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Digital Commons as new Infrastructure

Towards an Industrial Policy for the Digital Age

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ABSTRACT

Free and Open Source Software (FOSS) has come to largely dominate software production. This means that the main technology and industry of the digital revolution has integrated digital commons among its main institutional regulations. However, to understand the successful trajectory of FOSS it is necessary to revisit the initial approaches to the production logic behind FOSS and this new generation of commons.

This is particularly necessary with regard to public policy, which have so far failed to participate productively in these new productive arrangements.

A review of the notion of infrastructure and an analysis of the principles emerging in the architecture of the latest generation of digital infrastructures provide a perspective from which to identify new possible approaches both to the construction and governance of these shared goods and resources and to a renewed and extended scope of public policies. Moreover, software trajectory provides a meaningful model for the entire information paradigm. Its relevance is high and immediate, potentially, for many other sectors, including cultural production and creation.

KEYWORDS

Free and Open source software (FOSS) – Digital Commons – Infrastructure – Public Policy – Innovation - Standards – Modularity

DIGITAL COMMONS AS NEW INFRASTRUCTURE

Free and Open source software (FOSS) has come to largely dominate software production. This means that the main technology and industry of the digital revolution has adopted the commons (Benkler, 2002; 2006; Weber, 2004) among its main institutional regulations. And with that, that digital commons represent an organizational and economic innovation that has much to say about the organizational models of production in the digital age.

Despite the importance of this evolution, the phenomenon is still little known and even among scholars its understanding is in the making (Berlinguer, 2020b).

Commons, for example, are often celebrated because they are open access resources and potentially democratize productive and cultural environments. But the open source has not prevented the formation of new forms of concentration of power and wealth. In its current form, it could even encourage its expansion. This is visible by observing the leading role that the giants of the web (Google, Facebook, Amazon, and ultimately Microsoft itself)¹ - the same ones that monopolize much of the digital economy - have had and are having in the growth of open source (Berlinguer, 2020a; 2020b).

Another necessary adjustment concerns the relationship between commons and markets. Common goods and markets have idiosyncratic institutional forms: if a good is open access, it cannot be appropriated exclusively, nor can it be sold. However, if open source has been absorbed by markets and capitalist competition, it is because commons and markets can not only coexist, but can grow in synergy. Successful inclusion of a commons in a production ecosystem eliminates the market in its domain, but can create, reconfigure or grow adjacent and complementary markets (Berlinguer, 2018).

For this reason, digital ecosystems typically operate on a multi-layered scale, exploiting the existence of “multi-sided markets”, but they have also increasingly learned to operate through different regimes of value creation and appropriation, adopting and/or orchestrating in some levels or layers, regimes of shared value and collaborative production (Rochet, & Tirole, 2003; Lepak & al., 2007; Berlinguer, 2018).

¹ A similar approach is spreading more recently among China’s top tech companies, like Hawei, Tencent, Alibaba.

Practically, all the most innovative and successful companies of the digital age have learned to use these hybrid strategies. The case of Google-Android is a clear example. Google's condemnation for abuse of dominant position obtained through the open source operating system Android also indicates how the Antitrust Authority must revisit its doctrine (Katz & Sallet, 2017).

The ability to move in production environments made of multi-level integrated systems operating through different regimes of ownership, governance and value generation and appropriation (Jessop, 2001; Geels, 2002), is in any case one of the important lessons that we can draw from the trajectory of open source and its absorption in the market.

This innovation also indicates a possible entry point for an approach to public intervention in digital production environments, radically different from the previous industrial-Fordist paradigm.

In fact, the formation of the above sketched productive ecosystems outlines the contours of a new type of mixed economy and can provide many insights for an industrial policy more apt to the digital age.

So far, public policies have lagged behind in their ability to participate virtuously in these new environments. There has been no lack of attempts, since there have been hundreds of public administrations that have announced and implemented policies to adopt or promote FOSS (Lewis, 2010). But, somehow, it is fair to say that the first versions of public policies applied to FOSS have not worked (Berlinguer, 2020a).

Looking at the evolution of the FOSS ecosystem, a new approach can be glimpsed.

It goes through a re-examination of the notion of infrastructure in information society and a new understanding about the extended role of this type of shared goods and resources in digital production (Edwards, 2003; Frischmann, 2012; Benkler, 2013; Eghbal, 2016; Kawalek & Bayat, 2017; Constantinides & al., 2018; Rahman, 2018; BMWi, 2019)

A further look at the latest generation of digital infrastructures (Cloud computing, Internet of Things, Artificial Intelligence, etc.) also highlights an innovative matrix, which is increasingly shaping their architecture and design, that is organized around three principles: FOSS, standardization and modularity (Shapiro & Varian, 1998; Baldwin et al., 2000; Blind, 2016; Blind & Bohm, 2019). This institutional and architectural matrix responds to unprecedented rhythms of evolution, complexity and interdependence, and aims to combine the advantages of specialization, stabilization and scalability with the need to maintain maximum flexibility to allow agile experimentation, innovation, adoption and integration, but also greater resilience to disruptive events and changes. These same design principles, however, are emerging along with a new hierarchy of layers, as more stable blocks are being created that constitute new common infrastructures (e.g. platforms) that largely establish the technological trajectories and economic regimes that can be built on them (Dosi, 1982; Gawer & Cusumano, 2014; Constantinides & al., 2018; Berlinguer, 2018).

The increasing adoption of FOSS, standardization and modularity is giving rise to a new understanding of the very "fabric" of innovation (Arthur, 2009; Benkler, 2013; Hawkins et al., 2017). But it also outlines new possible approaches to the construction and governance of this new generation of infrastructures and to a renewed and extended scope of public sector action, both regulatory and productive, to foster, monitor, orchestrate, exploit a new generation of commons or global and trans-national public goods, co-generated and co-managed with a multiplicity of other agents and stakeholders, and according to a new productive logic. This requires however new approaches, with particular attention to the combination of open source, modularity and standardization in the design of the architecture of these infrastructures and to the orchestration of the different value creation logics and models of governance implied by these new productive environments.

Furthermore, there are good reasons to consider this new production logic emerged in the software and this trajectory as a model or "exemplar" (Kuhn, 1971) for the informational techno-economic paradigm (Perez, 2010). Its relevance is high and immediate, potentially, for many other areas, starting from the increasingly central and controversial issues related to data governance, property and economic exploitation. But the same cultural production and creation, which are undergoing a radical transformation induced by the digital revolution, have much to learn from a better understanding of the trajectory of software.

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