Chapter 8. EU cloud policy requires an innovative governance

Marco Berlinguer
The Institute of Government and Public Policy (IGOP), Autonomous University of Barcelona (UAB)
DOI: 10.54103/milanoup.180.c273

8.1 Introduction

The European Union aims to achieve "digital sovereignty", that is, to regain an active role in the digital revolution and avoid an irreparable worsening of its dependence in technology and the digital economy. This is occurring in a moment in which the digital revolution is entering into a new phase. In fact, a new generation of general purpose technologies and enabling infrastructures are in the process of being designed, developed and deployed. Cloud computing, Internet of things, 5G, Artificial Intelligence form the core of this group of new technologies, which are set to develop in a highly integrated manner and will have a profound and far-reaching impact on all social and economic sectors, as well as on the functioning of all types of organizations and institutions.

Against this backdrop, the EU is seizing this moment of change as an opportunity to re-enter the "race" for digital transformation, in which it has so far failed to participate as a major player.

This article focuses on the EU's cloud computing policy. Cloud computing, the most mature of these new technological infrastructures, are being deployed and has been the subject of numerous EU initiatives and legislative interventions. It is also a paradigmatic infrastructure, in the sense that it incorporates a number of characteristics exemplary of this phase of transition. Cloud computing is an enabling infrastructure for the transition to a society based on the intensive exploitation of data and computational capabilities. It is an infrastructure whose introduction destabilizes and reconfigures modes of operation and boundaries of economic sectors, organizations, and institutions. Finally, it is an infrastructure that is extremely complex, in its components and architecture, and subject to constant dynamism. All these characteristics make it emblematic and, likewise impart a push toward innovations in the existing systems of governance.

This latter point is one of the reasons why it is particularly interesting to study, the ongoing attempt by European governments and the EU to regain an active role in the digital revolution. In fact, added to the advent of a new stage

of the digital revolution, there is a clear return of industrial policy and public intervention in the governance of technological and economic development. This shift is driven by the very importance of these new infrastructure technologies, the explosion of geopolitical competition between the U.S. and China for the control of these new technological frontiers, and the crisis of neoliberal globalization.

Europe is entering this new stage of development facing hard challenges. It must reorganize its functioning and policies, which have been for long shaped by the neoliberal consensus. At the same time, Europe needs to find innovative ways to foster a robust and autonomous digital industry. It also faces the task of overcoming a highly fragmented system of governance in digital policy, which is disjointed even within individual nation-states. This fragmentation appears inadequate for the large-scale design, coordination, and governance required for the next generation of digital infrastructure.

Despite its intentions, Europe is thus being forced to become a laboratory for innovative forms of governance, which will have at the same time to reflect the maturing of the digital revolution and the new techno-economic paradigm that has been forming around it.

Our thesis is that, in this process of renewed public intervention, there will be a need for institutional and organizational creativity. An innovative strategy can be seen in the diverse initiatives that EU governments have launched in the field of cloud computing. The implementation, however, has been uncertain and inconsistent. Therefore, a clarification effort can help EU to act more boldly, address some blind spots that remain in its policy, and identify areas of innovation that have not yet been adequately focused.

Specifically, the argument will focus on a number of design and technology development principles that have been identified by the EU as levers for achieving internal coordination and sovereignty in cloud computing systems. By delving into these principles, their rationale, and their development, we will argue that the challenges the EU is facing require experimentation with a new type of hybrid forms of agency and governance.

8.2 EU cloud strategy in a nutshell

The EU identified the importance of the shift to cloud computing as early as 2012 (EU Commission). Since then, regulatory activity and promotion of initiatives have scaled up and intensified. There have been in fact 4 strategic statements, 15 legislations (approved or in the process of being approved) and at least 8 initiatives that - directly or indirectly - relate to cloud computing (Berlinguer, 2024). However, EU has so far failed to reverse the trend toward a deepening of the structural dependence of the European economy and public

administrations on a few oligopolies, mainly from the United States, that dominate the cloud computing market[12].

The overall goal of all EU activism can be summarized by the notion of digital sovereignty, which has taken on at least two distinct meanings. The first, which is more classical, focuses on regulating the digital sphere. In this regard, the EU, alongside China, is leading the way in pioneering new legislation across various areas of digital development. The second, more innovative meaning, aims to ensure that individuals, organizations, and governments maintain autonomy, self-determination, and freedom of action and choice within new digital environments.

Concretely, the initiatives undertaken by the EU and European governments operate along three complementary axes.

The first is the regulation of the new digital platforms and critical infrastructures. In doing so, the EU is *de facto* acknowledging the nature of essential services of many digital technologies and the numerous monopolies ("gatekeepers" in EU legislative language) that have formed in digital services. Regulations span across multiple subjects, given the critical and pervasive nature of these infrastructures. They range from the protection of users' fundamental rights and freeing users and businesses from private and unsupervised rules, to the introduction of transparency on algorithmic content moderation and prioritization, to the introduction of rules to ensure "sovereignty" aka control over one's own data or immunity from surveillance by non-European authorities. Economically, the main concern is to protect users and businesses from power asymmetries vis-à-vis platforms and "gatekeepers" and the possibility of abuse by the latter due to their dominant position. The most ambitious goal is to increase competition by beginning to disarticulate monopolistic positions, for example by making interoperability of services on these platforms mandatory.

The second line of action is the preservation of security and sovereignty over the most sensitive data of citizens, businesses and governments. In the wake of the pioneering GDPR, an important part of EU initiatives and legislation has been dedicated to this goal. These initiatives include Gaia-X, the EUCS - Cybersecurity Certification Scheme for Cloud Services - under discussion within ENISA (the European cybersecurity agency), the new rules on the regulation of critical infrastructure, and the new legislation on data governance. The EU aspires to make these superior legal data security guarantees its own competitive advantage and a tool to overcome the main barrier to cloud adoption and data exploitation, which is the lack of trust of companies, citizens and institutions. Second, these security requirements can form the basis for creating

12 According to recent estimates, the collective market share of the European players in the European cloud infrastructure services sector, for example, has shrunk in the last 5 years from 27% to a mere 13% (Synergy Group, 2022).

in critical infrastructure and public services a protected market in which to grow a European autonomous industry and set of systems and technology standards.

Finally, the third line of action is the reactivation of industrial policy, a fundamental shift in EU policy, which is not limited to cloud computing or the digital sphere. Edge computing and industrial data have been identified as the two main opportunities for European industry in cloud computing. Edge computing is considered the next evolutionary stage of cloud computing and is expected to support the exponential increase in data flow and data exploitation made possible by the Internet of Things and 5G. In addition to being a new technological frontier, edge computing requires a more decentralized architecture for data and computational resources and open communication protocols. Thus, it can help advance the goal of disrupting the centralized, closed and proprietary systems that currently monopolize cloud computing service offerings. The intensive use of data in industrial processes, instead, is a new frontier, on which the EU aspires to build a leading ecosystem of innovation based on its strength in traditional manufacturing, which potentially provide a rich source of strategic data for the development of innovative services.

In both areas the EU aims at leveraging on the size of its market and its leadership in regulation, to become a "trustworthy" global standard setter.

8.3 … and some of its limitations

Will the EU achieve its digital sovereignty in cloud computing? It is still too early to assess the effectiveness of the new EU cloud computing policy fully. In the area of regulation, the European Union has become a pioneering laboratory for digital regulation and certainly will influence global regulatory standards on emerging digital technologies. As it happened with the GDPR, laws such as the Digital Market Act (DMA) and the Digital Services Act (DSA), which regulate the platforms and gatekeepers of the digital economy, or the long-awaited AI act, are regulations that are poised to have a global impact. The EU's legislation on data is similarly ground-breaking. The "data strategy", introduced in 2020, has been central to Europe's new digital policy from the outset with the declared ambition of making the EU a leader in the future "data-driven society". To support this, there are six specific regulations addressing data governance - three approved in the previous legislature and three proposed or approved in the current one[13].

13 The "data strategy", presented in 2020, has been at the heart of the new European digital policy from the outset, with the declared ambition is to make the EU a leader in the future "data-driven society". EU data legislation is undoubtedly the most prolific and extensive in the world. The issue of data cuts across all sectors of the digital economy and is therefore present in any digital regulation. However, there are 6 specific regulations focused on data. The first foundations were laid in the previous legislature with the General Data Protection

Overall, it is possible to discern the outlines of a technological, regulatory and industrial strategy that advances toward the goal of achieving greater European digital autonomy in cloud computing. This strategy is succinctly articulated in the Berlin Declaration of the 2020 European Council (European Council, 2020). The principles relied upon in that document to build sovereign cloud infrastructures in the critical area of European public administrations are: interoperability, open source, standardization, modularity. Accordingly, this strategy would fundamentally rely on a bold and strategic use of Free and open source software (FOSS) and open standards, ideally supported by regulations and coordination at the European level. Though undeniably challenging, this strategy would be based on existing - and most predictable future - trends in the evolution of contemporary digital systems. Moreover, the EU has allocated significant resources with the Next Generation EU fund, 20 percent of which - about 160 billion euros - dedicated to investments in the digital sphere.

However, the first steps of implementing these policies have been uncertain and inconsistent. The most critical step to look at is the migration to cloud computing of European administrations. This transition involves substantial investments and the need to preserve the security of the most critical data. As a result, many major European countries have chosen to exclude non-European or non-domestic providers from handling their most critical data and services. Examining the plan approved by the Italian government - which benefited from the largest share of the EU's Next Generation fund - reveals that it primarily involves using local encryption for managing the most sensitive data and transferring licenses from U.S. hyperscalers to a consortium of Italian companies. This approach suggests that Europe's technological dependence will not only be unaffected, but will actually be strengthened. On the other hand, the plans presented by France and Germany for the migration of their public administrations, while more ambitious in terms of pursuing strategic autonomy, appear uncoordinated (Berlinguer, 2024). In sum, obvious weaknesses emerge: the main ones being the lack of clarity and determination on common goals, the lack of coordination among European governments, and the absence of an effective digital policy governance system. While a further difficulty arises from the highly innovative nature of the industrial policy that the European strategy demands. This challenge is due in part to the absence of an autonomous

---

Regulation (2016) which regulates the use of personal data and with the Free Flow of Non-Personal Data (2018) for non-personal data, aimed at liberalizing the flow of data within the EU; and the Open Data Directive (2019), replaced the Public Sector Information (PSI) Directive, with the aim of promoting access and re-use of data held by public institutions. In this legislature, three new legislative initiatives have been added (of which only the first has been definitively approved): the Data Governance Act, the Data Act and the European Health Data Space. All these last regulations have as their main objective to incentivize and facilitate the economic, scientific and technological exploitation of data.

European digital industry and partly to the difficulty of reconciling the competing interests of different governments and economic sectors.

8.4 An innovative matrix for governing technological systems

Overall the European digital policy in cloud computing must be seen as a tentative and unfulfilled attempt.

But what can we learn from this attempt, particularly in terms of innovations in the governance systems that have not yet been sufficiently thematized by the EU policy?

One approach to answering this question is to look at what is perhaps the most original insight followed by the European strategy: the specification of a set of design and technology development principles as a guide for building sovereign cloud computing systems.

The principles of interoperability, open source, standardization, modularity are, on closer inspection, principles widely used in the construction of software systems. These principles have increasingly gained prominence, especially with the advancement of information and communication technologies, and software development in particular. The main and most innovative of these principles is undoubtedly the Free and Open Source Software (FOSS). FOSS is in fact a digital commons, as its open licensing allows anyone to use, study, modify and redistribute the software. Despite this challenging feature, it has come to largely dominate the production of software, which is the cornerstone technology of the digital revolution. Today, in fact, it is estimated that between 70 to 90% of existing software systems is made of open source components (Synopsis, 2023), and thousands of companies participate in the FOSS ecosystem. FOSS is a center piece on all the main frontiers of digital innovation, from Cloud computing, to Internet of Things, Artificial Intelligence, 5G, Blockchain Technology, or even Quantum computing. In certain cases, open source solutions have become an arena for convergence, standardization and industry-wide forms of collaboration. In other cases, FOSS alternatives have become a central instrument for capitalist competition (Berlinguer, 2018; 2021).

Moreover, FOSS non-proprietary logic has expanded and exerts a growing influence on the other principles of the matrix, and their governance models, as for example, with open standards or open APIs. And it is, to a large extent, in this vein that the EU has adopted these principles.

In fact, FOSS, standardization, modularity, interoperability have so come to be increasingly intertwined in their evolution. Overall, this already allows to draw a first teaching. Already today - and predictably even more so in the future - the core of digital infrastructure is developed and regulated by nonmarket

forms of governance, which are based on novel forms of collaboration and competition. More specifically, delving deeper into the relationship of the principles of this matrix to markets, a common feature of these principles is that they shape but also eliminate markets and release productivity according to a different logic. The majority of the value they generate is shared and not directly measurable through market transactions. This is an aspect that Big Tech companies have come to know and strategically leverage (Berlinguer, 2018; 2023). However, it still remains a key blind spot for public policy and it is among the most underestimated aspects of the EU approach.

But what is behind the success of this matrix? There is no single determining factor. However, the main common denominator is that these principles constitute a set of strategies that respond to the need to manage the growing complexity, scale and integration of software systems and their constant dynamism (Steinmueller, 2003; Baldwin, 2008; Gottschalk, 2009; Benkler, 2013; Blind, 2016)[14]. While, in turn, the adoption and use of these principles have further facilitated the growth of the complexity, integration and dynamism of these systems, in a self-reinforcing cycle (Berlinguer, 2024).

This resulting complexity is evident in the sometimes hardly understandable system of dependencies and unexpected fragility of present software systems. This complexity has become a major force pushing for an evolution in the governance of software systems and for the governmental intervention in it, and thus in the governance of this same matrix.

Another key factor in understanding the success of this matrix is its alignment with a family of organizational forms that have gained prominence with the digital revolution, differing markedly from those typical of the Fordist era. These include phenomena like networks[15], platforms[16], and ecosystems[17]. All of which are more aptly defined as "meta-organizations" (Gawer, 2014). These "meta-organizations" are characterized by "policentricity" (Ostrom, 2010) and porous and elusive boundaries (Parker & Van Alstyne, 2016; Berlinguer, 2023). Furthermore, the main economic device through which they generate value is collaboration, not competition. And indeed, at a closer look, FOSS, modularity, standards, interoperability, are all arrangements that facilitate decentralized collaboration among people, and organizations with weak or nonexistent ties and different or even competing interests and agendas. Or, as Powell would have

14 This is just a selection of a vast literature that has been developed around each of these principles. Looking at this literature, there are two general rationales that are most widely used to justify and explain the adoption of each of these design rules separately: to simplify complexity management and to reduce communication and transaction costs.

15 For networks, see for example, Powell (1990), Castells (2004) or Benkler (2006).

16 For two different approaches to platforms, see Srnicek (2017) and Constantinides et al. (2018).

17 For ecosystems, see Baldwin (2018), Jacobides et al. (2018) or Cennamo et al. (2018).

put it, under conditions in which "neither markets nor hierarchies" provide effective means of promoting collaboration (Powell, 1990).

This suggests that the development of the digital revolution is driving a shift in organizational and institutional forms. Nevertheless, this doesn't mean that these principles of technological development have affirmed themselves or evolved naturally. Rather it has unfolded through a tense and evolutionary path, characterized by conflicts and innovations. Moreover, the use of this matrix can take various forms, especially as these principles have been variably combined with markets. The clearest example is provided by the parallel growth of the widespread use of FOSS with the formation of giant monopolies in the digital sector (Berlinguer, 2018)[18]. This apparent paradox also means that the importance of this matrix does not allow any simplistic technological determinism to be deduced and applied from it.

8.5 … and its next stage of evolution

What does it mean to find these principles of technology design and development articulated as tools in a policy document? Primarily, two things.

First, is that this matrix offers new levers for governing digital ecosystems. This is something that Big Tech companies are already familiar with[19]. What is new is that public policy is beginning to experiment with its use. As EU policy shows, this matrix can be leveraged in two distinct but complementary directions: to regulate new digital infrastructures and to implement a new kind of industrial policy. However, we are still in the early stages of this process, and there is still significant hesitancy in its implementation. But we can expect a gradual increase in clarity, capacity and more decisive actions based on these new tools in the future.

Secondly, this indicates that we are entering a new phase of evolution in the forms of governance of this matrix. The trajectory of FOSS is again illustrative of how important this evolution has been. FOSS has experienced two distinct

18 Began with the same adoption of Linux. Linux, in fact, did not succeed so much as operating system for personal computers (where Microsoft maintained its dominance). Instead it found its way as a dominant platform in other areas such as mobile devices (Android is a derivative of Linux) and in servers and Web servers. This latter is the use that started to be made of Linux, since the mid-90s, by large organizations, with supercomputing necessities, such as NASA or later Google, that exploited it to build relatively inexpensive huge data centers and processing capacities. Which, in turn, highlights a paradox. Linux, often celebrated for the democratization it brought in software production and in a crucial layer of technological innovation, provided a potent foundation to what is the processes of "industrialization" and "platformization" of the Internet, and the present hugely concentrated architecture in cloud computing itself.

19 One of the first and most successful examples of wide use of this matrix to gain a monopolistic position has been Android.

phases: the first hegemonized by communities of developers and the second by enterprise adoption and new forms of market competition. Each of these phases has been characterized by important innovations. The first created and consolidated the institutional, organizational and cultural innovations that are still the basis of FOSS today (Benkler, 2006). In contrast, the second phase saw these initial dynamics complemented and increasingly overcome by new driving forces, represented by FOSS adoption by business, and the new competitive dynamics and business models that have characterized the growth of the digital economy (Berlinguer, 2023).

As a result of this trajectory, a number of hybrid organizations and arrangements have emerged. The most obvious example are the large foundations that have arisen within the FOSS ecosystem. Some of these foundations have grown spectacularly and which so far managed to dynamically maintain contradictory principles, such as private profit and sharing, the logic of voluntary communities and that of business organizations[20].

The active and structured involvement of governments in this ecosystem signals the onset of a new phase in its evolution. This more direct involvement of governments is not a phenomenon limited to the European case and is driven essentially by three factors: the systemic and infrastructural role that FOSS has assumed, the widespread impact of the latest digital technologies, and the intensification of international competition. As a result, the FOSS ecosystem is probably on the brink of changes, which are likely to be as profound and unpredictable as those seen during its previous transformations. However, some anticipations can be made. In the near future, we will see the emergence of new forms of governance, which we might call second-generation hybrids, that will have to integrate public powers and sovereign instances in their mode of operation. In truth, traces pointing in this direction are present in all initiatives promoted by the EU and major European governments. Nevertheless, a clear awareness and explicit thematization of this challenge is still lacking in European strategy.

This new phase of development is unlikely to be straightforward. In fact, it is likely that these new governance systems will play a much larger role in the future, and a more systematic use of this matrix could have repercussions in many areas, from antitrust and competition policy to industrial policy, financing and management of public goods, and tax and redistributive policy.

Nevertheless, the EU's chances of advancing its digital strategic autonomy will depend largely on its ability to play a role in this new frontier of governance innovation.

20 The most important by large is the Linux Foundation, which has become an highly influential hub in the relationships between global tech companies and open source projects. Other important foundations are Eclipse, Apache and the newly founded Chinese OpenAtom Foundation.

Acknowledgement

The argument presented in this contribution is explored in greater detail in an upcoming essay by Berlinguer, M. (2024), titled "*The Matrix. Is there a European way to Cloud computing? Lessons from an unfulfilled endeavor on the governance of digital transformation. "* This essay will be published in Transform! E-papers.

References

Baldwin, C. Y. (2008). Where do transactions come from? Modularity, transactions, and the boundaries of firms. *Industrial and corporate change*, *17*(1), 155-195.

Baldwin, C. Y. (2018). Design Rules, Volume 2: How Technology Shapes Organizations: Chapter 14 Introducing Open Platforms and Business Ecosystems. *Harvard Business School, Harvard Business School Research Paper Series*, 19-035.

Benkler Y. 2006. The Wealth of Networks: How Social Production Transforms Markets and Freedom. Yale University Press

Benkler, Y. (2013). Commons and Growth: The Essential Role of Open Commons in Market Economies. University of Chicago Law Review.

Berlinguer, M. (2018). The value of sharing. How commons have become part of informational capitalism and what we can learn from it. The case of FOSS. *Rassegna italiana di sociologia*, 59(2), 263-288.

Berlinguer, M. (2021). Digital Commons as new Infrastructure: A new generation of public policy for digital transformation. *Umanistica Digitale*, (11), 5-25.

Berlinguer, M. (2023). Open Source and Economic Models in an Evolutionary Approach. In *Business Models and Strategies for Open Source Projects* (pp. 18-49). IGI Global.

Berlinguer, M. (2024) The Matrix. Is there a European way to Cloud computing? Lessons from an unfulfilled endeavor on the governance of digital transformation. Transform! E-papers.

Blind, K. (2016). 14. The impact of standardisation and standards on innovation. *Handbook of innovation policy impact*, 423.

Castells, M. (2004). Informationalism, networks, and the network society: a theoretical blueprint. *The network society: A cross-cultural perspective*, 3-45.

Cennamo, C., Gawer, A., & Jacobides, M. G. (2018). Towards a theory of ecosystems. *Strategic Management Journal*, *39*, 2255-2276.

Constantinides, P., Henfridsson, O., & Parker, G. G. (2018). Introduction—platforms and infrastructures in the digital age. *Information Systems Research*, *29*(2), 381-400.

European Council. (2020) Berlin Declaration on Digital Society and Value-Based Digital Government. Declaration.

European Commission. (2012). Unleashing the Potential of Cloud Computing in Europe - What is it and what does it mean for me? Communication.

Gawer, A. (2014). Bridging differing perspectives on technological platforms: Toward an integrative framework. *Research policy*, *43*(7), 1239-1249.

Gottschalk, P. (2009). Maturity levels for interoperability in digital government. *Government information quarterly*, *26*(1), 75-81.

Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic management journal*, *39*(8), 2255-2276.

Ostrom, Elinor. 2010. Beyond Markets and States: Polycentric Governance of Complex Economic Systems. American Economic Review, 100 (3): 641-72.

Parker, G. G., & Van Alstyne, M. W. (2005). Two-sided network effects: A theory of information product design. *Management science*, *51*(10), 1494-1504.

Powell, W. W. (1990). Neither market nor hierarchy. *Sociology of organizations: structures and relationships*, 30-40.

Srnicek, N. (2017). *Platform capitalism*. John Wiley & Sons.

Steinmueller, W. E. (2003). *The role of technical standards in coordinating the division of labour in complex system industries* (pp. 133-151). Oxford: Oxford University Press.

Synergy Group. (2022). European Cloud Providers Continue to Grow but Still Lose Market Share. *Synergy Blog*. September 27, 2022

Synopsis (2023). *Open Source Security and Risk Analysis Report*. Synopsys, Inc.