on the exploitation of the positive network externalities of the diffusion of information (standardization, increasing returns of adoption, cumulative innovation, etc.). These social and private benefits are traditionally reduced when one grant the innovator (or the information producer) with the right to capture the social benefits of its innovation (because both he will provide its information on a fee basis, and because he will practice Monopoly pricing). In that respect, the two extreme models are the scientific "publication" regime in which the information is provided for free to the users, and the industrial "patent" regime that grant the inventor with exclusive uses rights. The new business models like "Freeware" invented on the Internet enable to create a whole set of intermediary regimes that have interesting effects on both innovation and diffusion.

Studying the property of these new ways of producing and valuing information and knowledge is an interesting way to re-think the economics of IPRs and to consider new types of IPRs' regimes. It is also a good way to identify more precisely the various way to manage transaction over intangibles.

5-Challenges for the traditional institutional frameworks

Most problems pointed out above are difficult to solve because of the maladaptation of the traditional institutional environment.

On the one hand, Internet is a global network that contradicts the national and territorial logics of existing institutions. New institutional solutions have therefore to be designed to overcome the bounded ability or traditional National States to control Internet based activities (and also knowledge bases activities).

On the other hand, Internet challenges the precise delimitation and attribution of property rights. This is essential because the ability to settle agreements, to identify liabilities, (etc.) is depending upon the precise identification of these elements. These elements are nevertheless not precisely stated in the existing networks and information activities. This is because it is quite complex to assess and implement an efficient system of IPRs over knowledge and information. Optimal IPRs is still an open question both in theory and practice. This is also due to the specificity of the data networks where property rights over the various components of the networks are quite unclear. Indeed, telecommunication networks were traditionally State (or at least Monopoly) owned. It was useless to precisely delineate and grant property rights. Data networks were most of the time proprietary networks wholly owned and operated by single firms. It was also useless to establish distinctions among the different components of former communication data networks. Today, the divestiture of these networks into "basic bricks" owned and operated by various agents call for the design of more precise property rights. This is an essential issue to manage coordination in our modular networked activities, to establish clearer liability rules, to manage externalities.

This looseness of the existing institutional frameworks is the reason why there is today a strong call for self-regulation by the various industries that develop new activities based on the Internet. Self-Regulation is indeed a good way to redesign institutions better fitted to actual practices and needs, and to their diversity. Moreover, it is also one of the possible way to rapidly design a transnational institutional framework.

In the same time, as pointed out above with the case of E-Commerce, Private Institutions are complement, not substitute to Public ones. Public Institutions — in the case of Internet Global
Public Institutions — are necessary to provide the basic infrastructure for private institutions (e.g. a system of last instance appeal, property rights systems, contract enforcement mechanisms, etc.). This is the present challenge.

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