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The Changing Landscape of European Cloud Computing

Gaia-X, the French National Strategy, and EU Plans

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Key Takeaways

- Non-European cloud service providers host the vast majority of European data, which is viewed as an economic as well as a political problem.
- Gaia-X, European governments and the European Union aim to bolster the European cloud market while responding to data privacy and cybersecurity concerns.
- Cloud offers a concrete illustration of data sovereignty: at a minimum, it means storing and processing data in Europe, according to European law, and fostering a diverse digital ecosystem that offers users a choice.
- From an economic standpoint, if European hardware and software providers fail to catch up and lead in the cloud business, the development of edge computing could open new possibilities.

THE RISING POLITICAL STAKES OF CLOUD COMPUTING[1]

It is estimated that, with the ongoing digital transformation, the global volume of data will be multiplied by five by 2025.[2] Cloud technologies are playing a central role in facilitating this growth. Cloud computing provides remote, on-demand data storage and processing that gives access to computing capabilities, big data analytics services, and machine learning algorithms, while reducing IT costs for businesses.[3]

Today, non-European service providers host 80% of European data.[4] A few players, especially Amazon Web Services (AWS), Microsoft Azure, and Google Cloud, dominate the market in Europe and the share of those three companies has been growing over the past four years, from around 50% to 66% in 2021.[5] The pandemic of COVID-19, while it has demonstrated the essential role of technologies in ensuring the continuity of social life, businesses, and administrations, has further expanded the presence of US cloud service providers in Europe.

These dynamics become problematic when service providers can make use of data of EU citizens, governments, or companies, including data stored in the EU, in a manner that is unlawful from a European standpoint. Considering the market share of US companies, Europe's attention has focused especially on American practices and on the 2018 Clarifying Lawful Overseas Use of Data (CLOUD) Act, which facilitates US federal agencies' access to data hosted by US providers, for national security purposes. Microsoft recently indicated that they are presented with 7 to 10 secrecy orders per day from US federal law enforcement.[6] In addition to the CLOUD Act, the Foreign Intelligence Surveillance Act (FISA, amended in 2008), also grants the National Security Agency access to foreign data. European lawmakers allegedly have no information about the FISA's actual reach, and, under that law, there is no reporting by service providers about US intelligence services' requests for data access.[7] Chinese digital companies such as Alibaba are also reaching into the European cloud market. Data processed by Chinese companies is potentially subject to

1. The author wishes to thank Tyson Barker and Claire Demesmay at the DGAP, and the participants in the IFRI-DGAP webinar on "Europe's Data Infrastructure and Digital Sovereignty" (April 27, 2021), on which part of this analysis is based.
2. European Commission, "European Data Strategy: Making the EU a Role Model for a Society Empowered by Data", no date, available at: https://ec.europa.eu.
3. For a brief overview of the various types of cloud services, see E. Neuber and K. Sahin, "Bright or Cloudy?", *Berlin Policy Journal*, June 18, 2020.
4. European Commission, "European Data Strategy", *op. cit.*
5. C. Donnelly, "European IT Providers Struggle to Capitalise on Continent-wide Growth in Cloud Demand", *Computer Weekly*, January 15, 2021, available at: www.computerweekly.com.
6. L. Dobberstein, "Microsoft Tells US Lawmakers Cloud Has Changed the Game on Data Privacy, Gets 10 Info Demands a Day from Cops", *The Register*, July 2, 2021, available at: www.theregister.com.
7. Interview with a French official, May 2021. See Office of the Director of National Intelligence, "Section 702 overview", no date, available at: www.dni.gov.

yet more far-reaching infringement of privacy, under the State Security Law or under the forthcoming Data Security Law.[8]

European states display diverging practices and levels of tolerance when it comes to how much their own intelligence services can access citizens' data for security purposes. And, in many cases, European governments do cooperate with US intelligence agencies in digital surveillance, as was recently highlighted in the case of Denmark.[9] However, unlawful foreign access to citizens', businesses', or governments' data, on top of raising cybersecurity concerns, is viewed as a serious threat to a state's sovereignty.[10] Companies also fear data access can be used for industrial espionage. These concerns are thought to play an important role in limiting European businesses' use of cloud solutions: only 21% of European companies use cloud services today, against 33% in the United States.[11]

EUROPEAN PLANS FOR THE CLOUD SECTOR

This situation has been called into question over the past few years. For nearly a decade, but especially from 2018 onward, digital sovereignty – in particular, sovereignty over data – has been seen as a necessary response to the privacy and cybersecurity concerns of Europeans, whether individuals, governments, or industry. Europe has sought to build its own governance framework for data and to develop European cloud solutions.

The Gaia-X project

In 2018, both the French and the Germany ministers of the economy, Peter Altmaier and Bruno Le Maire, made a priority to boost the cloud sector in their respective country. The following year, at the 21st Franco-German Council of Ministers, they agreed on a roadmap establishing a common approach for developing the European infrastructure and data ecosystems. The two governments published a position paper in February 2020 and launched Gaia-X, the initiative for a trusted European cloud market, in June 2020. It was formally set up officially as an association under Belgian law (AISBL) in January 2021.

Gaia-X is not about building a European "hyperscaler" or "sovereign cloud", but about encouraging uses of cloud services while responding to the privacy and cybersecurity concerns mentioned above; combining existing European capabilities; and facilitating the sharing of data among those involved.

Gaia-X has 22 founding members, including, on the French side, Atos, EDF, the Institut Mines-Télécom, OVHcloud, Orange, 3D Outscale, and Safran; and on the German side BMW, Deutsche Telekom, the Fraunhofer Institute, Siemens, and SAP. They formed part of the interim association board. Since, more than 270 European and international

8. H. A. Kurth, "China Issues Data Security Law", *National Law Review*, June 16, 2021, available at: www.natlawreview.com.
9. S. Seibt, "How Denmark Became the NSA's Listening Post in Europe", *France 24*, June 1, 2021.
10. C. Bômont and A. Cattaruzza, "Le Cloud Computing: De l'objet technique à l'enjeu géopolitique. Le cas de la France", *Hérodote*, No. 177, 2020, p. 150.
11. A. Green, "Europe's Gaia-X looks to Challenge Big Tech's Cloud Dominance", *Financial Times*, March 9, 2021.

companies (cloud providers or consumers) and scientific organizations have become members of Gaia-X, including many non-European companies such as Google, IBM, Intel, Oracle, Microsoft, Huawei, Alibaba, Palantir, Cisco, or Salesforce. In the election that took place in June 2021, DigitalEurope and Bitkom, major lobbies that represent non-European companies like Amazon or Google, were appointed to the board of directors.

The participation of non-European companies has raised eyebrows, especially in France.[12] The participation of US or Chinese companies indeed can be seen as defying the very purpose of Gaia-X, given the serious cybersecurity and sovereignty concerns mentioned above. A Gaia-X press release stipulates that "being a member of the Gaia-X Association will not mean that any of the services of a member company will be compliant".[13] Indeed, services, rather than the companies, will be certified, and each service offered by a provider will be examined to evaluate its compliance with Gaia-X principles and rules.[14] This policy of openness aims to ensure that there is no discrimination against non-EU companies, or between larger and smaller service providers.

Gaia-X does not leave out foreign providers but seeks to provide transparency to users

Nonetheless, Gaia-X seeks to embed European values with regards to data management: interoperability, reversibility, transparency, cybersecurity. Thus, on the one hand, it is a federated cloud marketplace, where companies can provide or use services and collaborate with partners, all while ensuring the interoperability of the chosen services and the portability of their data. And, on the other hand, it is about providing visibility and transparency about the level of legal and technical data protection. The marketplace will show whether the service providers are subject to foreign law, as well as whether the data are located or required to circulate outside the EU. The levels of cybersecurity requirements in Gaia-X are based on the European cybersecurity certification framework defined by the European agency ENISA (protection at basic, substantial, or high level). For the participating cloud services providers, it will also help them collaborate and create consortia that build on their complementary skills to respond to procurement bids.

The project is still in the prototyping phase. The Association's board and committees, such as the technical committee, oversee working groups that are defining standards, use cases, and the architecture. One difficulty for the project is to not come up with technical specifications that are overly complex or costly to match.[15] Conversely, if Gaia-X is successful, it could influence the development of international standards, in the manner of the EU's General Data Protection Regulation with regards to personal data.

12. A. Vitard, "Gaia-X accueille 212 nouveaux membres… dont Huawei, Alibaba Cloud et Palantir", *L'Usine Digitale*, April 1, 2021, available at: www.usine-digitale.fr.
13. Gaia-X, "GAIA-X Accelerates with 212 New Organizations Joining and Announces a Forthcoming Compliance Label", press release, March 29, 2021, available at: www.data-infrastructure.eu.
14. It is still unclear at this point who will oversee the certification process, and whether it will be done by an external body or as self-certification.
15. T. Barker and K. Sahin, "Europe's Capacity to Act in the Global Tech Race", Report, DGAP, April 2021, p. 26.

The French "cloud de confiance"

While foreign providers raise privacy or cybersecurity concerns, European cloud offers have suffered from an attractiveness problem. This has been noticeable in even public procurement choices in European capitals. Illustratively, in April 2020, the French government chose Microsoft Azure to host the national Health Data Hub – although that decision was later reversed. The director of the French national cybersecurity agency (ANSSI) had then justified choosing Microsoft due to the quality and availability of the service: "in a prototyping phase, the choice of an easy-to-use solution was preferred", he explained.[16] The French government later changed gears and will now be looking for a new provider as part of its new national strategy for cloud.[17]

Ongoing European policy efforts on cloud computing build on the lessons from past attempts at developing "sovereign" cloud solutions. In the 2010s, the French government had launched a public-private partnership to develop *ex-nihilo* a national cloud offer, which failed, *inter alia*, because it did not meet a demand.[18] Bruno Le Maire, Minister for the economy and finance, referred to this lesson-learning process when he announced France's cloud strategy. He affirmed that "there have already been a lot of attempts to make [...] sovereign clouds, and they have failed quite simply because [...] we did not take into account the technological realities or the expectations of the companies or the expectations of the administrations".[19]

The new French government's national strategy for cloud, introduced in May 2021, builds on these lessons learned. At the press conference, Bruno Le Maire set out his three ambitions. Firstly, he announced a new label: the "cloud *de confiance*", or trusted cloud. The label ensures data sovereignty, based on the "SecNumCloud" certification awarded by ANSSI. The "trusted" nature of the cloud service rests upon the idea of a double security: one is cybersecurity, i.e., technical protection against cyberattacks; the other is certainty about the legal protection of data, in particular against extra-territorial laws.

The second priority is to ensure that French companies, citizens, and the administration have access to the best cloud technology and services available. This includes foreign technology: the government acknowledges that some of the most successful cloud services in the world are those of foreign companies, especially American ones. Thus, the label allows new, hybrid combinations, via the creation of European companies using licensed foreign technologies.[20] We already see such cloud solutions from OVH, and from the newly created Bleu (an Orange-Capgemini joint venture), with offers that include services from Google and Microsoft, respectively. Bleu founders explain that four safeguards will guarantee the cloud's

16. V. Cimino, "Anticor estime que l'hébergement du Health Data Hub a été attribué illégalement à Microsoft Azure", *Siècle Digital*, April 14, 2021, available at: https://siecledigital.fr.
17. A. de Monchalin, "Présentation de la stratégie nationale pour le cloud", Paris, May 17, 2021, available at: www.economie.gouv.fr.
18. C. Bômont and A. Cattaruzza, "Le Cloud Computing", *op. cit.*, pp. 151-152.
19. B. Le Maire, "Présentation de la stratégie nationale pour le cloud", Paris, May 17, 2021, available at: www.economie.gouv.fr.
20. Government of France, "Le Gouvernement annonce sa stratégie nationale pour le Cloud", press release, May 17, 2021, available at: www.economie.gouv.fr.

immunity to US law: 1) 100% French or European capital; 2) day-to-day operations carried out by Bleu as a stand-alone company, without Microsoft's intervention in management; 3) separate data centers, owned by Bleu; and 4) the control of ANSSI, which comes with the SecNumCloud certificate.[21]

Thirdly, the government's priority is to support the growth of the European cloud market and of European cloud providers. Indeed, one commonality with past French attempts at cloud strategy is the view of cloud computing as an industrial sector and the intent to develop of European technologies. According to Le Maire, "access to the best global services does not mean giving up developing our own services and our own service technologies".[22] Therefore, the first two measures are complemented with financial support for developing European cloud companies. The support forms part of the COVID-19 relief package and of the *Programme d'investissement d'avenir* (future investment plan) both of which seek to build Europe's "technological sovereignty". The government aims to focus on cloud solutions for the deployment of artificial intelligence and big data analytics, and software suites for collaborative work. A call for expressions of interest has already identified five projects for an initial amount of €107 million.

EU plans for data flows and next-generation clouds

In the background of Gaia-X and individual member states' national strategies, the EU is developing tools, too, to shape the cloud sector and data exchange within Europe. All these efforts, with rather converging agendas, are occurring in many ways in parallel.

Firstly, the EU's priorities are to foster the free flow of data and data sharing within the EU. Gaia-X contributes to furthering the Union's broader agenda for creating a "Digital Single Market", based on the principle of free flow of non-personal data within the EU.[23] The European Commission's proposal for a "Data Governance Act" aims to further bolster the sharing of non-personal data across the bloc, especially for public policy purposes. In addition, the development of the internet of things will require the pooling of various types of data in "data spaces" (*cf. infra*): automatic vehicles could share data within urban infrastructures, along the industrial production line, as well as actors involved in maintenance. Lessons have also been drawn from the pandemic: shared and secure data at the EU level would have been useful and important in managing the pandemic.[24] Consequently, the Commission is due to release its legislation on a European Health Data Space by the end of the year, for both e-health and medical research purposes.[25]

21. Interview with a representative of Capgemini, July 2021.
22. B. Le Maire, "Présentation de la stratégie nationale pour le cloud", *op. cit.*
23. According to a 2018 EU regulation, EU member states cannot require data localization on their national territory, except for public security reasons. Regulation (EU) 2018/1807 of the European Parliament and of the Council of 14 November 2018 on a framework for the free flow of non-personal data in the European Union.
24. See J. Martinez and C. Tonon, "La gouvernance des données de santé: Leçons de la crise du COVID-19 en Europe, en Chine et aux États-Unis", *Études de l'Ifri*, Ifri, July 2021.
25. European Commission, "Digital Health Data and Services – The European Health Data Space", no date, available at: www.ec.europa.eu.

Secondly, the EU is working toward a set of technical solutions and policy norms for data exchange, as well as on a cloud rulebook, and a cloud services marketplace in 2022. Today, data exchange between actors in the same sector is limited by several obstacles, including physical-technical barriers in the infrastructure – which the Gaia-X project is also aiming to tackle. It remains to be seen whether all the standards and strategic preferences of Gaia-X, the EU, and member states, will eventually converge. Gaia-X representatives believe that the policy rules they have developed could inspire the EU, to avoid duplicating the work carried out within the association. As for non-European providers, they fear that stringent regimes like the French "cloud *de confiance*" could become the norm for cloud services, including for the management of non-sensitive data.

Data sharing will have uses in industry, health, public services

Finally, the Commission is committed to supporting European cloud businesses and to funding cutting-edge cloud and advanced IT projects. While Gaia-X is focused on bolstering the cloud market in the present day, and includes non-EU players, the EU is seeking to help develop future European cloud offers. EU member states signed a joint declaration for "Building the Next Generation Cloud" in October 2020.[26] An Important Project of Common European Interest (IPCEI) was then set up with the ambition to help develop a European cloud offer in areas of technological breakthrough, via calls for project. The EU will also co-finance efforts toward the deployment of a resilient and secure cloud infrastructure in Europe. The total investment could reach up to €10 billion in 2021-2027, with the view to modernize data centers of public infrastructures, and to interconnect infrastructures and services across Europe (e.g., toward shared data spaces for transport).[27] On July 19, 2021, the Commission announced the creation of a European Alliance for Industrial Data, Edge and Cloud, with a view to strengthening the position of EU industry in the sector. In complement to the IPCEI, the Alliance will bring together relevant EU stakeholders (businesses, Member State representatives, and experts) to jointly defining strategic investment roadmaps.

EDGE COMPUTING: AN OPPORTUNITY FOR EUROPE?

European initiatives in the cloud sector illustrate in a rather practical fashion what the sometimes-hazy terms of data sovereignty can entail. When it comes to cloud computing, at a minimum it means storing and processing data in Europe, according to European law, and fostering a diverse digital ecosystem that gives customers the choice among various suppliers and data protection regimes.

Edge computing might provide a further opportunity to implement these principles. Whether in industry, electricity networks, cities, or transport, we are moving towards a

26. IPCEIs are large-scale projects bringing together companies and research centers from different Member States andbringing substantial benefits to the EU's strategic objectives. Through the use of an IPCEI, Member States can address market failures by significantly funding R&I activities by derogation from EU state aid rules. Participants are France, Germany, Italy, Spain, Belgium, Luxembourg, Slovenia, Hungary, Czechia, Poland and Latvia.
27. Interview with a representative of the European Commission, May 2021.

generalization of interconnected systems using artificial intelligence. Data collection and analysis will be at the heart of these systems. Currently, most of the data generated by connected objects is processed remotely, in large data centers, through cloud computing. However, some connected objects, especially in transport, health, or finance, require almost instant data exchange, which the cloud does not always allow. With the deployment of 5G, the volume and complexity of data will explode, which will risk saturating bandwidths and slowing down processing. Thus, while "today 80% of data processing and analysis that takes place in the cloud occurs in data centers and centralized computing facilities and 20% in smart connected objects", by 2025 these proportions are likely to be inverted, according to the European Commission.[28]

Edge computing is a distributed model of servers that brings data processing closer to where it is generated. Proximity reduces latency and enables real-time processing of data, such as video analysis in the case of an autonomous vehicle. The principles of edge computing can be applied more broadly, as potential degrees of proximity are multiple. In the case of a "smart city", local servers will, for example, allow vehicles and traffic lights to be interconnected to regulate traffic in an optimal fashion. In rural areas that are far from large data centers, the "edge" may consist in installing small local data centers, to provide a better quality of service. Edge computing, in that it will allow the local processing of part of the data, should also limit risks of unlawful access to data (even though the multiplication of connected objects might increase cybersecurity risks).

Given its potential, edge computing is of strategic importance to industry and the data economy. As it is an emerging market, it is not yet distributed. Consequently, and as the creation of the "alliance" indicates, it is viewed in Europe as a unique opportunity to deconcentrate the digital services market, and to improve the competitiveness of European cloud service providers and software companies.[29]

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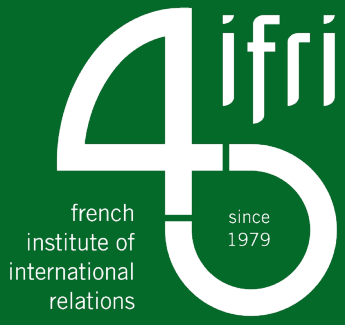
28. European Commission, "A European Strategy for Data", communication, February 19, 2020, available at: https://eur-lex.europa.eu.

29. European Commission, "Cloud and Edge Computing: A Different Way of Using IT", Brochure, March 8, 2021, available at: www.digital-strategy.ec.europa.eu.



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