

Openness, technical standardization and regulation

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Abstract:

In information and communications technology even more than in other branches of industry, standardization is a key factor for regulating competition. However, the economic issues, given their importance, set limits on a standardization that combines cooperation (in drafting standards) and competition (in applying them). Given the characteristics of present-day technical systems, it is time to reconsider the place and forms of standardization, which, by its very nature, lies outside the scope of economic regulations in the strict sense of the word. New developments in telecommunication networks have upended historical standardization procedures, which are open to a new conception of standards centered around the issue of interoperability. Guaranteeing that the Internet remains open means knowing how to adjust the economic and technical limits on access that a network's material characteristics impose.

The power of over-the-top (OTT) platforms is usually mentioned in reference to their domination of competition and their relations with Internet service providers (Net neutrality).¹ From the regulatory viewpoint, the danger is that one of them comes to control the whole value chain and several of the layers of technology that the IP protocol governs and has managed to separate (ABITEBOUL 2018). The response for coping with this risk cannot just be economic. Making sure that the Internet remains open implies knowing how to use its material characteristics and the equipment for accessing it so as to handle and regulate the technical limitations and constraints on both access and interoperability.²

The electronic technologies used in networks form an interlaced "system" around uses and information systems. This system's structure and performance depend on ceaseless interactions between several quite different layers (infrastructure, equipment, terminals, software, people-machine interfaces), each with its own dynamics and innovations. This setup raises questions about the coherence, reliability and consistency of fast evolving systems. On the one hand, firms, faced with continually changing technology (soft- and hardware), do not always have the means to see to its upkeep and retain control over it. On the other hand, given the wide variety and flexibility of tools and practices, maintaining overall coherence is the only way to be able to collectively build the system, capitalize on it and share in it.

¹ This article, has been translated from French by Noal Mellott (Omaha Beach, France).

² This holds, in particular, for terminals, as shown in an important report published by the French Regulatory Authority of Electronic Communications (ARCEP 2018).

The trends and forces shaping networks

This technical system's properties force us to dwell on the arrangements for setting standards and on the place of standardization, which, by its very nature, lies outside the scope of economic regulation in the strict sense. Standards are not just means for coordinating and regulating exchanges in industry; they also refer to seats of authority where rules of a technical sort crystallize. These rules relate economic agents to each other: coercively and normatively but also by fostering a convergence of behavior patterns. The current standardization organizations have come out of a sedimentation and formalization of such practices, which they, in turn, oversee and diffuse.

The Internet is the most recent stage in a trend of computer technology that started in the 1960s. Several, quite different or even opposite, efforts have shaped this trend (DANG NGUYEN & DEJEAN 2014). Of course, one trend had to do with the techniques used, as successive waves of information and communications technology (ICT) unfurled, depositing layer upon layer of technology. From the ARPANET (Advanced Research Projects Agency Network) to the data routes launched by Clinton and Gore in 1992, governments, in particular of the United States, were politically involved in shaping and controlling this infrastructure. In parallel however, the Internet was being shaped by the rules, community-based models and ethical values stemming from the activism of volunteers and from its own capacity for self-organization. Evidence of this are the self-proclaimed institutions of governance (*e.g.*, the IETF or W3C) and, too, the recent debates on Net neutrality. Finally, the building of the Internet very much depended on the weight and influence of big tech firms and online platforms and on the system for funding startups in electronic technology. These efforts are, to a large degree, represented in the arrangements for standardization that shape the networks in the Internet's infrastructure.

Over time and down through many technical modifications, standardization processes have also deeply changed, with an impact on the engineering and design of the technical choices underlying the standards themselves. The brunt has also been felt on the various standards organizations and, of course, on the economics of the networks in the infrastructure. These ongoing changes have spawned standards and even spurred competition between standards organizations. Depending on the problems addressed, successive organizations of expertise, standardization, certification or even regulation have been set up, each with its rules of coordination and procedures for controlling application.

Two models of standardization

Governance of the Internet is not exempt from this multiplication of organizations that make standards, rules and regulations. This variety can, of course, be set down to the complexity of the field to be governed, a complexity that leads, in each case, to the specification of a new rule-making organization. However it can also be seen as a response to alternative conceptions of standards and of their functions during two distinct phases of innovation: the profusion of technology and growth of networks followed by the need to rationalize procedures and make them coherent.

Depending on the case at hand, the forces driving standardization stem from arrangements set up for coordination (with incentives or constraints) or sometimes arise out of existing standards (with control procedures and the obligation to use such and such a technique). The first (historical) model of standardization involved making adjustments between preexisting techniques or infrastructures, which various parties had developed independently. In this case, standardization occurred afterwards for the purpose of interoperability. Constructing the Internet involved building bridges, interfaces and black boxes for ascertaining compatibility and securing data exchanges among components in the infrastructure. Under a second model, a set of techniques gradually crystallizes around a platform or a common core. This crystallization relies on previously set standards. Thanks to these preexisting standards, various players (service-providers, hardware-makers, etc.) coordinate their efforts; and

the market and infrastructure develop harmoniously. This model has proven adapted to telecommunications, organized as it is around a club of public monopolies that can easily coordinate their activities for the purpose of setting new standards.

This alternative places players in ICT in an ambivalent position, given the nature of this technology and trends in it (accelerated evolution, turnover, varied forms of appropriation). A current example of this is 5G NR, the new radio access technology, a field where practices and even the vocabulary are not yet stable even as the processes of formalization and standardization are under way (the architecture of networks, protocols, components and terminals).

Open standards and interoperability: Rivalrous or complementary?

Current developments in telecommunication networks have shaken the aforementioned models of standardization. Besides the new architectures arising out of virtualization, increased traffic flows and rising connection speeds, several important changes are affecting the networks as the traditional functional specialization by type of use (voice/ data), of connection (landline/mobile) or of client (B2C/B2B) disappears. Along with this has come a proliferation of the applications, products and activities proposed on these networks (diversification and hybridization of “managed” services with different performances).

The changes now under way in the Internet and networks have led to a new conception of standardization centered around the question of interoperability. Since techniques change so fast, this conception more effectively responds to the twofold ambition of system of standardization: stimulate innovation and allow for interconnections among heterogeneous components. In this context, it is hardly possible to follow a deliberate process for setting standards prior to the existence of the technology to be standardized — the historical process in which international organizations, such as the International Telecommunication Union (ITU), European Telecommunications Standards Institute (ETSI) and European Committee for Standardization (CEN), played a key role. In fact, no single player or organization is any longer capable of steering technical developments in its sector or geographical region, like the big public networks or computer builders (IBM, Microsoft, Apple) used to do.³

The emergence of open standards takes on full meaning in this context: technical flexibility leads to transferring the capacity for taking initiatives from consortiums or monopolies to the marketplace. Procedures for using open standards that have emerged out of an existing form of technology do not obviate the model of setting standards after the development of a new technology, since what is at stake is not so much to draft evolving standards as to provide for interoperability (by standardizing interfaces, code, gateways and labels). As the example of the Internet shows, these two sorts of standardization are not necessarily contradictory.

In both cases — open standards and interoperability — broader forms of competition or coordination between operators, hardware-makers and service-providers arise. Open standards facilitate innovation and make it easier for new businesses to gain access to networks. But this does not keep these same players from diverging (and even moving toward a “closure”) as standards are set for others components. As for interoperability, its development deeply affects competition at all levels in an industry. The use of interfaces for ensuring compatibility breaks the dependance of users on manufacturers, service-providers and networks. Standards about the ergonomics of devices and services, the transferability of data and the transparency of modes of access to networks have made it very easy to change suppliers. Competitive pressure is thus shifting toward innovation and quality.

³ As the examples of Android or Chrome have shown, even the dominant influence wielded by major league players like Google encounters situations where the convergence toward a standard (in the form of a common platform) necessarily entails a strong variability of forms of appropriation.

Governance and standardization

This concourse of quite different factors and trends updates the issue of governance, in particular in relation to the Internet. At first, the aim was to respond to technological breakthroughs and innovations that had a strong impact on uses. For this, it was necessary to deal with the limits of a technical management of the Internet (size, congestion, security) and to draft new protocols. As business increasingly penetrated the Internet (the commodification of services and social relations, the outsized OTT platforms), the dominant economic forces came to carry enough weight to sway the choices made about particular techniques. Nowadays, the issue of digital sovereignty has cropped up, as the growing power of emerging countries (mainly China and Russia) with different traditions of social control is naturally shifting the balance of power in transnational bodies of governance. Given the confluence of these trends, we wonder whether the institutions set up to oversee Internet's purely technical governance (IETF, W3C, ICANN, etc.) are adapted to a multipolar world where the economic stakes are growing and are shaping the system, where it has become important to imagine the "legal contestability" of technical standards.

Owing to their history, current forms of governance in the digital realm have limits (DANG NGUYEN & DEJEAN 2014). For one thing, public authorities, relatively unaware of this technology's technical aspects, have difficulty when they have to handle contradictory issues or weigh in on choices that will shape the system. An example is the slow process of working out a joint position on taxation of the Internet giants or of big data. For another, the self-regulation of the Internet (for instance, the Internet Engineering Task Force, IETF) bears contradictions owing to its libertarian origins (volunteerism, no hierarchy, decision-making for reaching a consensus, practices for diffusing proposals). This very horizontal type of organization implies, for example, the use of English as the *lingua franca* and thus provides for the dominance of English-speakers. Yet another example, volunteerism means that, within these governing bodies, there are differences of motivation, availability and influence, since powerful economic forces can more easily than NGOs or nonprofit organizations rely on experts. This generates a conflict of interests between the representation of organizations and the supposedly "individual" participation of the members in governance.

In conclusion, standardization is a key factor for regulating competition in the digital realm (even more so than in other sectors), but the ever higher economic stakes set limits on the process for drafting standards via tacit cooperation among economic agents, *i.e.*, a combination of cooperation for drafting standards and of competition when applying them. This question is very sensitive when, for example, Web standards are to be converted into standards for applications. The digital realm's economic structure — industries with fixed costs, strong externalities, domination by a few global players — risks, through the decisions made when choosing specific techniques, resulting in the formation of monopolies.

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