1 France's Sovereignty in Cloud Computing and Artificial Intelligence

1.1 Introduction: French AI Sovereignty Between Strategic Ambitions and Technological Constraints

1.1.1 "For now, it gets the job done, but we'll have to see in the future..."

On the first day of my internship, I was talking with an employee from the Delivery team—the department to which I was assigned—when he explained that the data and applications developed by Informatique CDC containing sensitive information were stored in an internal cloud, meaning one owned by the company itself. Intrigued by this information, I naively asked why they did not rely on major cloud providers such as Amazon Web Services or Google Cloud. He replied that this was primarily a matter of data protection: information concerning French citizens must not be made accessible to another country.

I then pointed out that there must nonetheless be a performance gap between Informatique CDC's internal cloud and those of global cloud giants. He answered: "For now, it gets the job done, but we'll have to see in the future." It is precisely these uncertain future prospects that caught my attention: can France still hope to preserve its sovereignty in a global digital arena dominated by technological superpowers such as the United States or China?

However, the term "sovereignty" is polysemous, which makes it necessary to clarify the different perspectives through which it will be examined in this third section. Traditionally, sovereignty refers to the supreme authority of a State within its borders, namely its ability to legislate and make decisions without external influence. One of the most commonly cited definitions is that of Louis Le Fur, who defines sovereignty as "the quality of the State of being bound or determined only by its own will, within the limits of the higher principle of law, and in accordance with the collective purpose it is called upon to fulfill."

This definition dates back to the nineteenth century, but in the digital age it has broadened significantly. In 2019, the French Senate's inquiry commission on digital sovereignty defined digital sovereignty as "the capacity of the State to act in cyberspace," which is considered a "necessary condition for the preservation of our values." This implies, on the one hand, "an autonomous capacity for assessment, decision-making, and action in cyberspace," and, on the other hand, control over "our networks, electronic communications, and data." It is through the lens of this definition that this third section is structured.

As briefly mentioned, Informatique CDC operates its own internal cloud and does

not rely on leading cloud service providers such as Amazon Web Services, Microsoft Azure, or Google Cloud, mainly for confidentiality reasons. Indeed, as these companies are American, their use raises legitimate concerns regarding data confidentiality, particularly due to extraterritorial laws such as the Cloud Act. For a French public entity, entrusting sensitive information to foreign actors may therefore appear risky.

However, the company's internal cloud does not offer the same level of performance, flexibility, or computing power as those provided by American tech giants. This situation highlights an increasingly pressing question: how can digital sovereignty requirements be reconciled with growing demands for technological performance? To what extent is France truly capable of ensuring its autonomy in large-scale data management and artificial intelligence processing without resorting to foreign solutions?

This issue is all the more significant given that the dominant powers in today's AI landscape—the United States and China—are investing massively in cloud infrastructure and AI platforms. France, by contrast, appears to be lagging behind these digital superpowers. This potential dependency raises a strategic question: is French digital sovereignty a realistic objective, or an ideal that is difficult to achieve in a world dominated by technological superpowers?

Before pursuing this line of inquiry further, it is worth asking what relationship exists between cloud computing and artificial intelligence. Is there a connection? The answer is yes: discussing cloud performance necessarily implies discussing artificial intelligence.

1.1.2 Links Between Cloud Computing and Artificial Intelligence

Artificial intelligence can enhance cloud performance and, consequently, its attractiveness. It facilitates data management and generally enables the automation of processes that would otherwise be manually burdensome. For example, in December 2024, Air France signed a partnership with Google Cloud for several purposes, including leveraging artificial intelligence to better identify customer needs and improve the overall customer experience.

This partnership illustrates how AI, when combined with advanced cloud capabilities, becomes a strategic lever for large corporations. Through AI, data derived from customer interactions, reservations, and feedback can be analyzed in real time to deliver more personalized services, optimize logistical operations, and anticipate demand on specific routes.

Such agreements also demonstrate how even major French companies may come to depend on foreign service providers to integrate cutting-edge technologies into their operations. This reinforces the idea that mastery of cloud computing and artificial intelligence is not merely a technical issue, but one that directly affects competitiveness,

autonomy, and the sovereignty of national economic actors. The question that then arises is whether France will eventually be able to offer a credible alternative to these technological solutions for its own companies and institutions.

The following two sections aim to provide elements of response to the issues raised and to extend the reflection initiated in this section.

1.2 Vulnerabilities and Risks to French Digital Sovereignty

1.2.1 Technological Dependency: From Software to Hardware

France exhibits a dependency on American technologies. Services offered by GAFAM companies are highly sought after by French firms, as illustrated by the partnership between Airbus and Google Cloud mentioned earlier, thereby exposing their data to foreign jurisdictions. The Cloud Act, a U.S. federal law adopted in 2018, allows American judicial authorities to access data hosted abroad by American companies, representing a direct threat to French legal and strategic sovereignty. Even when American cloud providers operate data centers in France, the data hosted there may be requisitioned under a U.S. warrant.

Moreover, software is intrinsically linked to hardware. Graphics Processing Units (GPUs), essential for machine learning and AI model training, are currently dominated by the American company NVIDIA, whose chips—such as the A100, H100, or B200—have become indispensable in AI data centers. France, like many European countries, does not manufacture its own GPUs and therefore lacks sovereign access to these components. This dual dominance of both hardware and software enables the United States to maintain its technological lead.

China, which has introduced competitive AI models such as DeepSeek, is also seeking this vertical integration. Although it has relied on NVIDIA chips in the past, it aims to replace them with chips produced by the Chinese giant Huawei. According to the Berlin-based think tank Stiftung Neue Verantwortung, China was the world's largest importer of semiconductors in 2019, spending more on them than on oil.

The hardware required for AI development can thus be seen as the new oil or rare earth resource. Philosopher Bernard Stiegler argued that while the raw materials of the nineteenth century were physical resources such as wood or iron, the twentieth century transformed human consciousness into the primary resource through cinema, radio, and television. Extending this reasoning, one could envision a pessimistic scenario in which the free will and sovereignty of European nations become raw materials for digital superpowers if the technological gap in AI and cloud computing continues to widen. In such a case, the "autonomous capacity for assessment, decision-making, and action in cyberspace" would be severely compromised.

1.2.2 Lack of Human and Financial Resources

The lack of hardware and technological resources is itself the result of deeper issues: digital sovereignty cannot be guaranteed without qualified human capital and substantial financial investment. France faces shortages in strategic domains such as AI and cloud computing, as well as comparatively lower levels of investment than the United States and China.

French engineers and researchers sometimes choose to expatriate to countries offering higher salaries and more advanced research infrastructures—a phenomenon known as brain drain. This represents a major challenge, as France loses experts it has trained, despite being among the world's top four producers of AI research publications. As mathematician Cédric Villani emphasizes, the challenge lies not only in offering competitive salaries, but above all in creating a favorable working environment.

Although the United States attracts a disproportionately large share of elite AI researchers, China faces similar challenges, demonstrating that talent retention depends on more than national origin alone. Financial investment also plays a decisive role. The Artificial Intelligence Index shows that countries most advanced in AI are those that have invested the most.

While initiatives such as Mistral AI or Lucie reflect promising momentum, they must compete in a fiercely competitive global ecosystem. Although Lucie was ultimately withdrawn due to reliability and ethical concerns, Mistral AI represents a hopeful sign for the future, potentially foreshadowing a more sovereign and sustainable French technological landscape.

1.3 Assets and Levers for Sustainable French Digital Sovereignty

1.3.1 A Talent Pool and Recognized Technological Expertise

Before aspiring to become a global leader in cloud computing and AI, a country must first rely on a robust educational system. France benefits from prestigious institutions that have trained renowned researchers such as Yann LeCun, currently Chief AI Scientist at Meta, who studied in part at Sorbonne University. French universities remain competitive in international rankings, with Paris-Saclay University ranking 12th in the 2024 Shanghai Ranking.

Moreover, nearly all French engineering schools offer AI-related training or specializations. While France's talent pool is smaller than that of the United States or China due to population differences, it nonetheless possesses undeniable strengths. Retaining talent and countering brain drain therefore remains a priority. Encouraging early exposure to AI in schools and increasing female participation—women accounted for

only 24% of digital professions in France in 2023—could further strengthen human capital.

France also excels in research and innovation through institutions such as CNRS, INRIA, and CEA. For instance, INRIA contributed to the development of Scikit-learn, a widely used machine learning library in Python, while CNRS has established engineering networks to support AI research under the National AI Research Program.

1.3.2 National Infrastructures and Technologies

Leading cloud providers remain predominantly American, but France has taken strategic steps by developing national providers such as OVHcloud, Outscale, and Scaleway. These companies are experiencing solid growth, with OVHcloud reporting a 13.2% increase in revenue between the third quarter of 2022 and the third quarter of 2023.

Regarding hardware, France hosts advanced infrastructures such as the Jean Zay supercomputer, acquired in 2019 by GENCI. Although it supports AI research and integrates components from French startups such as LightOn, it was designed by American companies, limiting its contribution to full technological sovereignty. The forthcoming European supercomputer Jules Verne, expected to be hosted in France in 2025, reflects a more balanced approach through European cooperation.

1.3.3 Regulations and Public Policies: A Balance Between Ethics and Progress

Technological competition increasingly unfolds at the national level, making public policy a crucial driver of innovation. On February 9, 2025, French President Emmanuel Macron announced a €109 billion investment plan for private AI companies. This initiative complements the France 2030 plan launched in 2021, which aims to invest €54 billion to strengthen France's digital capabilities.

However, financial investment alone is insufficient. Regulatory frameworks also shape the pace of innovation. While regulations such as the GDPR and the European AI Act aim to protect privacy and fundamental rights, Europe has adopted stricter legal constraints than the United States or China. Excessive regulation may slow innovation, particularly for high-risk AI applications. For instance, facial recognition in public spaces is banned under European law, whereas China has deployed such systems extensively, providing valuable real-world training data.

This situation highlights a fundamental trade-off between accelerating technological progress and upholding ethical standards.

1.4 Conclusion

The analysis of France's position in cloud computing and artificial intelligence reveals a clear reality: digital sovereignty is not a given, but a long-term project shaped by ongoing tensions. The case of Informatique CDC illustrates the complexity of technological choices when data control and performance are at odds. Choosing a sovereign but less powerful internal cloud reflects a trade-off between independence and efficiency, between security and convenience.

Yet sovereignty cannot be achieved through caution alone. It must be built, nurtured, and sustained through coherent decisions at every level—from education and research funding to industrial development and European cooperation. It is unrealistic to assume that France can compete alone with the United States or China.

Technologies are civilizational in nature: they partly define sovereignty itself. By engaging in AI and cloud computing, countries also entrust part of their future to those who master these technologies. In this context, initiatives such as OVHcloud, Mistral AI, Jean Zay, and the European supercomputer Jules Verne represent more than technical projects; they embody the foundations of a credible alternative to American and Chinese dominance.

Ultimately, France does not lack talent or ambition. What remains to be refined is its ability to align technological ambitions with ethical commitments, resources with objectives, and national interests with European cooperation. As digital history continues to unfold, it will be up to French leaders to decide whether they are ready to take up the pen.