

TIME TO BUILD A EUROPEAN DIGITAL ECOSYSTEM

RECOMMENDATIONS FOR THE EU'S
DIGITAL POLICY

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The European Union is at a crossroads in its digital transformation, with geopolitical tensions and growing dependence on foreign tech giants highlighting the need for greater technological sovereignty. This policy study addresses the crucial steps required for the EU to reduce its digital dependencies and build a more resilient, autonomous, and socially inclusive digital ecosystem. The study emphasises the importance of enforcing existing digital regulations and creating a European Digital Industrial Policy (EDIP) to drive innovation and secure European values.

Critical recommendations for the new European Commission focus on creating a unified digital industrial strategy, including developing a EuroStack, a European technology framework encompassing hardware, infrastructure, AI, data, and governance. Public institutions should lead by adopting European-made technologies, setting standards, and investing in crucial infrastructure. A strengthened digital commons model, including open and interoperable systems, can help counter Big Tech's monopolistic control and ensure inclusivity and sustainability in digital governance.

The study also stresses the need for sustainable AI development, calling for energy-efficient, renewable solutions to meet the growing demands of AI applications. Public investments in AI must be tied to societal benefits rather than competing with Big Tech. A progressive AI regulation approach should foster fair competition and democratic decision-making while promoting innovation across European AI value chains.

Effective enforcement of EU digital rules is paramount. The study highlights the importance of enforcing regulations like the Digital Services and Markets Acts and GDPR, particularly around algorithmic transparency and the protection of users' data. The EU must also address the accountability of algorithmic management at work, ensuring that workers' rights are protected through social dialogue and transparent decision-making processes.

Ultimately, the EU must pursue a strategic overhaul to secure its digital sovereignty, balancing legislative measures with capacity building and advancing a digital future grounded in European values of fairness, sustainability, and innovation.



This policy study addresses the crucial steps required for the EU to reduce its digital dependencies and build a more resilient, autonomous, and socially inclusive digital ecosystem.



INTRODUCTION

This policy study examines the EU's path towards greater digital sovereignty in the face of growing geopolitical challenges and dependence on foreign tech giants. It highlights the need for effective regulation enforcement, the creation of a European Digital Industrial Policy (EDIP), and the development of a resilient, inclusive digital infrastructure. A strengthened digital commons model, including open and interoperable systems, can help counter monopolistic control by Big Tech and ensure inclusivity and sustainability in digital governance. At the same time, a progressive AI regulation approach should foster fair competition and democratic decision-making while promoting innovation across European AI value chains. The study offers recommendations to help the EU build a secure, innovative, and socially beneficial digital future.

INTRODUCTION

The beginning of the new EU mandate means the closure of a very productive legislature in the digital domain, where trademark laws like the Digital Services and Markets Acts were passed. Europe was the first to legislate artificial intelligence (AI).

This is why the incoming European Commission will have to make sure that the existing *acquis* will be followed by the digital gatekeepers and, if needed, enforced by the Commission services. This is an ongoing battle, and in his chapter Johnny Ryan writes about how we can get the enforcement of digital rules right this time and why this is key for citizens and digital markets.

However, more than extra legislative rules and better enforcement, Europe needs to look for ways to reduce its dependence on large foreign companies to provide it with essential digital infrastructure. This is why Francesca Bria makes a plea for the European Digital Industrial Policy, which can stimulate the creation of a EuroStack. Sophie Bloemen goes into more detail about how this infrastructure could be governed as a digital commons to serve democracy.

In the short term, the AI revolution is raising concerns that the EU is missing the boat on this digital revolution completely. In his chapter, Leevi Saari looks at the market monopoly aspect of the current AI landscape and at the infrastructure needed to build European alternatives. Instead of trying to compete with Big Tech's AI investments, the EU needs a strategic overhaul that links public investment in AI to beneficial societal goals. For this reason, Fabian Ferrari, José van Dijck and Antal van den Bosch discuss the conditions for public investment in hardware, software and talent in their chapter.

To illustrate the urgency of European capacity building in the digital domain, we look at two specific and vital aspects of society: the role of media in our digital democracy and making online news consumption by European citizens less

dependent on Big Tech platforms in the chapter by Matthias Pfeffer. Finally, in her chapter, Annarosa Pesole discusses the impact of AI and algorithmic management (AM) on workers and their well-being. Both chapters call for concrete EU actions in the new mandate.

That the digital transition remains an issue of the highest political importance can be seen by European Commissioners, and more specifically, with Henna Virkkunen in the position of Executive Vice-President for Tech Sovereignty, Security and Democracy. From the mission letter sent to her by Ursula von der Leyen, it becomes clear that rapid and effective enforcement actions are expected from her under the Digital Services and Markets Acts. Also, she will be responsible for deploying digital public infrastructure (DPI) and initiatives that can be expected to boost AI innovation through AI factories, an EU Cloud and the AI Development Act. She is also responsible for developing a single, EU-wide cloud policy for public administrations and procurement.

While the last term was very productive in regulating the digital transition, we see signs of a shift in focus to more capacity building at the start of this European legislative period. This policy study gives some guidance and inspiration for how to make the most of this new direction of travel in uncertain times, when the geopolitical context and the need to stay competitive in the global markets will force the EU to invent its own model for the digital transformation of society.

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EUROPEAN DIGITAL SOVEREIGNTY NEEDS A EUROSTACK AND AN INDUSTRIAL POLICY APPROACH



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EUROPEAN DIGITAL SOVEREIGNTY NEEDS A EUROSTACK AND AN INDUSTRIAL POLICY APPROACH

The EU faces mounting economic challenges that test its resilience. Conflicts in Ukraine and the Middle East, alongside ongoing energy and climate crises, have disrupted critical raw material supplies and driven up costs, fuelling inflation across Europe. This inflation is not only due to supply-chain disruptions and rising energy prices; structural market dynamics also play a role, with dominant companies raising prices to capture super-profits, further eroding consumer purchasing power and destabilising the economy.

Escalating US-China trade tensions add further pressure, intensifying uncertainties within global supply chains. Both nations are rapidly advancing in critical technologies – AI, semiconductors and high-performance computing (HPC) – posing a direct challenge to Europe’s competitiveness. The USA supports its tech sector with subsidies like the CHIPS Act and Inflation Reduction Act, while China’s Made in China 2025 strategy channels substantial state investment, often distorting global markets. In this context, Europe faces the task of remaining competitive and technologically advanced while upholding its commitment to a values-driven digital sovereignty.

To address these risks, Europe must adopt a cohesive industrial strategy focused on technological sovereignty, strategic autonomy and resilience. By channelling resources into digital infrastructure, AI and green technologies, the EU can strengthen supply chains, reduce dependencies on external powers and secure a competitive stance in the global economy. This strategy allows Europe to leverage its unique strengths, aligning growth with its values, aspirations and capabilities.

This moment offers Europe a pivotal opportunity to reclaim digital sovereignty. With the European Commission prioritising technological autonomy, security and democratic values, Europe is well-positioned to lead in establishing the EuroStack¹ – an independent digital infrastructure comprising cloud computing, advanced chips, AI, data spaces and HPC. This infrastructure, as essential today as roads and electricity, forms the backbone of modern societies.

Europe’s dependence on imported digital technologies – accounting for over 80% of its digital services and products – poses a significant strategic risk.² In the modern era, true sovereignty requires secure, sustainable access to critical resources, such as lithium, cobalt and nickel for batteries, and gallium, titanium and tungsten for semiconductors and the aerospace industry.

Without decisive action, Europe risks replacing its past dependence on oil and gas with new dependencies on digital infrastructure and critical raw materials. Europe must prioritise securing supply chains, reducing dependencies and strengthening its role in essential sectors like AI, semiconductor production and quantum computing. These supply chains, however, are increasingly susceptible to geopolitical tensions and market volatility. To address this, Europe’s industrial strategy now prioritises “de-risking”³ by reducing reliance on foreign sources – especially in clean tech and semiconductor supply chains. The strategy focuses on sustainable sourcing, energy efficiency and expanding domestic production to boost resilience while aligning with Europe’s climate goals.

From Schuman's coal and steel to sovereign AI and computing

The foundation of European integration was laid when Robert Schuman proposed a unified market for coal and steel in 1950, envisioning a Europe where war between France and Germany would become “not only unthinkable but materially impossible”.⁴ This vision fostered unprecedented collaboration and laid the groundwork for major European industrial achievements, like Airbus. In the 1960s, France, Germany, Spain and the UK pooled resources to establish Airbus, enabling Europe to compete with American giants like Boeing. Today, Airbus commands over 50% of the global commercial aviation market, exemplifying the success of a coordinated European industrial strategy.

Momentum for a united European industrial approach grew under Jacques Delors, president of the European Commission from 1985 to 1995. Delors championed industrial policy as a tool to enhance Europe's global competitiveness, and his 1993 white paper on growth, competitiveness and employment⁵ advocated for a single market, a unified currency and strategic public investments. This approach framed the state as an active force in industrial transformation – a philosophy that remains relevant as the EU seeks to develop a cohesive industrial strategy for the digital era.

The 2019 rejection of the Alstom-Siemens merger by the European Commission reignited debates on EU industrial policy, underscoring longstanding differences between France and Germany regarding the state's role in supporting strategic industries. While France backed the merger to create a European railway leader, Germany was more cautious. Recently, the two nations have moved closer in alignment, proposing adjustments to EU competition rules to support “European champions” capable of competing globally – a critical collaboration as Europe renews its industrial policy ambitions.

The current policy landscape reflects dissatisfaction with the passive, non-interventionist approach of past decades, which has failed to provide Europe with the resilience, innovation or social gains it

needs. **To address today's challenges, Europe must reinvigorate collaboration between industry and the state, positioning the state as an entrepreneurial actor that drives investment in critical sectors and steers initiatives toward Europe's goals of technological innovation, sustainability and social equity.**

Today, semiconductors, computing power and AI are as essential to Europe as coal and steel were in Schuman's era. Achieving digital sovereignty demands new cooperative and governance models that can bolster Europe's resilience, foster sustainable growth and address global tensions.

The era of hyper-globalisation, once celebrated for driving growth through trade liberalisation and deregulation, has concentrated wealth, deepened inequalities and exacerbated environmental harm. In response, governments worldwide are pivoting toward strategic economic interventions to protect national interests. Policies such as tariffs, export controls and targeted industrial strategies are becoming more common. For example, the USA has restricted exports of advanced lithography technology from Dutch company ASML to China⁶ to limit access to critical semiconductor technology. China, in turn, has implemented investment screening measures to control foreign involvement in sensitive sectors like telecommunications, energy and advanced technology.⁷

These shifts signal a transition from *laissez-faire* globalisation to more state-crafted economic models, where policy tools are used to achieve strategic objectives. For Europe, this moment demands a coordinated, forward-looking strategy that strengthens domestic technological capabilities and ensures secure access to essential resources. Europe's heavy reliance on imported raw materials and limited domestic processing capacity challenge the resilience of its industrial base. Sourcing critical resources from politically unstable regions adds further risk, underscoring the need for a balanced, strategic approach to securing supply chains.



In line with Schuman's vision, Europe's efforts to build a resilient digital ecosystem must drive innovation, ensuring technology serves the public good and prevents monopolistic control. As the USA and China expand their digital influence, Europe must act decisively to shape a future grounded in its principles and reinforcing its global competitiveness.



In line with Schuman's vision, Europe's efforts to build a resilient digital ecosystem must drive innovation, ensuring technology serves the public good and prevents monopolistic control. As the USA and China expand their digital influence, Europe must act decisively to shape a future grounded in its principles and reinforcing its global competitiveness.

Powering Europe's digital industrial policy: A public-interest EuroStack vision

Current EU digital initiatives lay a solid foundation but reveal limitations in scale, speed and cohesion. Programs like the Digital Europe Program (DEP), Connecting Europe Facility (CEF), Important Projects of Common European Interest (IPCEI) and European Digital Infrastructure Consortia (EDICs) target HPC; cross-border infrastructure; and strategic investments in semiconductors, cloud technology, digital skills, cybersecurity and AI. Additionally, the Next Generation EU initiative has allocated over €800 billion, with 20% dedicated to digital transformation.

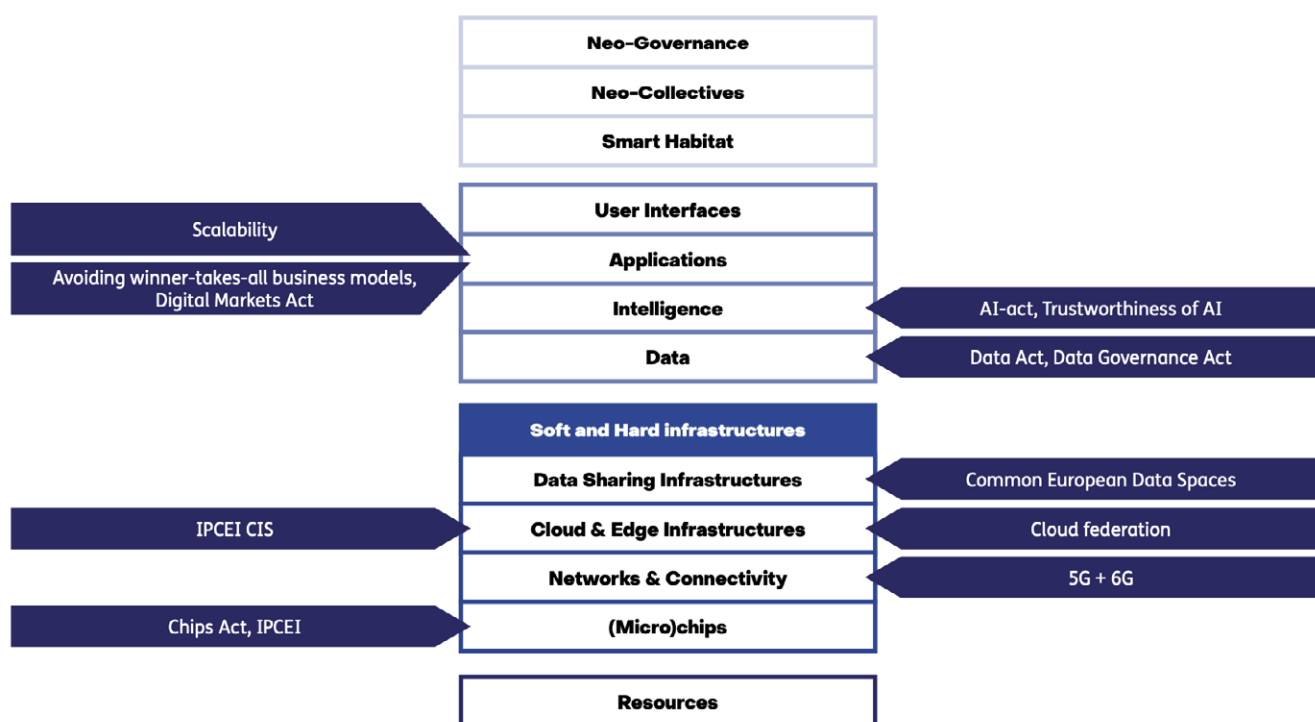
These public policy initiatives are intended to pool resources across Europe, but meaningful impact will require increased investment, streamlined oversight and adaptability to keep pace with technological advances. **Europe's pursuit of digital sovereignty requires a cohesive, values-driven technology framework embodied by the EuroStack. This comprehensive model spans every essential layer of technology – from hardware and infrastructure**

to data, cloud technology, AI and governance – forming a foundation for a secure, autonomous digital future aligned with Europe's principles of openness, security and resilience.

To avoid "digital colonialism" and ensure that Europe is more than a consumer in a tech-dominated global landscape, building domestic capabilities in critical sectors is essential. As digital infrastructure increasingly underpins essential areas like healthcare, energy, transportation, education and public administration, control over these assets has become a matter of strategic sovereignty. Today, a few Big Tech corporations control key infrastructure, data flows and computational capacity, often prioritising corporate over public interest. Without a coordinated EuroStack, Europe remains vulnerable to external pressures that could threaten its autonomy and democratic values. **The EuroStack vision provides a roadmap for a fully integrated digital ecosystem rooted in European values, enabling Europe to strategically fortify each layer of its tech stack, reduce dependency on foreign tech giants and foster innovation for the public good (Figure 1).**

To achieve this, Europe should build on the Strategic Technologies for Europe Platform (STEP), initially designed to leverage €13 billion and potentially mobilise up to €160 billion. While STEP is a constructive move, it mostly repackages funds from existing programs like EDF, RRF, InvestEU and Horizon Europe, and lacks the fresh investment needed for meaningful impact. **Europe must allocate additional**

Figure 1. Technology stack model and main EU policies.



Sources: Freedomlab, revised in "Towards a sovereign digital future – the Netherlands in Europe".

resources and implement a rigorous “sovereignty seal” to prioritise high-quality, EuroStack-aligned projects, truly advancing European-made technologies and reinforcing strategic autonomy.

Strategic foundations: Reducing dependencies across the stack

Europe’s path to digital sovereignty and sustainability hinges on addressing dependencies across the technology stack, from raw materials to digital infrastructure. The Critical Raw Materials Act⁸ aims to “de-risk” these dependencies by promoting sustainable sourcing, recycling and bolstering local production, laying the foundation for a resilient supply chain that supports both climate goals and strategic autonomy.

The €43 billion European Chips Act aims to increase Europe’s share of global semiconductor production by addressing strategic dependencies and encouraging international investment. However, despite the focus of IPCEI⁹ on critical areas like semiconductor production, regulatory complexity and differing national priorities continue to slow progress. Key investments, such as Intel’s planned facility in Magdeburg, Germany, and the STMicroelectronics-GlobalFoundries partnership in France, are important steps forward. Intel’s Magdeburg project, however, has encountered delays, impacting Germany’s semiconductor production targets. In contrast, the STMicroelectronics-GlobalFoundries collaboration is advancing, backed by European Commission approved state aid. These projects will contribute to the EU’s goal of capturing 20% of global chip manufacturing by 2030.

Europe's funding for semiconductor initiatives still lags behind that of the USA, which has committed \$52 billion through its CHIPS Act. This ongoing reliance on non-European manufacturers for advanced chips underscores Europe's strategic vulnerabilities. While companies like STMicroelectronics and Infineon are advancing in mature technologies, Europe's capacity to produce the advanced nodes required for AI and HPC remains limited. **To remain competitive, Europe must boost funding, streamline regulatory processes and foster cross-border collaboration in advanced semiconductor development.**

Strengthening HPC through the EuroHPC project is crucial for supporting competitive AI applications and large-scale research. The European Processor Initiative (EPI)¹⁰ aims to address Europe's processor dependency by developing European-designed processors specifically for HPC and AI applications. Additionally, the EU's investment in the open-source, royalty-free RISC-V architecture, led by the Barcelona Supercomputing Center (BSC), is a key step toward achieving chip independence. Initially focused on Arm-based processors, the BSC pivoted to RISC-V following geopolitical shifts, such as Brexit and Arm's acquisition by SoftBank, which underscored Europe's reliance on proprietary technology.

RISC-V, as a royalty-free, open-source hardware architecture similar to Linux in its accessibility, enables regions like Europe to design and develop processors without restrictive licensing fees. The BSC, in collaboration with European companies and research institutions, is leading efforts to establish a complete RISC-V ecosystem, including software tools, compilers and operating systems.¹¹ This ecosystem supports flexible, European-made hardware crucial for AI, advanced manufacturing and secure digital infrastructure.

To secure Europe's digital future, establishing a European cyber shield and implementing stringent security standards for 5G networks are essential. The Open RAN initiative, which promotes an open and interoperable telecom infrastructure, plays a key role by fostering competition and reducing dependence on single-vendor solutions. This integrated approach to cybersecurity and telecommunications is critical

for strengthening Europe's strategic independence and scalability.

Europe's reliance on foreign-owned cloud infrastructure, especially in sectors like the automotive industry, reveals a critical vulnerability, as industries depend on US-owned platforms for data integration and operational management. Relying on external cloud services and AI capabilities means that sensitive data and strategic assets remain vulnerable to foreign policies and legal frameworks, such as the US CLOUD Act,¹² which could mandate data access without European consent.

Initiatives like GAIA-X were designed to pave the way for a federated European cloud ecosystem, but the project has faced significant challenges in realising this vision. Originally launched by Germany and later supported by France, GAIA-X encountered obstacles due to a lack of clarity around its goals and diverse priorities among its stakeholders, which have complicated efforts to build a cohesive European cloud infrastructure.¹³ To achieve genuine data sovereignty, Europe needs to invest in dedicated, robust and federated cloud infrastructure with high standards for security and privacy – independent of external influence.

Additionally, prioritising public-interest data, shared through data trusts and governed in line with principles of data altruism, aligns with the EU Data Act. **Implementing data-sharing clauses in public procurement contracts, as advised by the New Hanse project in Hamburg,¹⁴ can further support this across cities and regions.** This approach ensures that data generated through publicly funded services remains accessible for public benefit, fostering innovation and enhancing public services.¹⁵

The rapid growth of AI and cloud computing, while central to Europe's digital ambitions, presents a sustainability challenge. AI model training and data processing require massive energy resources, primarily consumed by data centres. In 2022, data centres accounted for approximately 2.7% of Europe's total electricity use, with particularly high consumption in Ireland, where data centres represented 20% of national electricity use. Europe is

witnessing an influx of large-scale data infrastructure on its soil. To meet AI's energy demands, US companies invest billions into new AI-centric data centres, including Amazon's \$150 billion global data centre plan and Microsoft's massive \$100 billion AI supercomputer initiative, including Microsoft and BlackRock's \$30 billion fund. These developments are exploring nuclear-powered solutions, and raise significant concerns around energy and water consumption, and alignment with the EU's emphasis on renewables like wind and solar, which are essential to meeting Europe's carbon neutrality and waste-reduction targets.

As global investments in AI-centric data centres increase, Europe must prioritise energy-efficient, renewables-based solutions that align with its climate goals. Big Tech's use of renewable energy certificates (RECs) and complex accounting practices often obscure the true environmental impact of data centres, underscoring the need for stricter oversight and transparent emissions reporting. Investing in energy-efficient HPC systems, such as Finland's hydropowered LUMI supercomputer powered by the Swedish energy company Vattenfall, provides a model for sustainable supercomputing within the EuroStack framework.

Europe's AI ecosystem, recognised globally for its regulatory leadership through the AI Act's standards on transparency, accountability and risk management, still faces critical competitive challenges. Despite these advances, Europe remains heavily dependent on foreign-controlled data and computing resources, which risks concentrating AI capabilities outside Europe. Major tech corporations – such as Microsoft (with OpenAI), Google (Gemini/Bard) and China's Baidu (Ernie) – dominate key AI technologies, limiting competition and constraining Europe's ability to develop domestic alternatives.

The EU AI factories program, backed by approximately €1 billion in investment, illustrates this risk. Intended to advance Europe's AI infrastructure, the program could become overly reliant on non-European technologies, from cloud infrastructure to foundational AI models. This dependence may undermine Europe's capacity to capture value from

its investments, limiting returns and compromising competitiveness (see also the chapters by Saari and Ferrari et al.).

To ensure initiatives like AI factories create sustainable value, policymakers should prioritise funding for European-led technologies across the AI value chain, from data processing to model development. Building an autonomous AI ecosystem would help Europe retain control over its capabilities, secure long-term returns and strengthen technological independence.

Europe can further differentiate itself by focusing on open, transparent AI frameworks that address public needs.¹⁶ By prioritising sector-specific applications – such as healthcare, public administration and education – Europe can build a competitive AI ecosystem that aligns with societal values. Strategic support from the European Investment Bank (EIB) and the European Innovation Council (EIC) is vital, as these programs fund early-stage AI startups, open-access datasets and shared AI models, reducing reliance on non-European providers. Public Domain 12M (PD12M),¹⁷ a publicly governed dataset created by artists and creators, is a good example of Europe's commitment to public-interest AI. As the largest public-domain image-text dataset, with 12.4 million image-caption pairs, PD12M provides a robust foundation for training models while minimising copyright issues. Through the Source. Plus platform, it introduces community-driven governance to ensure ethical use, reduce harm and support reproducibility.

Additionally, Europe's governance model should be paired with a strong antimonopoly approach¹⁸ and investments in alternative AI models and public options. Structural separation – preventing companies from controlling multiple layers of the AI stack, such as cloud services, foundational models and applications – would reduce conflicts of interest and foster fair competition. Enforcing non-discrimination rules would also ensure equal access to services, cultivating a balanced and competitive AI market aligned with Europe's commitment to public-interest innovation.

Digital industrial policy with conditionalities

Europe's digital initiatives mentioned in this chapter have made strides, yet they lack the unified vision and urgency required to channel investment effectively and attract top talent essential for technological autonomy. Fragmented priorities across member states continue to slow implementation and hinder scalability. The EuroStack framework offers a path to bridge these gaps by advancing digital sovereignty, building resilient supply chains and fostering a robust tech ecosystem aligned with Europe's ambitions for sustainability, strategic independence and competitive strength.

To realise this vision, Europe needs a cohesive industrial policy that prioritises decarbonisation, energy-efficient supply chains, data sovereignty and robust public digital infrastructure. **Given Europe's largely national approach to industrial policy, there is a clear need for a coordinated, EU-scale digital industrial strategy. A proactive European industrial policy, as advocated by Rodrik and Mazzucato, should incorporate conditionalities in public investments to drive job creation, welfare and public value, embedding societal goals into the digital economy.**¹⁹ For digital industrial policy, this means setting clear conditions on firm behaviour to ensure equitable access to technology, prioritising green and digital standards, enforcing data ownership rights, and mandating profit-sharing and reinvestment for public benefit. These conditions could be fixed, with non-negotiable terms and timelines, or flexible, allowing adaptation through consultation with stakeholders.

Risk-sharing mechanisms are essential to balance costs and rewards between the public and private sectors, including cost sharing in cases of underperformance and provisions for profit sharing if projects exceed targets. By linking investments to measurable outcomes, with transparent criteria and rigorous monitoring and evaluation processes, Europe can ensure accountability and alignment with policy goals.

Achieving these objectives requires decisive public investments, streamlined state aid and innovative procurement strategies. **Public institutions should lead as early adopters of European technologies, setting standards and driving adoption to build local expertise and stimulate the development of sovereign technology and products.** To address regulatory fragmentation, Europe must establish standardised interoperability requirements, following the General Data Protection Regulation (GDPR) model. A unified approach will accelerate open-source adoption; enable seamless data flows, while ensuring data protection and sovereignty; and promote transparency – aligning digital transformation with Europe's democratic values, workers' rights and resilience goals.

Additionally, Europe's commitment to technological autonomy requires further strategic measures. Expanding talent, digital skills and education to prepare and empower the European workforce for future AI advancements across the EU is essential, as is encouraging SME participation in the EuroStack through incentives, innovation hubs and subsidised access to public resources, and adoption of European technology products (see also the chapter by Ferrari et al.). Ensuring data infrastructure as a public good and setting clear sustainability targets in all tech projects would reinforce EuroStack's alignment with circular economy principles. Developing a sovereign, federated EU-wide cloud and edge platform for public services, along with a central hub for setting and enforcing standards and compliance, would bolster the resilience, scalability and regulatory alignment of EuroStack technologies. Learning from GAIA-X's challenges, this initiative would establish a clear mission and governance structure that prioritises European oversight and transparency. By fostering commercial and technical federations among existing providers, Europe can accelerate the growth of domestic players, enabling them to deliver widely distributed services that remain fully compatible and seamlessly integrated across platforms. This approach not only strengthens Europe's digital autonomy but also creates a resilient ecosystem that supports both innovation and interoperability across the continent.

The EuroStack is more than a technological framework; it is a commitment to a sustainable, democratic and welfare-oriented digital ecosystem. By securing scalable cloud platforms; investing in critical infrastructure; and fostering cross-sector partnerships in AI, the internet of things and cybersecurity, Europe can set a global standard for a resilient, values-driven digital ecosystem. This framework offers Europe an opportunity to lead by example, building a future-proof tech ecosystem rooted in shared European principles and strategic independence.

A European sovereign tech fund to grow digital public goods

Ambitious investments are essential if Europe is to keep pace with other regions making significant strides in the digital space. Mario Draghi's call for €800 billion in new resources underscores the need to close the competitiveness gap and enhance Europe's innovation capacity, while President von der Leyen's proposed Competitiveness Fund will help reduce strategic dependencies and bolster industrial resilience.

Draghi's report highlights a critical gap in Europe's digital landscape: the absence of EU-based hyperscalers and the dominance of US companies in the development of cutting-edge technology and AI. This imbalance is at the root of Europe's ongoing struggle to establish digital competitiveness and technological sovereignty. Such gaps pose a real risk of Europe lagging further behind in global value chains, impacting not only economic sovereignty but also the region's capacity to shape global rules and standards.

To secure digital autonomy, Europe has intensified focus on deep tech, with €17 billion in venture capital directed toward AI, quantum computing and photonics in 2022. Initiatives like those from the EIC are essential in scaling Europe's technological capacity, supporting strategic procurement to drive adoption of European technologies and accelerating the commercialisation of research outputs, particularly in fields like AI and quantum computing. The EIC plays a pivotal role, facilitating early-stage

funding and enabling market entry for emerging European tech solutions. Equity investments from the EIB and initiatives like VentureEU aim to retain intellectual property, reduce reliance on foreign funding and accelerate growth. InvestEU (€26.2 billion) will support commercialisation, industry digitisation and scaling innovative companies. The European Defence Fund (€8 billion) fosters collaboration on interoperable defence technologies, encouraging startups and SMEs to contribute.

To strengthen Europe's technological autonomy, its investment model must integrate stable public funding, agile venture capital and targeted private-sector incentives. The EIC should prioritise high-impact projects in cloud infrastructure, AI and cybersecurity, built around a federated EuroStack – a collaborative platform of interoperable technologies that align with European standards and values. **A proposed €10 billion European Sovereign Tech Fund, backed by the EIB and included in the upcoming Innovation Act, would provide the dedicated capital needed to fuel this model and support Europe's tech ecosystem, with an emphasis on green technology to align with Europe's sustainability goals.**

This fund would supply long-term patient capital, increasing Europe's risk capacity while attracting private investment to scale its digital infrastructure. As a blended facility, it would combine grants and equity investments, unifying national and EU initiatives by coordinating with national innovation agencies, building on existing innovation funds like the Netherlands National Growth Fund²⁰ and Germany's Future Fund²¹ and Sovereign Tech Fund.²² Through this collaborative framework, the European Sovereign Tech Fund would establish the foundation for a robust "EuroStack" – a secure, federated digital infrastructure built by Europe's leading tech talent and grounded in European regulatory standards.

By establishing a robust funding ecosystem focused on tech sovereignty, the fund would enable Europe to retain its intellectual property, talent and innovation, reducing foreign dependency and creating high-quality jobs. Currently, around 75% of Europe's high-tech companies in late-stage development are acquired by non-European investors, primarily from

the USA and China, draining critical capabilities from the continent. To address this structural issue, Europe has introduced a €3.75 billion Fund of Funds²³ to support its tech champions. However, the European Sovereign Tech Fund proposed here goes a step further. Unlike a Fund of Funds, it would be a blended instrument, directly aligned with EU digital industrial policy and the EuroStack concept. This fund would fast track and scale essential projects in cloud technology, AI, chips and quantum computing, accelerating adoption and fostering Europe-made technologies crucial to digital autonomy.

By ensuring inclusivity and gender balance, the funding schemes would enable all Europeans to benefit from the digital future. Pragmatically, this approach requires close alignment with member states, European promotional banks and industry stakeholders to effectively deploy resources, emphasising projects with measurable impacts on Europe's autonomy and economic resilience.

A reformed digital taxation system is essential for Europe's digital sovereignty, ensuring that major tech companies pay taxes where they generate profits and collect user data, countering tax avoidance. The European Commission ruled in 2016 that Ireland had granted Apple undue tax benefits, allowing it to pay significantly less tax than other businesses. This decision was upheld after years of legal proceedings,²⁴ with Apple now required to pay the taxes due. Despite this landmark case, broader initiatives like the Digital Services Tax stalled,²⁵ as

unanimity among EU member states is required, and certain countries, particularly Ireland, have resisted such measures.

The funding strategy for the European Sovereign Tech Fund is anchored in a pragmatic, blended approach that leverages both public and private investments. Tapping into the EU budget's "own resources" and shared borrowing under the Multiannual Financial Framework (MFF), the fund would pool resources from industry, national promotional institutions and the EIB group, with a strong role for venture capital to drive innovation and growth. This coordinated financing model enables a stable, long-term capital foundation, designed to streamline public-private collaboration and prioritise high-impact projects.

With this approach, the fund has the potential to accelerate Europe's digital transformation and reinforce its technological independence – providing a realistic path forward for achieving strategic autonomy in critical areas like digital infrastructure, AI and cybersecurity.

Shaping Europe's independent digital future

By consolidating resources and talent to build an independent EuroStack,²⁶ Europe can establish a distinct digital ecosystem, empowering citizens and businesses to have greater control over their digital lives. The EuroStack initiative requires vision, scale and urgency.



The EuroStack mission extends beyond achieving technological independence; it is a strategic commitment to a secure, competitive and sustainable digital future for Europe. By aligning technological advancement with the public good, EuroStack aims to create a digital ecosystem that reflects Europe's core values, while driving economic competitiveness and meeting national security imperatives.



A dedicated EDIC powered by the European Sovereign Tech Fund could lead this effort, enabling member states to pool resources, drive transformative projects, set shared standards and ensure EU-wide interoperability. This body would oversee both regulation and development, keeping Europe's digital infrastructure competitive and focused on public interest.

A centralised but independent EuroStack governance model, inspired by the independence of the European Central Bank, would unify decision-making across member states and national innovation agencies. This structure would prioritise digital public goods – such as data, sovereign federated cloud technology, AI models and public computing resources – as the backbone of an autonomous European tech ecosystem.

As digital transformation accelerates, Europe must focus on advancing new capabilities that embody values like democracy, sustainability, equality and fairness. These principles should anchor technological evolution, ensuring digital development serves the public interest. Aligning investments with these values is essential for sustaining a fair and democratic European society. These critical digital infrastructures underpin digital citizenship and ensure universal access to public services like healthcare, social welfare and education. To maximise public value and serve societal needs, they must be managed as public goods, governed by European standards that prioritise transparency, accessibility and resilience over monopolistic interests (see the chapter by Bloemen).

Through strategic investments, innovative funding mechanisms and coordinated action, Europe can build an independent tech ecosystem rooted in transparency, democracy and sustainability. President von der Leyen's €100 billion commitment to a European AI initiative – akin to CERN – is a promising step, but it must be backed by robust industrial policies and targeted investments through vehicles like a European Sovereign Technology Fund to realise full autonomy in the tech sector.

The EuroStack mission extends beyond achieving technological independence; it is a strategic commitment to a secure, competitive and sustainable digital future for Europe. By aligning technological advancement with the public good, EuroStack aims to create a digital ecosystem that reflects Europe's core values, while driving economic competitiveness and meeting national security imperatives. This initiative offers a practical path for EU governments and industry alike to invest in resilient infrastructure, ensuring that innovation not only strengthens Europe's global standing but also delivers tangible benefits to society – supporting growth, security and collective well-being across the continent.

ENFORCING DATA PROTECTION LAW AND A WHOLE-OF-COMMISSION APPROACH TO AVERT THE DIGITAL CRISIS



JOHNNY RYAN

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ENFORCING DATA PROTECTION LAW AND A WHOLE-OF-COMMISSION APPROACH TO AVERT THE DIGITAL CRISIS

The next five years will decide Europe's digital fate. Will Europe slide into digital crisis, or will we build a sustainable digital future?

The first section of this brief chapter describes six digital challenges facing Europe, and the legal tools available to neutralise them. The second section describes how the incoming European Commission can rapidly marshal Europe's diverse tools to avert crisis.

Market concentration

The current situation is dire. A handful of Chinese and US giants control Europe's digital infrastructure, platforms and media. Europe is critically dependent on Chinese and US technology for consumer services, public services and elements of critical infrastructure. Google and Meta control 50% of the global digital advertising market. Amazon, Microsoft and Google control over 80% of Europe's cloud infrastructure market.²⁷ They also control the entire

AI value chain, creating a stranglehold on European AI startups. Their market dominance suppresses European startups and SMEs.

The incoming Commission will focus on competitiveness and digital sovereignty, informed by the assessment in the Letta and Draghi reports, that scaling up Europe's companies to compete with Chinese and US giants is both economically and strategically imperative.

What should be done? Any investment in capacity and innovation must be matched by enforcement. We must assert European values against giant Chinese and US firms that dominate our market by breaking our laws. No investment in infrastructure and innovation will be big enough to scale Europe's SMEs and startups, unless the enforcement of the EU's digital acquis against law-breaking giants' undertakings is deployed to create space for them in the market.



Any investment in capacity and innovation must be matched by enforcement. We must assert European values against giant Chinese and US firms that dominate our market by breaking our laws.



The GDPR will be an important tool in this endeavour. Thus far, there has been little substantive GDPR enforcement against giant Chinese and US firms' data misuse.²⁸ But those firms remain highly vulnerable to GDPR enforcement because it can unwind the enormous internal data free-for-all they rely on to dominate the market.

Right now, many of the large Chinese and US tech firms are legally operating out of Ireland. As a result, full GDPR enforcement in Ireland would significantly impact the entirety of Chinese and US giants' operations across the whole European market. **Focused enforcement in Ireland would create space for European SMEs and startups to scale up but would create no additional regulatory burdens for European SMEs and startups.**

As the mission letter of Commissioner-designate Michael McGrath mentions, the full enforcement of the GDPR across member states needs to be ensured. A modest investment of political capital is needed to fully apply the GDPR to Chinese and US giants in Ireland. If necessary, Europe's needs for competitiveness, security, digital sovereignty and child protection will require the threat of infringement procedures for failing to fully apply the GDPR.

In parallel, Digital Markets Act (DMA) enforcement can create interoperability and reduce market concentration throughout the AI value chain and in cloud infrastructure. The Commission should break up Big Tech monopolies, unless they defy expectation by scrupulously obeying the DMA. This should include major cloud providers, which the Commission has yet to designate as entities within the DMA's purview. The next Commission should also consider building public technology that provides European alternatives to tech monopoly (see also the chapter by Bria). Otherwise, foreign powers may not only hold the kill switch of our media, but also of our emergency services.

Recommender algorithms' impact on children

President von der Leyen announced an EU-wide inquiry on the impacts of social media on the well-

being of young people. Some experts already warn of a youth mental health crisis. Toxic recommender algorithms push a personalised stream of despair and self-loathing into our children's social and video feeds. TikTok pushes pro-suicide videos at vulnerable children. YouTube pushes videos promoting extreme hatred of women to young boys.

The solution focuses on data. Recommender algorithms need intimate data about users to operate. But intimate data, including data that may reveal a person's political views, enjoy particularly strong legal protection in the GDPR. **Enforcement of GDPR Article 9 protections would switch off recommender algorithms by default, and force digital platforms to carefully warn users and seek two-step confirmation before asking them to opt-in. This would transform our online spaces at a stroke.**

This data-focused approach avoids intrusion upon freedom of expression. It limits not speech but artificial amplification. It also has the virtue of practicality, unlike content moderation. Overall, it is more powerful than the Digital Services Act's algorithmic provisions.

Collapse in the quality of information in our democracy

The quality of information upon which democracy depends is collapsing. There are two reasons why the quality of information available to people in Europe is failing. One is Big Tech's habit of pushing an algorithmically tailored diet of hate and hysteria into each user's feed. Personalised angst is a revenue generator, calculated to keep us glued to our screens so that we can be shown more ads. But it also turns our communities against each other.

A further cause is the failure of online advertising, which undermines journalism. Online advertising technology generally operates by widely broadcasting sensitive (but commercially valuable) profile data about journalism's readers. This data free-for-all enables disinformation websites to trade off that data. Thus, previously unprofitable disinformation becomes profitable, while high-cost

journalism publications lose their ability to charge high advertising prices to show ads to their unique audience because that audience can now be found cheaper on low-cost websites. In addition, the data free-for-all enables a massive “ad bot” fraud, estimated to have cost businesses €78 billion in 2023. That data free-for-all also allows foreign entities to build intimate profiles of EU voters, and micro-target them with deceptive ads.

The solution to the toxic algorithm problem is the same that protects children against toxic algorithms discussed above: GDPR enforcement plus DSA and the Audiovisual Media Services Directive (AVMSD). This is a data problem, rather than a speech problem. Enforcement of GDPR Article 9 would be decisive.

The solution to the broken online advertising system is to enforce the GDPR against the data free-for-all at the heart of the industry. This would prompt a market adjustment that favours trustworthy journalism and simultaneously protect voters from malicious profiling. Separately, the DSA can be enforced to stop discrimination against publishers by search engines and platforms, and the DMA can be used to force fair app store treatment of media products. DSA enforcement may improve the transparency of targeted ads and help push platforms to respect national electoral and media rules. The enforcement of these rules is a necessary accompaniment to the creation of the public media platform that is advocated for in the chapter by Pfeffer.

Security and safety

European security is threatened by more digital problems than hacking alone. In many European capitals, one can walk down any street and be recorded by Chinese “Hikvision” internet-connected cameras. The Chinese state heavily subsidises their price, making these cameras the global market leader, and the default for public and private procurement in much of Europe. Despite the Pentagon’s assessment that Hikvision cameras are linked to Chinese intelligence, they are spreading across Europe – even to military bases and parliament buildings in some member states.

In parallel, the insecure technology at the heart of US-built online advertising system routinely sends compromising data about sensitive EU personnel to China and Russia. The same technology exposes Europeans to illicit profiling by data broker firms that peddle their secrets to the highest bidder, facilitating electoral manipulation. Separately, US tech giants also facilitate Russian propaganda and interference in candidate countries on Europe’s borders.

Foreign digital surveillance can be stopped by supervisory authorities taking enforcement action under both the GDPR and NIS2. In parallel, integrating “Democracy Shield” threat analysis into the DSA framework may improve matters and reduce duplication. Finally, concerted enforcement in diverse regulatory domains may give the Commission leverage over giant Chinese and US tech firms to stop adversarial interference in elections on our borders.



The solution to the broken online advertising system is to enforce the GDPR against the data free-for-all at the heart of the industry.



Workplace surveillance and AM

AI will not merely displace jobs. As the chapter by Pesole highlights, many human workers who manage to keep their jobs increasingly find themselves answerable to management by AI. Humans will work for machine bosses that they cannot know or understand. This is presaged by the spread of workplace surveillance from call centres and warehouses to the home office. How will people react when inhuman AI managers cancel their bonus, or refuse to allow a change in working hours to tend to a sick child?

Workplace surveillance and unfair and opaque AM can be immediately addressed using existing GDPR provisions and under the AI Act, the provisions of which are becoming applicable. When the Platform Workers Directive enters into force, it will empower national labour authorities to act, too. Strong enforcement can facilitate the creation of data trusts that do respect data protection law and that increase transparency and worker agency over workplace data processing – see the chapter by Pesole on algorithms and AI in the workplace.

Table 1. Key enforcement tools mapped to President von der Leyen’s political guidelines.

Objective	Targets and problems	Existing tools	What the taskforce should do	Venue
Political guideline: A new plan for Europe’s sustainable prosperity and competitiveness				
Create space for Europe’s startups and SMEs and AI	<p>Targets: Google, Microsoft, Apple, Meta, TikTok, Amazon</p> <p>Problem: cascading monopolies based on internal data free-for-alls</p>	<p>A. GDPR Articles 5(1)b and 6</p> <p>B. DMA Articles 5(2), 6(2), (9) and (10), and perhaps Article 14(1)</p> <p>C. DG Competition merger assessment rules (amended to include forensic analysis of companies’ GDPR Article 30 records of processing activities)</p>	<p>A. Political pressure on Ireland (and Luxembourg regarding Amazon)</p> <p>B. Rapid action within DG Competition and DG Connect</p> <p>C. Rapid action within DG Competition</p>	<p>A. Data protection authorities in Ireland and Luxembourg</p> <p>B. DG Competition</p> <p>C. DG Competition</p>
Political guideline: Supporting people, strengthening our societies and our social model				
Protect children and teens from toxic algorithms that promote self-harm and suicide	<p>Targets: TikTok, YouTube, X, Instagram, Snapchat, Facebook</p> <p>Problem: algorithms using intimate data expose vulnerable children to a personalised diet of self-loathing, self-harm and suicide</p>	<p>A. GDPR Article 9</p> <p>B. AVMSD Articles 6a(1) and 28(1)</p>	<p>A. Political pressure on Ireland</p> <p>B. Support for use of AVMSD by national authorities</p>	<p>A. Irish data protection authority</p> <p>B. National audiovisual media services supervisory authorities</p>

Political guideline: A new era for European defence and security				
Protect national security (online profiling of sensitive personnel)	<p>Targets: Google, Microsoft, others</p> <p>Problem: large-scale data leakage exposes sensitive military, political, and industrial leaders and personnel to manipulation, blackmail, hacking and undermining of their institutions</p>	<p>GDPR Articles 5(1)f, 24, 25, 32, 35 and 36</p> <p>NIS2, Article 32(4)</p>	Political pressure on Ireland	<p>A. Irish data protection authority, and Dutch data protection authority</p> <p>B.</p> <p>C. National cybersecurity authorities</p>
Protect national security (real world surveillance)	<p>Targets: Hikvision</p> <p>Problem: large-scale surveillance by foreign powers</p>	<p>A. GDPR Articles 5(1) f, 24, 25, 32, 35 and 36</p> <p>B. NIS2, Article 32(4)</p> <p>C. Proposed regulation for the screening of foreign investments (2019/452), Article 13</p>	<p>A. Political pressure on the Netherlands</p> <p>C. Finalise the regulation and enforce Article 13</p>	<p>A. Dutch data protection authority</p> <p>B. National cybersecurity authorities</p> <p>C. Co-legislators</p>
Political guideline: Protecting our democracy, upholding our values				
Curb online disinformation, hate and hysteria (including foreign interference and disinformation)	<p>Targets: TikTok, YouTube, X, Instagram, Snapchat, Facebook</p> <p>Problem: algorithms using intimate data expose vulnerable children to a personalised diet of hate and disinformation</p>	<p>A. GDPR Articles 6 and 9</p> <p>B. AVMSD Article 28(1) and perhaps in the absence of functioning and reliable age verification Article 6a(1) of AVMSD is applicable, too</p>	<p>A. Political pressure on Ireland</p> <p>B. Support for use of AVMSD by national authorities</p>	<p>A. Irish data protection authority</p> <p>B. National audiovisual media services supervisory authorities</p>

<p>Protect elections and improve media sustainability (including foreign interference and disinformation)</p>	<p>Targets: Google, Microsoft, other “RTB” online advertising exchanges</p> <p>Problem: large-scale data leakage in online advertising exposes voters to personalised disinformation and manipulation, and undermines media sustainability</p>	<p>GDPR Articles 5(1)f, 24, 25, 32, 35, 36</p>	<p>Political pressure on Ireland</p>	<p>Irish data protection authority, and Dutch data protection authority</p>
<p>Not in the political guidelines...</p>				
<p>Protect workers from unfair and opaque AI management and workplace surveillance</p>	<p>Targets: many companies</p> <p>Problem: workplace surveillance and unfair management</p>	<p>A. GDPR Articles 5(1)a and 22</p> <p>B. AI Act, Article 6(2); Title III Chapter 2 and 3; Articles 79, 81, 99; and Annex III (4)</p> <p>C. Platform Workers Directive, Articles 6-9</p>	<p>A. Political pressure on relevant member states</p> <p>B. Coordination of AI Act supervisory bodies</p> <p>C. Facilitation of action by relevant member states</p>	<p>A. Relevant national data protection authorities</p> <p>B. Competent market surveillance authorities, notified bodies and the European Commission</p> <p>C. National supervisory authority</p>

Solution: A mechanism for a whole-of-Commission approach

These challenges are diverse but connected. The Commission must develop a mechanism to unify enforcement of its diverse regulatory powers, including streamlined liaison and coordination with EU bodies and with supervisory authorities in member states.

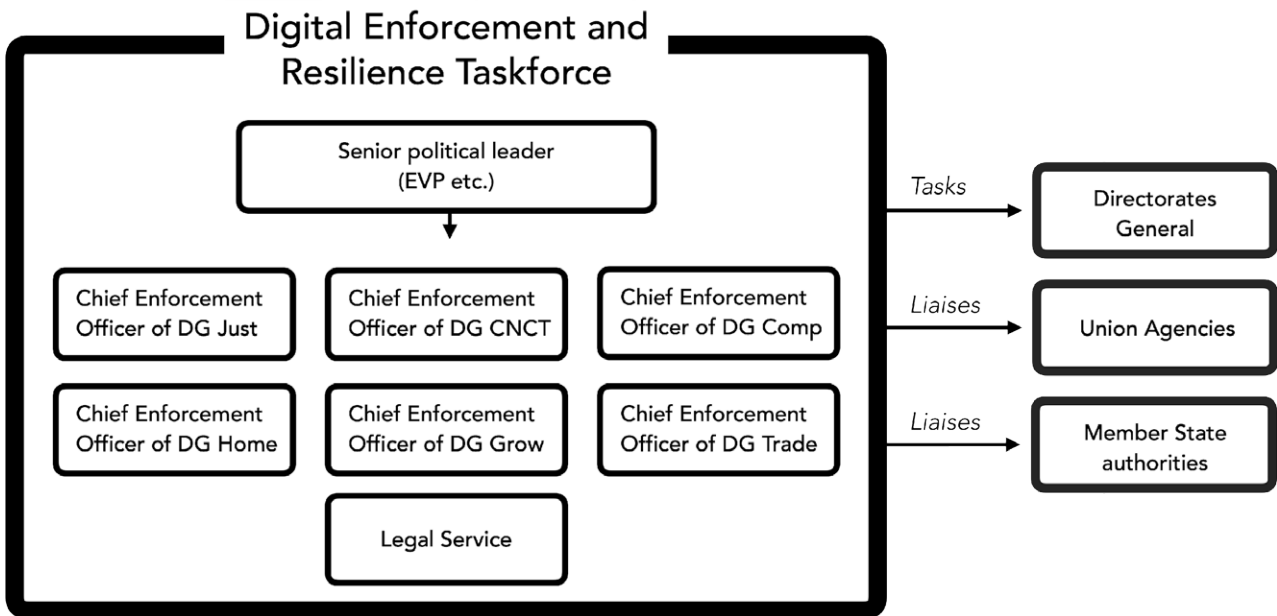
As early as is practical in the new mandate, the Commission should establish a taskforce composed of Chief Enforcement Officers of relevant Directorates General (DGs). The following DGs are likely to be relevant: Connect; Just; Comp; Grow; Home; and Trade. The new Chief Enforcement Officer roles should be senior, at Deputy Director General level, and focused on coordination. The legal service should also be present in the taskforce to advise on what is possible.

The taskforce should not deprive any DG of currently held powers and competences. Rather, it should enable early interservice consultation and the coordinated pursuit of objectives set by the political leadership (Figure 2).

The taskforce should be chaired by a senior political chairperson, perhaps the Vice President for Implementation and Simplification that President von der Leyen has announced. This is similar to Enrico Letta’s proposal for an overall Chief Enforcement Officer.

Taskforce objectives should be endorsed by the College of Commissioners. This will enable each DG to accommodate themselves to the objectives, including where objectives fall outside a particular DG’s particular area. This political leadership also allows the Commission to apply pressure on key member states when necessary, such as Ireland and Luxembourg, regarding the full application of the GDPR.

Figure 2. Overview of the proposed taskforce.



If political leadership of the taskforce is not desirable, then chairpersonship of the taskforce should rotate between the Chief Enforcement Officers of the DGs, and be held for a single year.

Each DG's Chief Enforcement Officer should coordinate enforcement within their respective DG. Together as a taskforce, they should work between DGs to pursue objectives set by the political leadership. They should also liaise and coordinate with bodies of the EU and with relevant member state authorities to pursue those objectives and have the necessary political support to do so.

The taskforce is not intended to directly manage joint cases. Therefore, it may not be necessary to agree confidentiality arrangements.

This unified enforcement structure has several important benefits:

- It enables the Commission to coherently deploy all the necessary tools to confront the above problems. At a minimum, it would help DGs avoid pursuing the same sanction against the same target, which does occur.
- It allows the Commission to deploy multiple legal instruments against a single undertaking in a coordinated way. This will reduce opportunities for malicious compliance and vexatious appeals and increase the odds of rapid settlement and remedy.
- It would also increase the Commission's power versus giant undertakings. For example, the taskforce would give the Commission a powerful lever to use against giant non-EU firms facilitating Russian influence in candidate countries' elections.
- Improving the coherence of enforcement will reduce fragmentation in the single market.

In the longer term, the Commission may consider establishing an entity (DG, Agency, etc.) that further unifies and makes enforcement coherent. This could enhance coordination and reduce bureaucratic

overlap, and allow for interdisciplinary staff who are freed from the constraints of existing structures. Establishing the new entity would also be an opportunity to set procedural rules that insulate it from political interference in technical enforcement.

Conclusion

Many of the EU's current problems, from online market concentration and workplace surveillance to the broken online media environment, can be starkly reduced by implementing and enforcing the EU's digital acquis. Therefore, the incoming European Commission should marshal its diverse tools, in the AI Act, GDPR, DMA, DSA, AVMSD, NIS2 and more, to confront the digital crisis. Establishing a taskforce composed of Chief Enforcement Officers of relevant DGs, led by a senior political leader to achieve Europe's strategic objectives, is a way to immediately do so. This enforcement agenda is a crucial complement to future initiatives to strengthen EU tech innovation, competitiveness and public digital infrastructure.

DIGITAL COMMONS AS PUBLIC DIGITAL INFRASTRUCTURE: A PATH TO SOVEREIGNTY



SOPHIE BLOEMEN

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DIGITAL COMMONS AS PUBLIC DIGITAL INFRASTRUCTURE: A PATH TO SOVEREIGNTY²⁹

Introduction

After decades of surrender to the market, we are now coming back the idea that some planning and targeted investment in what we would like our economy to look like might not be such a bad idea after all.³⁰ Europe has become increasingly dependent on technology provided by a small number of foreign Big Tech companies for many of its essential infrastructures and public services. This brings into question the level of self-determination and sovereignty citizens, communities and member states still enjoy. **Similar to our physical infrastructure, such as bridges and roads, the digital domain requires infrastructure that is accessible to all and managed in a democratic and public manner. Therefore, it is essential to get the governance and design of this infrastructure right.**

The EU has enacted important digital policies to protect democratic values and individual rights, but regulation alone isn't enough.³¹ Europe must actively shape its digital future and economy by investing in public digital infrastructure, democratic governance and sustainable business models. These efforts are key to guarantee alternatives to today's dominant, centralised and extractive platforms. Here, the digital commons, which realise democratic governance and a decentralised collaborative practice, hold great promise.³²

Public digital infrastructure

To be considered public, digital infrastructure – and the technologies it consists of – must be transparent and open, widely (if not universally) accessible, and

under some type of public control. As Berlinguer explains,

The notion of infrastructure is usually associated with essential or basic systems, with goods and services of general utility of the functioning of a society as a whole. This is also the main reason why infrastructure have mostly been considered as not suitable to be provided and managed by a pure market logic, and have been associated with some kind of public intervention. This can be either through direct control and ownership or through regulation, in order to ensure the cheapest, most universal and non-discriminatory access possible to both market actors and citizens.³³

In the digital age, our economy and societies rely on very different types of infrastructure than those of the industrial era. Frisschman defines them as digital resources, such as systems and specifications built as “shared means to many ends”, which must be consumed non-rivalrously.³⁴ These do not just comprise of physical infrastructure, such as cables and web servers of data centres, but also, for example, of software, protocols, data, standards, operating systems and programming languages. Additionally, there are services such as digital ID, payments and data exchange systems, as well as sectoral services, for example, in education. Both India and Brazil have introduced digital public payment systems in recent years, called UPI and Pix, respectively.³⁵

Robust public digital infrastructure is lacking in almost all layers of the European “internet stack”. From hardware to network technologies, cloud solutions, and office software and services, European countries are, for the most part, not

digitally sovereign but dependent on foreign players. European countries do not own or control basic infrastructure of vital technologies, such as communication networks, platforms, storage and identity services, and underlying protocols and standards. This dependence carries many risks; citizens are exposed to data extraction and manipulation, and democratic processes suffer from geopolitical interference, which is exacerbated by unequal political-economic power relations. Regaining digital sovereignty and developing a “EuroStack” is imperative.

Why switching to a EuroStack alone is not enough

President Ursula von der Leyen makes **sovereign, resilient** and **competitive** European economy the priority in her political guidelines of 2024. The Digital Decade strategy articulates a vision for how Europe can become a leading actor in the global technology sphere by 2030. However, without providing public digital infrastructure, and without collective and democratic practice, a strong domestic tech industry will not lead to long-term digital sovereignty or a resilient economy.

Digital sovereignty today is mostly associated with a country with a strong tech industry and large domestic tech companies, without great dependence on foreign (market) parties. This view of digital sovereignty has major limitations. Domestic companies seeking capital investment typically easily give up (part of their) ownership to foreign investors and shareholders, who may even be

located in the jurisdictions of hostile or authoritarian governments. Furthermore, when we talk about **digital sovereignty, we also have to consider self-determination**. This can apply to an individual, a community or an organisation, and refers to control over personal data and the ability to see, understand and help shape technologies. Digital sovereignty in this sense also depends on the ease of being able to switch from one technology to another, and thus, on the degree of interoperability and data portability between these technologies. For example, being able to exchange messages between different messaging apps.³⁶

Democratically controlled digital infrastructure is needed to tackle these aspects of sovereignty.

Democracy today is mostly understood as representative democracy at the national level. However, democratic governance is not necessarily about representation, but about forms of direct and collective decision-making. Democracy is interpreted practically: stakeholders should be able to co-shape the digital resource or technology. How that works in practice varies by type and case, but to democratise the digital stack, generally, we can say the *governance* needs to be addressed.

Furthermore, Europe’s digital ecosystem must support the transition to a sustainable and competitive economy by investing in more equitable ownership forms and business models.³⁷ Current extractive models centralise power, undermine worker rights and prioritise excessive data collection. To address these issues, and in the face of massive power asymmetries, Europe must invest not just in



Europe must invest not just in regular startups but foster alternatives that prioritise democratic values, community needs and local economies, such as cooperatives, social enterprises and steward-owned businesses that regenerate and share wealth rather than extract it.



regular startups but foster alternatives that prioritise democratic values, community needs and local economies, such as cooperatives, social enterprises and steward-owned businesses that regenerate and share wealth rather than extract it.³⁸

The example of GAIA-X illustrates the limits of investing in a European stack without paying attention to governance and business models. Foreign influence and corporate capture pose risks to Gaia X's original mission, putting digital sovereignty and self-determination, two core principles of the project, at risk. Scaleway, a French open-source cloud provider, left the project due to this foreign interference.

Digital commons: Democratic infrastructures and resilient ecosystems

Commons refer to a myriad of forms where communities collectively govern a resource or good.³⁹ Digital commons are digital resources, which are defined by distributed and communal production, ownership and governance. Digital commons have a lot to offer in both the provision of digital infrastructure and its governance, as well as in transformative business models that could help facilitate the economic transition. Principles like self-organisation, collective ownership and democratic practice are central to this model. Here, users, producers and the various communities to which they belong shape the design, development or management of a particular digital tool or platform, and ensure a degree of self-determination for the users and community around the technology. These models offer ways to implement democratic governance and non-extractive business models. Collaborative peer production and democratic stewardship have proven their potential through, for example, Linux, Apache or Wikimedia and creative commons licenses. Now, we also see many digital commons in cloud hosting and digital workspaces, social media, and (data)platforms, such as Next Cloud, the Fediverse, and platform or data cooperatives.

In contrast to proprietary technologies, digital commons deliberately seek to abandon hierarchies and replace them with more distributed and

decentralised models. Herewith, decision-making power is spread among a broad group of administrators and users and avoids a single central entity – public or private – controlling the digital resource or technology. This contributes to resilient digital ecosystems.

The development and use of digital commons can strengthen the resilience of DPI, countering dependence on a single provider and vendor lock-in. Furthermore, due to their shared decision-making, inclusivity and sustainability, commons-based governance structures can contribute to achieving the goal of “secure, reliable and inclusive digital public infrastructure”.⁴⁰

Different business and governance models in the digital commons

Open-source software, platform cooperatives and office tools are all example of “growing” digital commons (Figure 3). In the domain of data exchange, what holds particular promise are commons-based data governance models such as data cooperatives. Data commons have long been used in research as a way to pool and steward information in a collaborative and democratic way. The European Commission has already built on this idea with its European Open Science Cloud, an example of a digital commons-based initiative with a collective democratic governance regime.⁴²

The exploitative, monopolistic practices that dominate the digital ecosystem have led to an exploration of alternative ways of managing and creating value from data. Data cooperatives, such as health data coops, and collaborative data pools are starting to pop up as a way for people or organisations to manage their data in their common and in a manner aligned with democratic and public values. Examples are Midata in Zurich and SalusCoop in Spain.⁴³

Figure 3. Digital commons models and features.

Model	Community + Foundation	Community + business	Community = cooperative
Features	<ul style="list-style-type: none"> • Foundation supports the community (licensing, fundraising, etc.) and operates on a non-profit basis • Community builds and maintains open-source resource • Companies can act on as co-developers and service providers • Open licenses determine terms of use 	<ul style="list-style-type: none"> • Business or coop collaborates with larger community • Business and community jointly develop open source digital resource • Business and outside businesses operate as service providers • Open licenses determine terms of use • Public values potentially secured through models such as steward ownership 	<ul style="list-style-type: none"> • Cooperative consists of members of the larger community • Cooperative economic model underlies operation and use of the technology • Cooperative does daily management • Profit flows back to the community or other community projects • Community members directly involved in major model and technology decisions
Examples	Linux, Apache, Wikimedia	NextCloud, Cryptpad, Alkermio, Meet.coop	Salud.coop, Drivers Cooperative, Gemeinwerk

Sources: Commons Network: Digital Commons and Democratic Practices, explainer #3⁴¹

Policies to stimulate, participate and adopt digital commons

Governments and institutions can support the digital commons in different ways. They can collaborate and invest, or take an exemplary role by implementing the technology themselves at an early stage. We can basically differentiate between three approaches: stimulate; adopt; and participate.⁴⁴

Stimulate

- **Awareness** efforts, such as public campaigns, education and clear communication about the risks of closed systems. A practical “white list” of recommended programs aligned with public values.
- Early education open-source technologies and digital independence.
- **Providing long-term support, funding and incubation** of innovation that foster user-friendly and democratically grounded alternatives.
- **Protect digital commons** from corporate takeovers and maintain their alignment with public interests, through robust licensing, alternative ownership and new legal structures.
- **Regulation and enforcement** play a critical role in fostering a balanced digital ecosystem that prioritises privacy and fair competition.
- **Procurement policies** that favour diverse, independent digital options. Public spending can be a strong market-creating mechanism that reduces lock-in, empowers small businesses and benefits users. Coordinated procurement by city and county governments would create Europe-wide demand for democratic alternatives.

Make use of or adopt

- **Overcoming the network effect** of Big Tech means EU agencies should adopt, and thereby, invest in, democratic alternatives, such as office tools and cloud storage.
- **Make open-source solutions more accessible** through subsidies, cost reductions and clearer communication of the benefits of digital commons.
- **Unburdening public and semi-public institutions**, such as schools and broadcasters, is key to the transition to digital commons systems. Since Big

Tech often prevails in these environments due to convenience and low costs, hands-on guidance, best practices and dedicated training will be vital to make digital commons adoption feasible.

Participate

- Make sure there is the in-house technical **expertise** to participate in the digital commons community.
- Involvement through avenues such as “buy enough-to-influence” or, for example, by using the government as a steward for a digital commons initiative under a steward-ownership model.
- **Public commons partnerships**: co-build and co-govern digital commons.

Developments and opportunities in EU policy

Several policy opportunities for supporting a democratic sovereign digital stack deserve highlighting. Significant investment is needed to create viable alternatives to centralised services and public institutions should collaborate on shared systems and infrastructures.⁴⁵ The NGI commons project was not continued, but there should be other programs and funds directed to the digital commons. The European Commission will evaluate the Public Procurement Directive this term. This is an opportunity to redefine procurement terms to prioritise digital independence, open interoperable systems and sustainability. Funding needs to be ambitious, directed and systematic.

There are already several European policy initiatives that pick up on the needs for democratic and collective governance in digital infrastructures. Two initiatives deserve attention, as well as further development and support: the Digital Commons European Digital Infrastructure Consortium (DC-EDIC) and the Data Governance Act (DGA) framework for data intermediaries.



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DC-EDIC

In a report titled “Towards a sovereign digital infrastructure of commons”, 19 EU member states, alongside the European Commission and digital commons stakeholders, came together to iterate the importance of setting an agenda for a European digital commons infrastructure. This initiative was followed by the initiation of a DC-EDIC by Germany, France, Estonia and the Netherlands.

The DC-EDIC aims to strengthen the EU’s digital sovereignty, promote a multi-stakeholder and inclusive model of digital governance, contribute to the development of a digital public space, and make Europe a leading player in the digital transition through digital commons. Its main objective is to support the development, maintenance and scaling of digital commons as a pillar of our digital sovereignty, ensuring the development of an inclusive digital ecosystem supporting democratic values. Actions include:

- Building a European digital commons community that is characterised by its reliance on communities (developers, organisations, users, public authorities, academia and private companies).
- Smooth access to funding: the DC-EDIC will act as a facilitator by helping stakeholders navigate the funding landscape.
- Establishing a network of local nodes: the DC EDIC will support the maintenance, development

and scaling of digital commons. Furthermore, it will also participate in digital commons projects that provide for key public infrastructures, such as sovereign desk spaces/office software and cloud solutions for government institutions.

Ideally, many more member states will join this promising effort, which has the potential to establish digital commons as a norm.

Democratic data governance

We see a shift toward democratic governance in data policy with the European Strategy for Data (2020), aimed at creating a single market for data to ensure Europe’s competitiveness and sovereignty. The DGA, the first legislative step of this strategy, builds trust in voluntary data sharing for economic and public-interest purposes. It aims to boost and regulate data intermediaries, establish data altruism organisations, and promote alternatives to Big Tech practices, including data cooperatives for collective and democratic data management.

Some intermediaries are geared towards facilitating economic transactions between data holders and users, others mainly seek to produce collective benefits or public value.⁴⁶ At the same time, some offer more technical solutions and infrastructures, while others are more about legal entities and collective governance mechanisms. These models, though still underdeveloped, have significant potential to address power asymmetries in the data economy and promote data sovereignty through self-determination. By enabling broader stakeholder

participation in decisions on data access, control and use, they empower both economic entities and individuals. Data intermediaries also bridge silos and unlock economic and public value, advancing a more inclusive and democratic data ecosystem.⁴⁷

Data intermediaries as digital commons

Data cooperatives and data trusts are intermediaries that are particularly geared toward democratic governance mechanisms. A data coop is an association or communities of individuals or data holders that steward data in the interest of their members, in a democratic and collective way.

A data trust is an entity that holds a fiduciary obligation to represent the interests of beneficiaries. This configuration permits the rights of the data subjects/holders to be pooled and can have a highly participatory structure.⁴⁸ Data altruism organisations are another type of intermediary defined in the DGA that may or may not be democratically governed.⁴⁹

There are for now, however, still multiple challenges to the uptake of these collaborative and democratic data governance models by individuals, economic actors and public institutions. There is little awareness and little technical literacy generally. While there are examples, the business and governance models are not fully developed.

Here, and in general, **there is an important role for the EU to provide institutional support. There is little awareness and knowledge within institutions and, therefore, a lack of institutional support.** EU institutions and member states have an important role to build public infrastructure in key technologies and actively support and incentivise the development and uptake of democratic alternatives to regain our sovereignty and move towards a sustainable and competitive economy.



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INFRASTRUCTURE FOR A DEMOCRATIC EUROPEAN PUBLIC SPHERE



MATTHIAS PFEFFER

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INFRASTRUCTURE FOR A DEMOCRATIC EUROPEAN PUBLIC SPHERE

The current crisis of democracy is based, in large part, on the digital disruption of the public sphere, which continues despite all previous legislation. This chapter identifies the structural problems that have led to the crisis of the independent media and identifies more concrete countermeasures that the Commission and Parliament should take in the new legislative period.

Why it is essential for the future of democracy to strengthen the fourth estate

Digital disruption has enabled a small number of platform companies to shape the public sphere according to their business models. In the process, they have plunged the fourth estate, the public service media (PSM) and the private press, which are indispensable for democracy, into an existential crisis. 80% to 90% of the world's advertising revenue in the digital world today goes to three companies: Alphabet/Google; Meta/Facebook; and Amazon.⁵⁰ The independent press is being deprived of an essential source of funding. But that's not all: due to the dominant position of a few platform companies, the so-called intermediaries, the media houses have lost the direct connection to their users, which limits user loyalty and the monetisation of press products. **The media industry's increasing dependence on digital advertising revenue means that the dominant platform companies are having a decisive influence not only on the formation of opinion in Europe today but also on the future of journalism.** In view of this development, democracy must take decisive countermeasures to protect its own prerequisites by securing access to verified information and a free space to form opinions.

Why Europe needs to invest more in infrastructure for a trustworthy digital public sphere

Europe is at a crossroads. Due to the global threat to democracy and the current geopolitical shifts, fundamental decisions must be taken in the next legislative period to strengthen democracy and European integration and to fend off attacks from outside and within.

Democracy depends on a free and trustworthy information space as a vital prerequisite. Citizens who are misinformed cannot make free decisions and cannot positively participate in the democratic will-building process. Securing access to trustworthy fact-checked information and free opinion formation are the crucial elements of deliberative democracy, where only in this way can all other political decisions be made possible and legitimised.

The right to free access to information is enshrined in Article 11 of the European Convention on Human Rights, which guarantees the people of Europe the right to seek and have access to free information according to the fundamental values of democracy, diversity and social cohesion, and to *receive and impart information and ideas without interference by public authority and regardless of frontiers*.⁵¹ In times of ongoing digital disruption of the public sphere, defensive regulatory measures alone are not enough to protect this right. In addition to (necessary but not sufficient) measures to combat fake news through fact-checking and disciplining platforms through the DSA, there must also be a strengthening of those who practice trustworthy fact-telling according to professional standards. **To**

achieve this, the asymmetry of power in favour of the large platforms must continue to be combated, as already envisaged by the DMA, but, furthermore, those who adhere to journalistic quality standards and report comprehensively must be supported by a public-value-driven infrastructure, enabling them to better network with each other and be given the opportunity to be in direct contact with their users. They must be empowered to free themselves from the current tutelage and control of a few world-dominating digital platforms. **After the regulatory phase in the last mandate, it is now time for Europe to move decisively into a new phase of building its own capacities to achieve digital sovereignty.**

Why the existing legal measures are important but never sufficient

EU legislation has laid important foundations for correcting the undesirable developments described above. For example, the DSA will oblige platform companies to take stronger precautions than before to prevent misinformation and false information, as well as hate speech and polarisation. Whether these goals are achieved now depends on the determined implementation and enforcement of the laws. The European Media Freedom Act (EMFA) is intended to support and strengthen a free and independent

press. In addition, the EU has started to provide financial support for journalistic projects and digital innovations in the media. For example, the European Newsroom, a cooperation project between 18 news agencies from all over Europe, is funded by €1.76 million. All these individual measures are still not enough to help the press survive the digital tsunami because they impose reporting and transparency obligations on the platforms, but do nothing about the broken online advertising market, which has been taken over and is dominated by infrastructure providers such as Alphabet and Meta.⁵²

Measures to restore the deformed advertising market are still pending. These must include investment in public infrastructure for news and information. Significantly greater and sustainable investment is needed to safeguard independent media in the future, and thus, strengthen democracy in the long term. Europe needs a reliable digital infrastructure, which must consist predominantly of software that is based on democratic rules and values, and that forms an alternative to the predominant platforms of American and Chinese origin in Europe's public sphere. And this infrastructure can only exist if financed from EU funds.



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Concrete steps the EU must now take

A platform for trustworthy news and information in all European languages

Europe needs its own digital infrastructure for the digital public space. It will enable the operation of a networked platform, initially of European licensed media players. The PSM, in particular, must take on a pioneering role here, as they are already committed to the public mandate and are financed by public funds. Thanks to advanced real-time translation and its own search and recommendation algorithms, such a platform could give all European citizens insights into the news and political documentaries produced in all member states. This means that, for the first time in history, it is possible to overcome Europe's language barriers, and thus, create steps towards a common European public space in which common issues can be debated by everyone with everyone else. **To enable this, the European PSM must make their information programs freely available as a first step because they are already paid for by citizens.** In addition, other representatives of the fourth power must have their role on this platform: private TV stations and media houses; non-profit citizen media; and community media. In another step, online and print providers must also find their place. Making these offerings from all over Europe available to all European citizens in their native language, enabled by AI-based technology, will be an important contribution to better mutual understanding. With a comparatively small investment, it will make a huge contribution to increasing media freedom and media diversity in all member states. All this will be possible because **advanced digital technologies and generative AI enable the translation and searching of video and TV content and can thus be used in a way that strengthens democracy** instead of undermining it in the hands of a few international big tech companies.

Because the platform only makes the quality news and documentary content that is already produced in member states visible to all, and because the infrastructure is a platform in the legal sense of the word, not a station that takes editorial decisions,

the platform does not infringe on the independence of the media nor come with the danger of being a centralist EU propaganda tool. Rather, it creates a completely new, unified market of 450 million users for decentralised financed journalistic news and political documentaries, whether financed by private or public sources. **A new single market for news and information will open new opportunities for Europe's free press and media.**

The costs of the platform, according to initial rough estimates, will not be more than €40 million a year.⁵³ With this annual funding from the EU budget, the EU will make it possible for all citizens to view – in their own language – and search news and political documentary content that is produced by licensed media of member states with an investment of €27 billion alone for PSM in Europe. Due to the extremely favourable ratio of a relatively small investment in the EU platform to an immediate, enormous gain in the variety of information available to all citizens, the project is truly low-hanging fruit.

Europe must cover the costs of developing the software that *searches, recommends* and *translates* to the highest quality and in full compliance with European laws and values and for the needed infrastructure (see the chapter by Bria).

EU financing for this new European TV infrastructure goes hand in hand with strict governance of the platform, which excludes any influence from governments or EU institutions on the content shown on the platform. A media system financed by public funds and yet independent of the state is not a contradiction but has been tried and tested in the system of public media for over 70 years. The governance of the new media order must take up and further develop the best examples for this for the digital age. As no editorial decisions are taken – Europe only provides a technology platform that makes decentral produced content accessible – the governance issues are much less complex and sensitive than those relating to classic public TV. What is key are at least the following elements of governance:

- Governments and EU institutions take no content decisions relating to what is shown on the platform.
- The contributing stations must be licensed in member states.
- The contributing media partners cannot make selective contributions, but must either contribute all their news and political documentaries or nothing, thus providing equal treatment to their own domestic audience and the European audience.
- The platform must be run by a legal entity with nonprofit status, the statutes of which set out the governance arrangements and duties of the management.
- The platform does not make any editorial choices about the content distributed from participating broadcasters.
- The search and recommendation algorithms on the platform serve democracy, and thus, combine the plurality and diversity of information necessary for democracy with the personal interest of the person searching.
- EU languages are treated equally, as far as technically and economically possible.
- The governance body that appoints and controls the management of the platform is diverse and appointments are made by a variety of groups, including contributing stations, national parliaments and the European parliament, the European Commission and Council, civil society, academia, and media regulators.
- Further investments need to be made here to create an alternative to commercial translation services. The first steps towards reliable non-commercial European translation technology have already been taken with the European Language Grid.⁵⁴ Such initial approaches must be vigorously expanded. This needs to be an explicit objective of current and upcoming EU

initiatives to invest in AI (see also the chapter by Ferrari et al.).

The European Parliament's Science and Technology Options Assessment (STOA) has already presented a study that demonstrates the technical feasibility of the platform.⁵⁵ A further STOA study on governance, examining the legal and economic issues in detail, compiling best practice examples from Europe and clarifying whether additional legislation is necessary to make the platform a reality, is underway.

A findability obligation for trustworthy news on digital platforms

The current market-dominating position of a few US and Chinese companies distorts public communication and encourages misinformation. To strengthen public, private, profit-oriented and non-profit media houses, the introduction of a findability obligation for the major platforms is proposed. Similar regulations already exist in many areas of media regulation, for example, in the AVMSD,⁵⁶ which stipulates 30% European productions. For this reason, a findability obligation is not an unrealistic goal.

In addition to the windows for paid advertising, the platforms will therefore have to display neutrally selected news from independent professional media in the future. To ensure the greatest possible neutrality in the implementation of the findability obligation, the algorithms used must be developed in accordance with transparent public law principles and monitored by an independent institution.

A legal obligation for internet companies to pay a levy for licensed journalistic local and national media

Big Tech giants profit from the work of publishers but skim off a disproportionately high share of the revenue, penalising small and medium-sized publishers. **The EU should therefore start a legislative initiative that obliges internet giants to invest a significant amount in journalism and media in need.** The legislation in Australia and Canada can provide inspiration in some areas. At the same time, it enables European legislators to consider and avoid undesirable negative effects on the free press in these countries. California had also planned a law that would have required internet companies to pay levies to local media, which Google and others averted at the last minute by making voluntary payments totalling millions. The reason for the legislative initiative: regional media, in particular, is struggling with falling advertising revenues, while advertising dollars are migrating to the internet – to Google and Meta, among others. In California alone, more than 100 newspapers have disappeared in the past decade.³⁰The EU should consider a corresponding mandatory legal regulation.

COMPETITION POLICY AND LARGE-SCALE AI MARKETS IN EUROPE



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COMPETITION POLICY AND LARGE-SCALE AI MARKETS IN EUROPE

Introduction

To stay relevant in the putative AI arms race against China and the USA, the EU is turning towards industrial policy.⁵⁸ This aspiration comes with potential pitfalls. Without considering the context in which the latest wave of AI, based on large-scale AI models, is being developed, industrial policy could end up further entrenching the position of the incumbents, who already exercise a strong grip over this technological trajectory through controlling capital, research and infrastructure. **What is often misunderstood in Europe is that concentration is not an incidental, but constitutive, feature of AI as we know it today. Engaging with and shaping this ecosystem strategically through competition and industrial policy is crucial for maintaining the possibility of democratic and progressive directions for AI policy.**

Progressive case for competitive markets

To start from the basics: why is competition important? In typical policy parlance, competitive markets, in which many companies struggle for profit and market share, and in which no single or group of firms is dominant, lead to increased innovation, economic growth, efficiency and lower prices for consumers. This is the received wisdom and key justification for competition policy in the speeches of European policymakers.⁵⁹

However, approaching competition solely through lower prices and increased market efficiency sidesteps important considerations of the aims and role of competition in our societies, as part of the

original impetus for competition policy is driven not from the problem of efficiency, but from the problem of power.⁶⁰ Preventing monopolists from imposing their will on the market was thought to be crucial not only for reasons of economic efficiency, but also to safeguard democracy. It was argued that power was fungible and market dominance easily translated into undue political influence. **In the case of AI and digital technology more broadly, concentrated economic and political power in the hands of a few large companies narrows the space for democratic decision-making over the trajectory of digital technology in our societies.**

These broader considerations about competition have started to resurface globally. Especially in the USA, a shift in thinking about the means and ends of competition policy has been a hallmark of the Biden administration.⁶¹ For example, the Federal Trade Commission and the Department of Justice have taken ambitious steps towards efforts to position competition as a part of a broader political agenda of economic transformation, centred on principles of equity, fairness and sustainability. While these efforts have been only partly successful, due to interest-group opposition and long-standing institutional constraints, it provides a marked contrast to Brussels, where the consumer welfare standard still reigns supreme, and where the idea of competition policy serving the public interest is discussed by a narrow range of experts and enforcement agencies.⁶²

Progressives are well-placed to change this narrative. **Grounding competition law in a broader process to achieve social ends and defend the space for democratic governance over technology provides a foundation for a quintessentially progressive**

approach to competition, and it is urgently needed when it comes to AI.

Sources of AI power

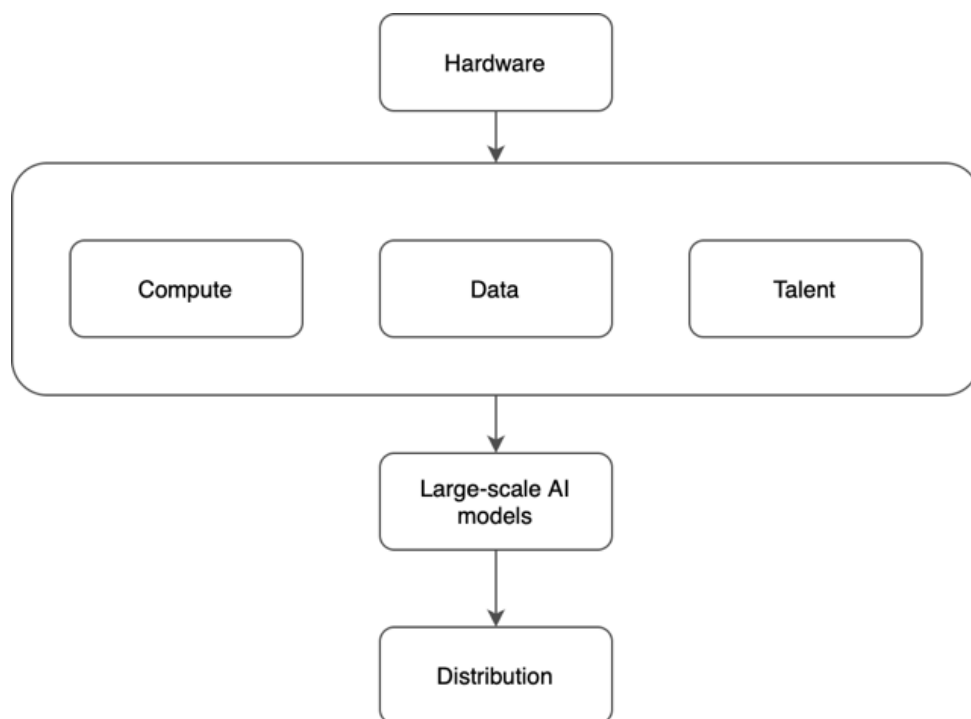
Rarely has a technological artefact caused a tremor like the introduction of ChatGPT in November 2022, inducing mania around large language models (LLMs). However, an LLM is not a discernible piece of software, but a sprawling ecosystem of relationships. Behind the user-facing prompt box or an API call is an ecosystem of computation, data, hardware and models that spans the globe⁶³ and that forms the necessary conditions for the functioning of contemporary AI systems.⁶⁴ This ecosystem is largely shaped around the American hyperscalers.⁶⁵

Onewaytothinkaboutthenatureofthisconcentration has been to conceptualise AI as a *stack* of these layered relationships (Figure 4).⁶⁷ By breaking down this stack into its component parts, to the control points of hardware, infrastructure and distribution, we can gain a further understanding of the sources of this ecosystemic advantage. The first level is the

hardware needed to train the models. The latest wave of generative AI has been heavily dependent on the efficient parallel processing in dedicated AI accelerator chips. These chips are designed and manufactured by a heavily concentrated sector, with design leader Nvidia owning 88% and the manufacturing giant TSMC occupying 90% of different stages of the chip value-chain market.⁶⁸

The second level consists of the infrastructure, the cluster of enabling conditions consisting of computation, expertise and data. Computation can be divided into two different parts, training and inference. Training is a one-off cost that requires the use of supercomputing clusters for extended periods of time to do the stupefying amount of computations needed to derive the statistical weights between different neurons of the LLM. After the model has been trained, there remains the ongoing cost of running the model.⁶⁹ When running models at scale, the cost of inference can surpass the training costs, which explains why most AI startups positioning for AI inference at scale are losing money. The leading hyperscalers dominate the computational capacity

Figure 4. Simplified idea of the stack⁶⁶



needed for this inference in customer-facing, global applications.

As to data, their competitive advantage depends on the specificities of the model. While frontier-based models are often trained by exploiting a massive core corpus of scraped content from the internet, with an often careless attitude towards copyright or ownership rights, various high-value datasets are used to improve and fine-tune the models. These datasets are getting privatised through exclusive licensing contracts or horizontal acquisitions.⁷⁰ This, in combination with the existing data advantage of the largest Big Tech companies, contributes to the concentration in AI markets. Talent to use and develop models completes the infrastructural layer. Knowledge of, especially the tacit knowledge of engineering the massive, parallelised processes, and organising the computation of the largest models are specific kinds of expertise that are scarce. The leading companies have tried to monopolise this knowledge, by hiring the staff of a young startup in de facto acquisition and creating salary inflation, which makes the talent pool too expensive for potential, smaller competitors.⁷¹

On top of the infrastructure are the models themselves. Quite straightforwardly, the current paradigm has been based on the idea that the quality of the LLM is a weighted function of compute, data and expertise.⁷² If these inputs are concentrated, the logic goes and the capacities of models will be concentrated as well. Sure enough, at the time of writing, according to a widely used benchmark, the pinnacle of the most capable large-scale LLMs in the world are largely linked to US or Chinese hyperscalers or their affiliates.

The fourth control level is their distribution. For the investments in these models to make financial sense, the models need to achieve customers at scale. The most efficient way is to use existing distribution and deployment networks, which, in the contemporary digital economy, are controlled by infrastructural digital corporations. Examples of these integrations are Gemini Nano in new Samsung phones, Gemma in Google Chrome or OpenAI products that are integrated with Microsoft

Office. On the developer side, the model-as-a-service platforms (MaaS) run by large cloud providers enable gated API access to various third-party models. The Google AI Vertex Garden, Amazon Bedrock and Azure ML are some examples of such platforms. These AI-specific control points are enveloped and further strengthened by financial dominance. The phenomenal success of the leading social media platforms of the 2010s internet economy has yielded financial firepower that enables the cross-subsidisation of business models and acquisition of promising startups.

These factors, in combination, lead to the infrastructural and ecosystemic dominance by the Big Tech companies in the contemporary paradigm of AI.⁷³ By controlling crucial nodes and connections of the stack from the ground up, the hyperscalers are poised to shape the market in most scenarios of AI futures. The vertically integrated ecosystems provide long-term competitive resilience, even when the market contracts and may gradually assimilate third parties in this ecosystem to consolidate control over value chains.

Competition authorities have started to pay attention to these dynamics.⁷⁴ In March 2024, the DG for Competition published a call for input and study of the market dynamics in the AI sector. In a recent speech, Competition Commissioner Vestager noted that Europe cannot repeat the same mistakes as those with social media and the digital economy, which have been “almost monopolised”.⁷⁵ In July 2024, the competition authorities of the EU, UK and USA published a joint statement addressing the emerging competition concerns in the AI markets, highlighting how the control of key inputs, leveraging existing dominant positions and arrangements between leading providers are potentially harming competition in the AI market.⁷⁶

However, the diagnosis above suggests quite bleak predictions of the efficacy of the proposed interventions. While some sporadic interventions and adjustments on the surface of the stack, to increase interoperability, choice and fair dealing, might intensify competition between the hyperscalers,⁷⁷ the broader *contestability* – the

possibility for change in the basic structure of the market – is difficult to fathom, considering the multi-layered dynamics of control in AI markets.⁷⁸ **While interventions based on curtailing anticompetitive behaviour might increase competition between model providers, true contestation would require shaping the structure of the ecosystem.**

Continental complications – state of play in European LLM AI markets

In Europe, we are seeing a less-known complementary and parasitic AI ecosystem developing in the cracks and fractures of these US giants. To illustrate the differences, we can take as a case study an illustrative comparison of the leading US and EU LLM startups, OpenAI, Anthropic, Aleph Alpha and Mistral.

Firstly, the dominance of hyperscalers on the digital economy has incentivised European AI startups to find alternative markets and business models. Some of these have come from government and business customers. More risk-averse customers focussed on trustworthiness, compliance and explainability have created a potential market opening for compliance-oriented models. On the government side, there might be a temptation to support this push through procurement, which leads to hasty AI adoption in public services to cut personnel costs, compromising the quality of services and existing public sector capacities and efficacy. On the business-to-business (B2B) front, many European AI startups have focused on specialisation and calibrating their smaller models to the European markets by supporting European languages and particular use cases, instead of chasing the absolute state-of-the-art in rankings.⁷⁹ Moreover, in terms of distribution, in addition to integrating their models to the hyperscaler offerings in the cloud services,⁸⁰ existing sectoral leaders are cooperating with AI startups to integrate their technology to existing offerings.⁸¹

Secondly, the training and inference of European models has not been wedded to the computation resources of American hyperscalers to the same degree as their American counterparts.⁸² While

OpenAI is dependent on Microsoft and Anthropic relies on Google and Amazon, Mistral AI has experimented with the European HPC cluster and alternative computation providers, the so-called neoclouds, such as CoreWeave and Scaleway, to serve their inference and training needs, coupled with a multi-cloud strategy (i.e., using all the hyperscaler's clouds). Aleph Alpha boasts its own data centre in Berlin, built by Hewlett Packard Enterprises, with additional strategic cooperation with chip manufacturer Cerebras, whose chips are partly used in the models of the company. This means there are a multitude of players in the European AI ecosystem. In general, on the hardware side, Nvidia still dominates, with its H100, A100 and upcoming GB200 chips providing the bulk of the computation needed to train these models. This makes Nvidia the current ultimate beneficiary of European AI development.⁸³

Thirdly, the financing environments of these companies are different. The valuations of OpenAI and Anthropic are high compared to the European AI companies, but much of this can be explained by massive single investments. Microsoft, Google and Amazon investments in Anthropic and OpenAI amounted to two thirds of global investment in AI startups in 2023.⁸⁴ In contrast, in Europe, the Mistral AI funding is a mixture of French national investment funding through BPI France, national capital, and Tier 1 VC companies from the USA, such as Andreessen Horowitz and Lightspeed Ventures. Aleph Alpha, in turn, is primarily funded by national capital sources, such as the Lidl supermarket magnate Dieter Schwarz, the Burda media empire and the software giant SAP. These variations suggest different operating logics, timescales and exit strategies in the AI system.

In conclusion, **the European AI ecosystem has developed in parallel a parasitic relationship with the Big Tech companies.** As the distribution channels and computation resources needed to deploy massive LLMs at scale are currently controlled by the hyperscalers, European AI companies have been trying to find pockets inside and on the boundaries of these ecosystems in which their businesses are viable, such as business-to-government

(B2G) markets and geographical customisation. While cooperating with Big Tech for compute and distribution, they have also tried to forge new partnerships with alternative providers and identify business models that are less susceptible to compete directly with the hyperscalers in terms of capital.

The long-term strategic outlook is still uncertain. The hyperscalers are also pivoting towards more economical models, with active participation in the B2B and B2G markets and financial firepower to sustain their own models at a loss when the competition increases and the capital flows start drying out in favour of competitors and partners.⁸⁵ The sustainability of the relative performance and geographical tuning to European languages is still unclear, with leading foundation models performing on European languages as well. Moreover, keeping these companies separate from the incumbents poses a challenge. Due to the nature of digital economies, Big Tech acquisitions have been the preferred exit strategy for venture capital and private equity backing technology startups.⁸⁶ This creates a challenge for the market regulators, who then must prevent voluntary and willing deals instead of “killer acquisitions” that see the European AI companies as powerless victims drawn in kicking and screaming.⁸⁷ In many cases, the existing incumbents are also best positioned for acquiring European companies.⁸⁸ Blocking the mergers might lead to criticism that the EU is “anti-innovation” and “scaring off” international capital, leading to political pressure on regulators to back down.⁸⁹

Market developments are also evolving. Recently, many commentators inside the industry have highlighted the unsustainability of the financial logic and infrastructure needs of the AI hype cycle.⁹⁰ Hence, for many investors, the focus has developed from chasing the absolute frontier to look for the right performance of the latency, speed and price to capture value. This parts with the logic of the largest model builders, which are explicitly not operating under profitability logics, betting that, because of model scaling, the resultant artificial general intelligence will make typical financial calculations irrelevant.⁹¹ Also, the economic rents that have

accrued for the infrastructure providers of AI have led to frantic competition to share these rents, with alternative computation providers and paradigms evolving in the market.⁹² Moreover, by open-sourcing their leading models, companies such as Meta are attempting to commoditise the market for models to prevent them from being dependent on an oligopolistic provider, undercutting the business model of companies such as OpenAI and Anthropic, which are based on paid-subscription closed models.⁹³

If the deflation of the hype cycle of the scaling models comes to pass, Europe might be able to make more nuanced decisions on the use of AI. By not having the future of Europe overshadowed by the hanging clouds of billions of euros of capital expenses requiring justification, Europe is more open to exploring alternative models of implementing AI while watching the bonfire of assets on the other side of the pond. This is true only, however, if we don't let the Big Tech companies impose their vision, serving their needs, to capture European futures.

Competition is a necessary, but not sufficient, condition of progressive technology policy

Competition, merely increasing the number of companies in the market, is not a sufficient lodestar for AI policy in Europe. No amount of competition will absolve us from deriving a purpose- and mission-driven approach to AI development (see the chapter by Ferrari et al.) that will set democratic norms and objectives for the role that AI should – and shouldn't – play in our societies. In some cases, increasing competition without considering the underlying incentive structures might even exacerbate the existing harms of the current AI paradigm.⁹⁴ Instead, the purpose of competition and antitrust enforcement is defensive. **Fostering competitive markets and curailing corporate power is a necessary condition to keep the space open for as-yet unforeseeable alternatives to emerge, to make the direction of technology amenable for democratic decision-making and shaping it towards applications that deliver in the public interest.** While such direction remains to be decided, even the possibility of such



Fostering competitive markets and curtailing corporate power is a necessary condition to keep the space open for as-yet unforeseeable alternatives to emerge, to make the direction of technology amenable for democratic decision-making and shaping it towards applications that deliver in the public interest.



a direction requires what Maria Farrell and Robin Berjon call *rewilding* – facilitating the development of a healthy ecosystem that supports a diversity of objectives and maintaining space for the unexpected to emerge.⁹⁵

There are some key steps to defend this space of possibility through existing institutional tools: developing structural theories of harm and taking the ecosystem-based perspective on competition proceedings in the EU would take these markets on their merits, instead of trying to impose outdated and idealised theories to an ill-fitting context. Developing a whole-of-Commission approach to enforcement in competition policy, to prevent institutional fragmentation and facilitate alignment, would streamline the implementation of a strategic mission through the use of all available tools (see the chapter by Ryan). **Review of the EU merger regulation to handle quasi-mergers would close loopholes that have enabled concentration to continue unabated. Developing more dynamic theories of harm would take seriously the capacity of incumbents to project existing power to the future by leveraging existing assets.**⁹⁶ This would help to solve the “Collingridge dilemma” underlying the current competition policy: when the market power has not entrenched yet, the tools of competition enforcement are not used; when the market power has entrenched, these tools are ineffectual. Taking a bold step in exercising judgment on what kind of market structures we allow might be a necessary step towards functional competition enforcement.⁹⁷

On the positive, directional side, the key task is to balance the creation of a European AI stack with the prospect of pouring public money into a captured ecosystem, and in the pockets of Silicon Valley giants. **Some steps would be to strategically support alternative providers at the infrastructural level, which would break the vendor lock-in.**⁹⁸ Focusing on new, more efficient model architectures, instead of trying to lock into the wasteful arms race based on an outdated idea of mere scaling, could lead to smarter adoption of European AI. Moreover, **pushing AI adoption as an industrial strategy in places where it does align with public benefit, such as AI in public services, becoming an end in itself, might lead to pathological consequences for the public interest.** The EU should explore creating market incentives and innovation policies, such as conditional computation, that lead to problem-oriented solving of public interest and supporting collective and creative AI that augments, not replaces, human capacities (see also the chapter by Ferrari et al.).⁹⁹

The existing AI paradigm, as we have known it for the past few years, might be hopelessly beyond the reach of the limited funds of the EU or its political ambition, but, in that gap, a wisp of optimism exists. We are sailing into a new time. No increase in speed through competition will help us reach a port if we do not know where we are heading. But also, no direction will help us if we don’t pay attention to the rocks and the currents hiding under the waves. **Using competition policy to keep open the way for a democratic direction towards more sustainable AI futures is a worthy goal for progressive policy in the future.**

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CONDITIONAL COMPUTING: A NEW PARADIGM FOR PUBLIC-INTEREST AI IN THE EU



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CONDITIONAL COMPUTING: A NEW PARADIGM FOR PUBLIC-INTEREST AI IN THE EU

Introduction

What might a progressive future of AI in Europe look like? Should public spending on AI be scaled up, so that Europe can better compete with technological superpowers in the USA and China? Or should public investments in this set of technologies be directed towards other societal goals because the current AI boom is a bubble on the verge of bursting?

Rather than attempting to seek definitive answers to whether investments should be increased or redirected, we propose a shift in the foundational question itself. The question should be how can AI be aligned with the public interest? The EU, along with its member states, must champion a strategic overhaul, where public investments in AI are aligned with beneficial societal goals. It is time to replace the current paradigm of *relentless computing* with a new era of conditional computing. By *relentless computing*, we mean an ideology where AI is treated as an end in and of itself, rather than a means to serve the public interest. By *conditional computing*, we mean a proactive approach to AI development, where public investments come with clear conditions that shape how the technology is developed and used. By embracing conditional computing, the EU can avoid getting caught up in a pointless AI arms race and instead focus on developing AI that serves the needs of its citizens.

Conditional computing can strategically position the EU in the global AI landscape, reacting to two important risks. Firstly, as the EU lags behind in AI infrastructure, public investments risk primarily benefitting American providers like Nvidia. Secondly, the current AI race appears speculative, with vast

resources funnelled into compute spending that may ultimately fail to deliver proportional returns. As such, the idea of conditional computing is a direct reaction to both of those concerns.

So, what are these conditions, and what can be done to enforce them? We discuss conditions for three dimensions of EU AI investments: *hardware* (e.g., chips, supercomputers, servers); *software* (e.g., generative AI models); and *talent* (e.g., AI scientists, developers, founders). Before discussing the three dimensions, we explain why a focus on public-interest AI is required.

Conditions for public-interest AI

States around the world increasingly invest in hardware, software and talent to seize AI's *perceived* economic benefits. The fact that those benefits are perceived – rather than evidence-based – is crucial here. From Saudi Arabia to the USA, there is a powerful imaginary that AI will unlock vast economic opportunities and productivity improvements. For instance, AI built into learning accelerators could improve educational efficiency, or built into diagnostic apps, AI might increase health benefits. However, the political rush to capitalise on these perceived benefits often overlooks the potential for AI to exacerbate inequality, amplify the climate crisis and further sideline democratic engagement. Therefore, it is **essential that conditions for public-interest AI not only counteract these risks but also promote public values, such as equality, transparency and democracy.**

As a complement to the defensive regulatory actions to US technology in the form of tools like competition policy (see the chapter by Saari), we recommend

building strategic capacity to actively shape, and not only fix, digital markets.¹⁰⁰ This means structuring investments in hardware, software and talent in ways that are not purely economically driven but focused on societal benefits.

Hardware

AI hardware, encompassing physical components such as chips, supercomputers and servers, forms the backbone of AI technology. It is the most tangible and capital-intensive aspect of AI, requiring significant financial investment in physical infrastructure to develop and deploy those systems. AI development, also called the *training* phase, and AI deployment, for which technical experts use the term *inference*, are two sides of the same coin.¹⁰¹ Computational processes involve making calculations about data flows in large data centres, often owned or operated by Big Tech firms. These data centres manage both the training and inference phases of AI, and both processes require substantial computational power to handle large data volumes.

It is the dimension of hardware where the financial disparity between the EU and major technological powerhouses like Big Tech companies in the USA and China is most pronounced. A prime example of this disparity can be seen in the EU's initiative to allocate €2.1 billion for the creation of "AI factories".

The Council of the EU defines AI factories as "entities that provide AI super-computing service infrastructure".¹⁰² These factories are advanced technology hubs equipped with high-performance computers. Supercomputers differ from traditional data centres in that they are specifically designed to execute pre-defined tasks, such as running complex simulations or training LLMs – a specific type of generative AI. Given that supercomputers are especially valuable during the initial development of generative AI (i.e., the training phase), policymakers view them as a crucial tool to boost startups and foster innovation in the EU. By investing in supercomputers, the EU aims to provide resources to accelerate research and development, offering local startups the computational power usually reserved for larger corporations.

Specifically, the EU's funding aims to upgrade nine existing EU-funded supercomputers, such as MareNostrum 5 in Barcelona, to be better suited for generative AI systems. However, the EU's investment pales in comparison with the massive expenditures by Big Tech firms on AI infrastructure, indicating a striking financial disparity (Figure 5). Simply scaling up investments would not bridge this gap effectively. **The sheer scale of Big Tech's financial capabilities means that competing solely on monetary terms is neither sustainable nor strategically sound for the EU. Instead, the EU must leverage its unique position to enforce**



The sheer scale of Big Tech's financial capabilities means that competing solely on monetary terms is neither sustainable nor strategically sound for the EU. Instead, the EU must leverage its unique position to enforce conditions that go beyond spending more money and focus on fostering a more just technological ecosystem.

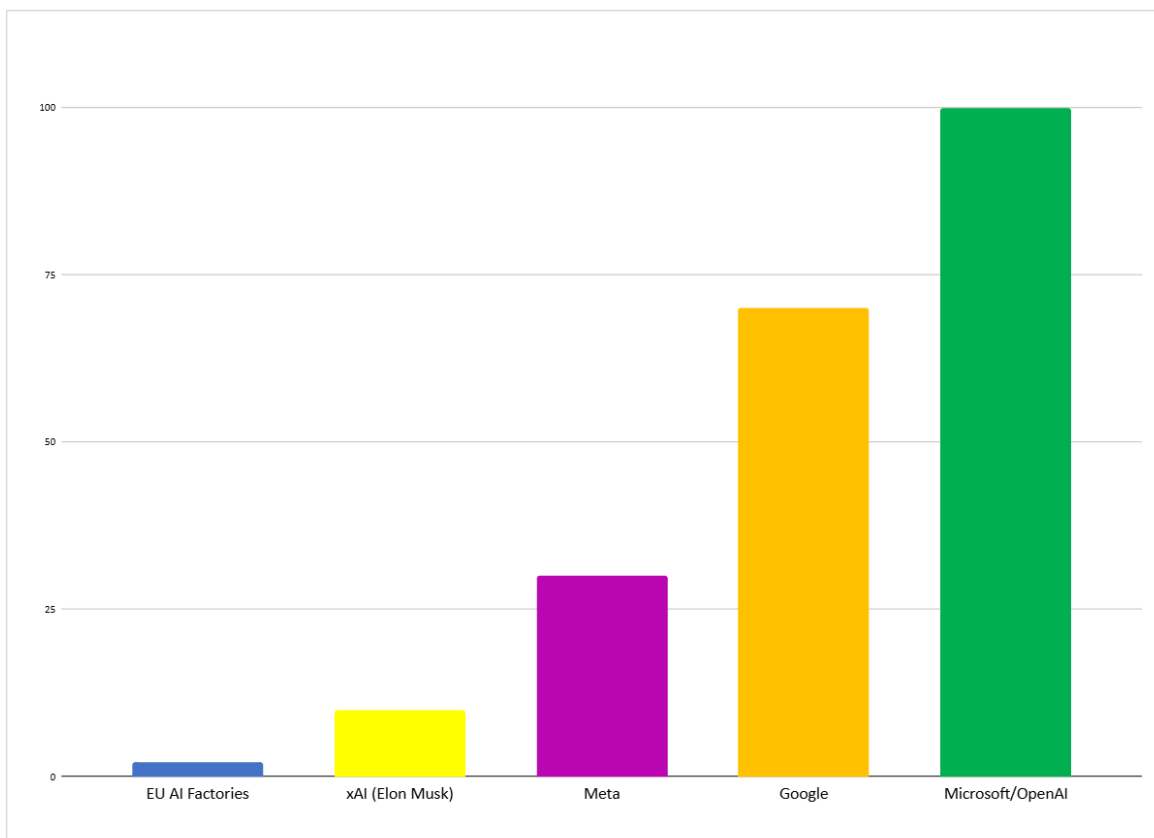


conditions that go beyond spending more money and focus on fostering a more just technological ecosystem. The EU's lack of homegrown processor technology in the world's top 500 supercomputers represents a significant strategic vulnerability, yet this can be transformed into a strategic advantage by capitalising on the EU's considerable market power. As a major buyer¹⁰³ in the global computing marketplace, the EU is positioned to influence industry standards significantly. In this scenario, the EU can stipulate that any hardware provider wishing to engage in public procurement contracts – such as in the development of “AI factories” – must adhere to specific criteria that align with European values and strategic interests.

In this context, it is paramount to highlight that conditional computing has two sides: the side of procurement and the side of use. In terms

of procurement, the application of conditional computing would involve setting conditions on the acquisition of AI infrastructure. An example of a proactive procurement strategy that connects public funds and public values is the LUMI supercomputer in Finland, which is a part of the “AI factories” initiative, known for its environmental sustainability by using hydropower and AMD GPUs.¹⁰⁴ In this case, a desirable societal goal (e.g., green energy) is tied to the acquisition of a crucial infrastructural component (e.g., GPUs). While AMD is also a major US tech player, its support for open-source software initiatives contrasts with Nvidia's closed (hardware) systems. This point underscores the overlap between hardware and software, indicating that these dimensions are closely related. Rather than discussing these dimensions in isolation from each other, conditional computing requires us to strategically combine them.

Figure 5. EU AI factory expenditure versus Big Tech AI infrastructure expenditure.



Software

Software encompasses the tools and systems that underpin AI technologies, including models that drive decision-making processes within AI systems. Each model type has different applications, such as image recognition, natural language processing or predictive analytics. Software also includes developer platforms, which refer to the environments or frameworks that enable the development and deployment of AI systems. Beyond generative AI models and developer platforms, there are also data management tools, specialised AI libraries, and deployment and monitoring tools.

Public investment in AI should be tied to stipulations of openness and transparency to ensure that AI benefits society. Developer platforms are a critical frontier where competition in the AI industry unfolds. While the attention of policymakers is often on (industrial) high-profile AI models, these developer platforms remain under the radar of regulators. But there are pivotal spill-over effects when state-led projects support specific software projects that are in line with public values. A notable example is AMD's ROCm software,³¹ which provides an open-source alternative to Nvidia's CUDA. It enables developers to use AMD GPUs for a variety of tasks, just as CUDA leverages Nvidia's GPUs. Open-source software allows anyone to use, modify and distribute the software, fostering a more collaborative and innovative environment, as developers can build upon each other's work, potentially leading to more diverse applications. This openness stands in direct contrast to proprietary developer platforms like Nvidia's CUDA, which restrict access and control. The case of LUMI, a supercomputer that utilises AMD GPUs running on hydropower and supports open-source software solutions, such as ROCm and Triton,¹⁰⁶ illustrates that **public investments can and should be directed towards projects that align with multiple social benefits – in this case, openness and sustainability.**

In this context, there are also important lessons to be learnt from other cases of linking public funds to conditionalities. For example, in the context of the COVID-19 pandemic, investments by the UK

government in the AstraZeneca/Oxford University vaccine were tied to a not-for-profit model to ensure affordable vaccine access. Recently, the much-discussed report on European competitiveness by Mario Draghi¹⁰⁷ included a similar strategy. The report recommends providing public "computing capital" to innovative SMEs in exchange for financial returns, such as equity options or royalties. This model, mirroring the AstraZeneca case, aims to leverage public investment to stimulate AI innovation while ensuring a return on investment for the public good. At the same time, it underscores the need to implement conditional computing not only in terms of the procurement of AI infrastructure, but also crucially in terms of its use by public and private actors, such as SMEs.

A shift from relentless computing to conditional computing also requires bold investments in fundamental research. The AstraZeneca example highlights the significance of funding fundamental research, as such investments can yield unexpected and valuable breakthroughs. The EU's vision to build AI factories should be complemented by a R&D strategy that supports fundamental AI research, as this can lead to the development of model architectures that challenge existing industry standards and reduce reliance on dominant players. While the current state-of-the-art in the generative AI field is dominated by the "Transformer" architecture, which was developed by Google researchers, this was not always the case. In the 1990s, a different type of model, long short-term memory (LSTM), was leading the way. Today, initiatives like the German startup nx-AI's development of xLSTM¹⁰⁸ demonstrate the role of competing technological building blocks that may be supported at the political level. By selectively investing in Big Tech alternatives, policymakers can encourage a diversified software ecosystem and impact the standardisation process of AI regulations, although the scalability of these experimental alternatives might not be on a par with frontier AI models.

It is equally important to invest in fundamental research on developing algorithmic alternatives to types of AI that are especially environmentally harmful by requiring a lot of energy. Generative AI

models often require extensive processing power, typically provided by GPUs. However, computing extends beyond just following the latest trends, which often favour GPU-intensive operations. Alternative computing approaches include using CPUs and memory or storage-based solutions. Additionally, neuromorphic computing,¹⁰⁹ inspired by the human brain architecture, presents an approach that potentially requires less energy than conventional systems. Open calls for fundamental research into these varied technologies are crucial, ensuring that advances in computing go beyond chasing current AI trends and truly broaden the technological landscape.

Regardless of whether software is open source or proprietary, whether it adheres to industry standards or pioneers new alternatives, its effective deployment and innovation depend fundamentally on high-skilled talent. This dependency leads us to cultivate a strong talent pool.

Talent

When speaking of “talent”, we do not just mean data scientists and other technological innovators – as specialists that are very much in demand in today’s job market. We also need individuals who can couple technological know-how with sectoral expertise and professionals skilled at implementing technologies. Moreover, we need critically minded individuals who work and think across policy silos. However, investing in talent poses significant challenges. Big Tech companies offer attractive incentives, such as access to high-quality facilities, competitive salaries, lavish benefits and career advancement. Tech talents are often recruited during their educational training or at an early stage of their career, tying them into industry standards, hence making them acquainted with (and loyal to) company-specific infrastructures (e.g., MS Azure or Google Cloud, Nvidia chips). **But what makes Big Tech environments so attractive for highly educated young tech talents is not just the salary, but also a mixed community of junior and senior experts from whom they can learn. Public-interest AI requires the creation of similarly**

attractive workplaces to compete for the best talent.

To attract and retain top talent, policymakers must strike a delicate balance. While providing access to state-of-the-art public digital infrastructure, such as the EuroHPC supercomputers discussed in the Draghi report, is crucial, simply lowering bureaucratic hurdles without also instilling a sense of responsibility could lead to an unsustainable approach. For example, Mistral AI, once hailed as a “European Champion” and potential unicorn in the AI industry, initially conducted experiments for their LLM on the public EU supercomputer, Leonardo.¹¹⁰ However, despite the political support and initial use of EU resources, Mistral AI later transitioned to training their model on Nvidia GPUs provided by a US cloud service, CoreWeave. This pivotal shift underscores how hardware and software availability influence the direction of EU startups, and how a dependence on non-EU infrastructure can work against the goal of European digital sovereignty.

The story of Mistral AI, as an example of domestic AI talent, highlights the need for a cautious approach towards the initial optimism often associated with EU AI startups. This optimism can act as a Trojan horse for larger companies’ interests, where seemingly independent European AI startups become entangled with larger companies, the strategic business decisions of which, driven by profit maximisation, might not align with broader public goals. However, this note of caution should not suppress innovation. EU efforts to develop its AI ecosystem, such as the “AI factories” initiative, must consider this complex interplay between talent, hardware and software. Simply providing infrastructure access without addressing the underlying structural issues in the AI industry¹¹¹ might not be sufficient to attract and retain the best talent in the long term.

When public computing resources are made accessible to domestic talent, they should thus explicitly serve public interests. An interesting example of an institutional arrangement that could safeguard these principles is the EU’s AI-BOOST challenge. In this innovation competition, four EU startups were selected by a committee to share a

€1 million prize and receive eight million GPU hours on EuroHPC JU supercomputers.¹¹² Their projects range from AI-enhanced multilingual support to developing machine translation for Balto-Slavic languages and using AI to analyse hate speech. This example **highlights the political necessity of judiciously managing critical resources – not as a nod to a planned economy approach, but as an essential strategy to govern and control the use of DPI in the face of the climate crisis. However, without specific stipulations on commercialisation or partnerships, EU startups, like Mistral AI, may ultimately become reliant on non-EU infrastructure and prioritise profit maximisation over the public good.**

Conclusion

Rather than viewing the policy challenges posed by hardware, software and talent as insurmountable barriers, we propose transforming them into long-term societal missions that broaden the scope of AI governance from mere regulation to strategic capacity building. It would be wrong to simply scale up the investments in infrastructure, endlessly subsidising Nvidia as a leading provider. In this chapter, we instead advocate for investments in fundamental research to develop *alternatives* to the prevailing AI model architectures, which often require different hardware. This strategy prompts us to make connections between AI funding frameworks, procurement policies and regulatory measures.¹¹³ The idea of conditional computing aims to motivate debates to connect those policy layers.

This reorientation towards public-interest technology demands that we reconsider the goal of investments and the societal values they support – values such as democracy, sustainability, equality, non-discrimination and fairness. In other words, we claim that the conversation must pivot to how these investments can be structured to bolster the public values that define a progressive European society. For example, the long-term success of the AI factories initiative, with its focus on providing computing capacity to startups and SMEs, hinges on the EU's ability to establish clear guidelines and conditionalities that promote agile innovation,

meaningful openness and societal benefit. **Applying the principles of conditional computing to Draghi's proposal of "compute capital"¹¹⁴ would involve establishing clear conditions for SMEs accessing public computing resources.** These could include stipulations on data privacy and non-discrimination, commitments to environmental sustainability, and mechanisms for sharing benefits with the public (e.g., affordable access to applications built on public infrastructure or contributions to public research initiatives).

The current geopolitical landscape is split between American companies, supported by the US government, and Chinese state-operated enterprises. This division compels European states to reassess their AI strategy not only from an economic perspective – the ability to compete in the long run – but also to safeguard the public interest by embedding democratic values into public digital infrastructure. **Given the impossibility of outpacing the advancements of major powers in the USA and China, the EU must shift its strategic focus from a technological race it cannot win to a paradigm where computing investments are strategically stipulated to ensure they serve the public interest. It is time to transition from the unsustainable era of relentless computing to a new age of conditional computing.**

THE DIGITAL REVOLUTION IN THE WORKPLACE NEEDS DPI TO BARGAIN WITH ALGORITHMS*



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** This chapter reflects the input given by Annarosa Pesole at the conference 'Shaping Europe's digital model' organised by FEPS and the S&D Group on 7 December 2023 at the European Parliament.*

THE DIGITAL REVOLUTION IN THE WORKPLACE NEEDS DPI TO BARGAIN WITH ALGORITHMS

Introduction

The digitalisation of the labour market presents both significant opportunities and considerable challenges, as it reshapes the way we work, communicate and engage with technology. The integration of digital technologies into the labour market is driving profound changes across all sectors, transforming job roles, demanding new skills from the workforce, and creating new opportunities and challenges.

The most acute issue is how algorithms and AI fundamentally reshape how work is organised and performed. These technologies are transforming industries by streamlining production and tasks and enhancing decision-making processes, but they also introduce new challenges for managers and employees alike.

Now that the development of Algorithmic Management (AM) is quickly taking off, we have started to see the adverse effects on workers and their working conditions.¹¹⁵ And while the labour market regulations remain in place to protect workers against occupational health risks, new rules are being considered to deal with the issues of the use of algorithmic technologies in the workplace, most notably an initiative on algorithmic management announced in the mission letter addressed to Vice-President Designate Mînzatu of the European Commission. This comes on top of the existing regulatory requirements from the GDPR,¹¹⁶ the Platform Work Directive and the AI Act, amongst others. However, **we should not stop short of considering whether effective regulation and enforcement are enough to bring about a**

worker-centric and European model of the use of algorithmic technologies in the workplace. We need to complement this with (public) digital infrastructure solutions that do not follow the Big Tech surveillance capitalist reasoning and model, but take into account the role of trade unions and the rights and obligations of the European social model.

How do we define algorithmic management?

Algorithms are sets of rules or instructions designed to achieve a determined output, enabling machines to process data, recognise patterns and make decisions with minimal human intervention. Integrated into AI systems, algorithms can handle complex tasks, such as natural language processing and predictive analytics. In the workplace, integrating algorithms and AI may facilitate more efficient operations, improve accuracy and support data-driven decision-making. Still, at the same time, it may increase the level of surveillance, intensify work, reduce workers' autonomy and extend control beyond work boundaries, putting workers' privacy at risk.

Applying algorithms in the workplace is extensive, encompassing various aspects of the employment relationship. They can assist in the hiring process by automatically sorting and selecting candidates, aid managers in organising work by providing data to set productivity standards, determine the pace of work and levels of worker autonomy, and even make dismissal decisions. Moreover, algorithms can regulate the work environment, mitigate accidental injuries and enhance transparency in work processes.

An algorithm is a sequence of instructions designed to accomplish a specific task. In the context of labour, Mateescu and Nguyen define AM as a “diverse set of technological tools and techniques used to remotely manage the workforce, relying on data collection and surveillance of workers to enable automated or semi-automated decision-making”.¹¹⁷ Kellogg et al. further explain that algorithms can be used to “direct workers by restricting and recommending, evaluate works by recording and rating, and discipline workers by replacing and rewarding”.¹¹⁸

Algorithms can be categorised based on their functions. Parent-Rochelau and Parker identify three types: descriptive algorithms, which record past events and analyse their impact on the present; predictive algorithms, which anticipate future events; and prescriptive algorithms, which identify optimal solutions and recommend or implement actions.¹¹⁹ While algorithms are integral to AI technologies, many do not require AI to function. For instance, the algorithms underpinning monitoring or productivity software often operate independently of AI.

The data-driven workplace: Algorithms and surveillance

Integrating algorithms and AI systems in the workplace introduces a data-driven governance model that monitors and controls workers extensively, both on-site and remotely. This model relies on two key elements: digital surveillance and AM, both of which raise ethical concerns about data exploitation and the legitimacy of data acquisition. Workers’ data, collected without their full knowledge, is often used not only for operational decisions like hiring and promotions, but also to control collective actions, undermining their privacy and rights.

Digital surveillance tools, such as biometric scanners and GPS locators, track workers’ behaviours, crossing into their private lives, particularly for platform or gig workers. Algorithmic systems, despite being marketed as more efficient, can reinforce biases, especially related to gender and race, and increase stress among workers. While AI and machine-learning technologies are praised for their accuracy, they often prioritise efficiency over

workers’ well-being, risking exploitation and unfair working conditions.

To ensure fairness in workplace digitalisation, workers and their representatives must participate in decisions regarding algorithmic technologies and surveillance. This can be achieved by enforcing data rights, establishing accountability mechanisms, and ensuring these systems adhere to principles of fairness, transparency and equity.

Algorithms serve multiple purposes within the workplace (Table 2). Broadly, they can be classified into those embedded in machines to control their operation or the ecosystems in which they function – such as algorithms that measure air quality in factories with chemical exposure risks – and those specifically designed to manage the workforce. Both categories have significant implications for working conditions.

Table 2. Different use cases of algorithmic management.

<p>Workforce management</p>	<p>Algorithms support primary managerial functions, including planning, organising, directing, controlling and evaluating. In the planning phase, algorithms assist in determining the courses of action necessary to achieve the desired goals, including staffing decisions regarding the number of personnel needed to deliver services. On digital labour platforms, algorithms regulate labour market access by, for example, limiting task availability when supply exceeds demand to prevent service prices from falling too low. They may also restrict access based on background checks, as seen on care and domestic work platforms, or for productivity reasons, such as microtask platforms excluding lower-performing workers.</p>
<p>Organising work</p>	<p>Algorithms are used to streamline workflows, reduce costs and improve work coordination. They are employed to assign tasks or match workers with clients, define time slots or shifts, and determine geographical access. Additionally, algorithms establish remuneration and, especially in the platform economy, surge-pricing mechanisms and implement gamification strategies to enhance worker engagement. Algorithms also define time slots, shifts or access to specific geographical areas to ensure continuous service provision and, in some cases, to prevent oversupply.</p>
<p>Directing work</p>	<p>Algorithms guide workers during task execution by recommending actions, providing instructions – such as following a specific route or tagging objects in a particular order – or setting the pace of work, such as allotting time to complete tasks or scheduling task steps. These directing functions encompass all aspects of task performance guidance provided to workers.</p>
<p>Controlling functions</p>	<p>Algorithms can be used for monitoring and supervising workers during or after task completion. Algorithms track physical movements, such as speed and route or keystrokes and screenshots; set and monitor performance indicators; and determine outcomes, including access to future tasks or decisions about deactivation or dismissal. These functions can be fully automated or integrated into processes where human intervention is required. However, even with human oversight, it is challenging to discern the level of autonomy algorithms have in influencing outcomes. This is especially challenging when machine-learning algorithms – capable of autonomous learning and updating their operational criteria without human input – are used, as even the programmers may not fully understand the principles underlying the system’s decisions.</p>
<p>Evaluating workers</p>	<p>Algorithms can autonomously classify workers according to specific criteria or third-party evaluations, such as client or customer ratings. The evaluation process, as part of the broader control functions operated by algorithms, involves assigning ratings, rankings, awards or prizes for meeting specific goals or thresholds, and badges to certify qualifications. Algorithms not only automate traditional managerial functions, such as worker appraisal, but also enable these functions to be outsourced to external parties. This shift introduces volatility and potential unreliability into the evaluation process, as workers may be assessed by individuals who lack the knowledge to accurately evaluate their performance and may instead focus on outcomes influenced by factors beyond the workers’ control. In response, many platforms have introduced reciprocal evaluation mechanisms, allowing workers to rate clients or customers. This approach aims to balance accountability, although it is important to differentiate between service evaluation, which reflects not only a worker’s abilities but also the overall organisation in which they operate, and customer satisfaction, which may be more subjective and less directly related to the worker’s performance.</p>

The existing European regulatory framework under the GDPR for algorithms in the workplace

Already existing EU legislation plays a role in addressing the risks associated with algorithmic technologies and data collection in the workplace. In particular, integrating data protection law (GDPR), anti-discrimination law and national collective agreements provides a potential framework for safeguarding workers' digital rights. The GDPR offers a legal basis to scrutinise the inner workings of algorithms, or the "black box", while anti-discrimination law addresses the consequences of these technologies, correcting disparities caused by their use. Collective agreement laws, in turn, can foster social dialogue, ensuring that the use of technology in the workplace is democratically determined, striking a balance between regulatory rigidity and the flexibility needed to adapt to rapid technological advancements.

The GDPR remains a central reference point for individual data protection in Europe. Still, its focus on personal data raises questions about its applicability to collective labour rights and how much it can protect workers from algorithmic exploitation.

The GDPR establishes several fundamental rights for data subjects, including workers. For instance:

- Articles 13 and 14 affirm the right of data subjects to be notified when their personal data is collected. They outline the purposes for which the data is processed; the duration of storage and whether automated decision-making systems, including profiling, will be used. In such cases, data subjects must be informed about the logic underpinning these systems.
- Article 15 introduces an individual right of access, obligating data controllers, such as employers, to provide detailed information on using personal data and automated systems.

- Article 22 restricts the use of solely automated decision-making processes that have legal consequences for the individual.
- Data subjects are granted rights such as the right to rectification (Article 16), the right to be forgotten (Article 17) and the right to data portability (Article 20).

At first glance, these provisions appear robust enough to ensure comprehensive data protection for workers. Theoretically, one might assume that these rights safeguard workers' personal data sufficiently. However, in practice, two key factors limit the effectiveness and applicability of the GDPR in employment contexts.

Firstly, **there is a significant power imbalance between employers and employees. It is widely accepted that explicit consent is not considered valid in an employment relationship due to the unequal balance of power** (as noted by Article 29 Working Party). Also, the rights granted by the GDPR are primarily individual in nature and cannot be transferred to collective representatives, such as unions. This reduces the practical utility of these rights in the workplace, rendering them little more than administrative formalities.

Secondly, the GDPR restrictions of Article 22 on automated decision-making do not apply when the data subject consents to the processing of their data or when such processing is deemed necessary for the performance of a contract between the data subject and the data controller, as stipulated in Article 22(2). While the validity of consent in employment relations can be challenged, the applicability of contractual necessity in employment contexts needs to be clarified.

Additionally, the right not to be subject to solely automated decisions only applies when decisions are entirely algorithmic. The inclusion of even minimal human intervention may circumvent the application of Article 22. Although there is broad consensus that more than superficial human involvement should be required to exclude the protections of Article 22, ambiguity persists regarding what constitutes

meaningful human intervention. In this regard, the GDPR offers little clarity. Similarly, there is ongoing debate over whether the GDPR establishes a “right to explanation” of algorithmic decisions or merely a “right to be informed” about the mechanisms involved. This uncertainty limits the GDPR’s potential for enhancing accountability and protecting workers in contexts where automated systems are increasingly used for decision-making. This adds to issues with the data protection authorities’ (DPAs’) lack of enforcement of the GDPR. DPAs are only haphazardly enforcing the law, and they are not conducting any proactive investigations, as addressed by Johnny Ryan in his chapter.

Despite these difficulties, policy instruments such as data protection impact assessments (DPIAs) offer potential solutions. DPIAs, required whenever data processing poses privacy risks, can help inform workers and scrutinise the use of new technologies. However, transparency alone is not enough. Effective oversight requires that workers, their representatives and public authorities have the knowledge and power to engage meaningfully in evaluating these technologies.

GDPR Article 88 offers a legal foundation for extending data protection laws to the labour context, allowing EU member states to introduce specific rules to protect workers’ personal data. In this regard, countries like Italy and Spain have made steps to strengthen transparency and accountability. Italian law, for example, mandates that workers, trade unions and public authorities be informed about adopting algorithmic technologies and grants access to the data used by algorithms. Similarly, Spain has amended its Workers’ Statute to include the collective right to be informed about the parameters and rules that guide algorithms and AI systems. Also, Finland has adopted comprehensive data protection rules that apply exclusively to employment relations in the Act on the Protection of Privacy in Working Life.¹²⁰ The Platform Work Directive reinforces this trend, requiring platforms to explain decisions made by automated systems that affect workers and mandating consultation with workers’ representatives on the introduction or modification of such systems.

Precedent created by the Platform Work Directive

At present, the most advanced legislative proposal to address the implications of algorithmic technologies in the workplace is the directive to improve the working conditions of platform workers. Although this directive focuses on platform work, it introduces three significant principles. Firstly, it recognises how these technologies blur traditional distinctions between employment statuses, acknowledging their power in creating new forms of authority and surveillance that can undermine workers’ freedom and autonomy, even for those who are self-employed. Secondly, the directive emphasises the need to mitigate the adverse effects of AM by increasing transparency, reinforcing the GDPR principle of the “right to an explanation” and introducing human oversight. Thirdly, the directive promotes communication between platforms and national and European authorities by clarifying existing obligations to declare work, and requiring platforms to provide key information about their activities and workers to national bodies to foster a cross-border regulatory approach.

The EU directive sets a strong precedent and mandates that platform companies provide clear and accessible information about how their algorithms function. This requirement aims to demystify the decision-making processes that affect workers’ livelihoods. Specifically, platforms must inform workers about the main parameters that the algorithms use to make decisions. This includes criteria for task assignments, performance evaluations, and any automated decisions that impact workers’ earnings or employment status. Platforms must explain what types of data are collected and how this data is used in algorithmic decision-making. Workers need to understand what personal and work-related data is being monitored and processed.

Besides transparency, the Platform Work Directive also introduces relevant legal requirements on the limits of the use of certain personal data of workers, the need for human oversight and the right to human review of automated decisions and reiterates

the information and consultation of workers' representatives by platforms on decisions likely to lead to the introduction of or changes in the use of automated decision-making systems. The platform workers' representatives can request assistance from an expert at the expense of the platform, insofar as this is necessary to examine the complex details of the algorithm.

The incoming European Commission could extend the existing regulation for platform workers to all workers under AM. Furthermore, as the Platform Work Directive stipulates transparency and effectively grants the power to demand "visibility" of the algorithmic processes, **it is also paramount to foresee the possibility for workers or their representatives to negotiate the conditions or parameters established by the algorithms as part of the social dialogue at the EU, member state and firm levels.**

Similarly, the Regulation on Artificial Intelligence (AI Act) aims to safeguard workers by classifying AI systems based on risk. It categorises as "high risk" those used in hiring, worker management and performance evaluation. Furthermore, the AI Act imposes stringent obligations on providers of high-risk AI systems. These obligations include adopting robust data governance measures, the mandatory registration of high-risk AI systems in an EU-wide database and the requirement to undergo conformity assessments to ensure the technology meets established regulatory standards. However,

the conformity assessment procedure is based on internal control, which does not require the involvement of a notified body to assess its quality management system and technical documentation. That is, **the legislation relies on the provider's risk self-assessment and self-regulation without the mandatory involvement of an independent authority, raising concerns about transparency and accountability.**

Other relevant legal requirements follow from the European Pillar of Social Rights, notably through Directive 2019/1152 on Transparent and Predictable Working Conditions, which provides more extensive and modernised rights for all workers in the EU and takes into account the abuse of the status of self-employed persons and the risk of bogus self-employment. In this regard, adapting the existing EU health and safety rules to the new and changing circumstances of the digitalised workplace, such as Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work, could also bring solutions.

In light of pursuing social dialogue to address the impact of technology and AM in the workplace, the Commission must reestablish human agency over work process decisions. **It is essential to level the playing field by giving trade unions and workers' representatives access to data and all relevant information that may help create a balanced discussion and reinforce social dialogue.** Indeed,



Employment protections and standards must be updated through a new approach to labour policy, incorporating a multidisciplinary perspective and fostering principle-driven, human-centred governance of algorithmic systems.



greater clarity on the functioning and effects of introducing algorithms into the workplace will allow workers to acquire knowledge of the mechanism underlying algorithmic decisions and will open the possibility of negotiating a worker-friendly and effective implementation of these innovative tools in the workplace.

However, as we have seen, the current regulatory and legislative framework reveals significant gaps concerning the governance of algorithmic technologies, heightening the risk that employers may circumvent legal restrictions on managerial authority. To address this, employment protections and standards must be updated through a new approach to labour policy, incorporating a multidisciplinary perspective and fostering principle-driven, human-centred governance of algorithmic systems.

Collective data rights and accountability

The critical element of the EU approach to regulating algorithms in the workplace, as shown in the Platform Work Directive, is **transparency**. Workers are often inadequately informed about the deployment of such technologies, the data being collected or the purposes for which the data is used. And while ensuring transparency will be critical in addressing these concerns, more is needed. Recognising **collective data rights** will be equally essential to promote a more democratic balance of power in the workplace. Collective rights would enable workers to exercise greater control over the data and technologies that shape their work environment.

Finally, a new **accountability** framework must be established to facilitate collaboration between regulators, labour institutions and private companies. This system should implement ex ante and ex post algorithmic impact assessments, involving the trade unions and workers' representatives within the social dialogue at the firm level, ensuring that algorithmic systems are monitored while protecting trade secrets and preserving incentives for innovation. This is in line with the requirements of the AI Act for the high-risk qualification of the employment-related use

cases for AI. Still, a right of consultation should be enforced by mechanisms that allow workers' voices to be heard and considered in the technological development decision of the firm. Such rights could be further specified in the upcoming algorithmic management initiative of the European Commission. Such a framework would promote accountability, foster social dialogue and safeguard workers' rights and interests.

Role of DPI for AI at work

The realisation of these objectives is closely linked to **establishing the requisite legal and digital infrastructures, which could create independent and secure digital environments where employers, workers and governments collaboratively shape the governance of the modern digital workplace**. A starting point would be establishing clear individual and collective data rights for workers and effectively enforcing the rules underpinning these rights. This is essential to promote workers' digital self-determination and address the power asymmetries associated with technology and data control in the workplace and labour market. The GDPR can serve as a basis, but, as we have seen, it falls short in several ways.

Many currently deployed Algorithmic Management tools are developed by big tech companies that do not align with the European social economic model. Product developers need to consider the role of trade unions in the EU context to allow for co-determination on the AM processes and their outcomes, or it should be made mandatory through EU regulation that puts protections in place for trade unions to negotiate on AM systems.

DPI offers a potential solution for fostering social dialogue and enabling algorithmic scrutiny while safeguarding trade secrets and intellectual property rights. To achieve these goals, regulatory intervention is necessary to introduce legal mechanisms and public digital spaces. Notably, the 2023 G20 Digital Economy Ministers Meeting outcome document defines DPI as "shared digital systems that should be secure and interoperable, built on open standards and specifications, and governed

by applicable legal frameworks to ensure equitable access, development, inclusion, innovation, trust, competition, and respect for human rights and fundamental freedoms.”¹²¹

DPI could provide a digital environment where workers and companies can negotiate the use of data and algorithms through an independent intermediary. Such intermediaries might emerge from grassroots empowerment structures or be established by national authorities. In Rajasthan, India, digital infrastructure was created for the gig economy to enforce social security legislation better and ensure workers’ working time and pay conditions were respected.¹²² Another form could be that of data intermediaries, as included in the European Data Governance Act. These intermediaries could pool workers’ data to counteract the power imbalances inherent in AM. Workers would transfer their data rights to the intermediary under predetermined constitutional terms, ensuring that the data is used to protect their interests and promote decent working conditions. **The EU could invest in pilot projects that build the infrastructure needed for these intermediaries and experiment with data intermediation in the workplace.**

A central function of data intermediaries could be the auditing and verification of the accuracy and fairness of algorithmic metrics, ensuring transparency while safeguarding trade secrets and proprietary source codes. This would prioritise the protection of workers by holding management accountable for algorithmic decision-making and implementing safeguards to prevent bias and discrimination. Data intermediaries, potentially including worker representatives, trade unions or third-party fiduciaries, would be tasked with negotiating data use and algorithmic practices on behalf of workers.

An ideal framework would consist of a diverse ecosystem of data trusts, each tailored to specific contexts but united by common societal objectives: addressing power imbalances; reducing inequalities; and restoring workers’ bargaining power. Additionally, DPI would play a vital role in supporting governments and national authorities in ensuring

legal compliance while reducing administrative burdens for companies.

DPI, data intermediation and other forms of data collectivisation could serve as essential tools for modernising the labour market and restoring democratic participation in an era of rapid digital transformation. The formation of workers’ data collectives would be predicated on the recognition of workers’ data rights and the accessibility of these data. Furthermore, governments should actively promote the development of ecosystems for data collectives, ensuring that data remains portable and erasable, thereby fostering a more balanced labour market and redistributing the benefits of technological advancements.

We can make this concrete and tangible by supporting unions and civil society initiatives that pool resources to set up a data intermediary infrastructure under the Data Governance Act. This act has been in effect for about a year now, and we see the first data intermediation entities being registered, mainly private initiatives.³² There is a clear need to simultaneously invest in public data intermediation initiatives, which can use data in the workplace to create worker-centric AM tools.

Data should be treated as a public good, and trade unions should be granted access to data and algorithms, positioning them as key participants in algorithmic governance within the workplace. The principle of co-determination in technological decision-making should be promoted to ensure a fair digital transition for all workers, safeguarding their rights and interests, as the labour market continues to evolve. This requires more than rules that are enforced; it needs the public digital infrastructure to create alternative ways of using data in the workplace to increase efficiency while enhancing workers’ well-being.

CONCLUSION

CONCLUSION

The EU's technological sovereignty is at stake. Increasing geopolitical tensions and its high dependency on digital infrastructure make the EU vulnerable. This is why, in the new mandate, the EU needs to look at ways to reduce these dependencies and build its own technological stack. A combination of proper enforcement of existing legislation and a digital industrial policy approach to steer investments and new initiatives is needed.

With this policy study, we tackle the broad scope of a holistic EU digital strategy and call for concrete actions in the new mandate. The policy recommendations given below are not exhaustive, but they pave the way towards a more resilient, sustainable and fair digital world.

Building the EU's digital sovereignty

- Europe must build a resilient digital ecosystem that fosters innovation, safeguards public interests and avoids monopolistic control. Central to this goal is the EuroStack framework, a comprehensive technology model encompassing hardware, infrastructure, AI, data and governance, ensuring an autonomous and secure digital future grounded in European values.
- Europe also requires a unified digital industrial policy at the EU level, incorporating public investment conditionalities that drive social welfare and economic value. Public institutions should take the lead in adopting and setting standards for European technologies with dedicated funding.

Digital commons for resilient and inclusive infrastructure

- The development and use of digital commons can strengthen the resilience of DPI, countering dependence on a single provider and vendor lock-in. Furthermore, due to their shared decision-making, inclusivity and sustainability, commons-based governance structures can contribute to achieving the goal of secure, reliable and inclusive DPI.
- Governments and EU institutions can support the digital commons in different ways: one is to lead by example by implementing the made-in-Europe technology themselves at an early stage.
- The European Commission will evaluate the Public Procurement Directive this term. This is an opportunity to redefine procurement terms to prioritise digital independence; open, interoperable systems; and sustainability. Funding needs to be ambitious, directed and systematic.
- More member states should join the DC-EDIC, which aims to strengthen the EU's digital sovereignty, promote a multi-stakeholder and inclusive digital governance model, contribute to developing a digital public space, and make Europe a leading player in the digital transition through digital commons.

Sustainable AI development and fair competition

- Europe must prioritise energy-efficient, renewables-based solutions for growing AI demands. A cohesive strategy is needed to enhance semiconductor development and foster European-led technologies across the AI value chain.
- The EU must strategically address the concentration of power in AI markets, where a few dominant companies shape the ecosystem of technology, data and infrastructure. This concentration limits democratic decision-making and narrows the trajectory of AI development. Grounding competition law in broader social and democratic objectives is essential to fostering a progressive approach to AI policy.
- AI development is not an end in itself. Public investments in AI should be explicitly tied to societal values. Rather than competing financially with Big Tech, the EU should use its strategic leverage to foster a more just technological ecosystem by attaching clear conditions to AI investments.
- Public workplaces must become competitive in attracting top AI talent by replicating Big Tech's collaborative learning environments while grounding them in public-interest values.
- Initiatives like Draghi's "compute capital" proposal should include clear conditions for accessing public resources, such as commitments to sustainability, non-discrimination and public benefit sharing.

Effective enforcement by the new Commission is key

- GDPR enforcement, particularly Article 9, can profoundly reshape online spaces. Harmful algorithmic practices would be curtailed by disabling recommender algorithms by default and requiring platforms to warn users before seeking opt-in consent.
- Focused enforcement in Ireland, where many Big Tech firms operate, would enable European SMEs and startups to grow without imposing additional regulatory burdens on them.
- Enforcing GDPR against the "data free-for-all" in online advertising would repair the broken system, favouring trustworthy journalism and protecting voters from manipulative profiling.
- The Commission must develop a mechanism to unify enforcement of its diverse regulatory powers, including streamlined liaison and coordination with Union bodies and with supervisory authorities in member states.

Building a European platform for trustworthy information

- Enforcement alone is not enough to save the broken online advertisement market: a European platform for trustworthy news and information is needed. This platform would unify public service media and licensed broadcasters across Europe, powered by AI-driven translation and search technologies. The EU should push forward and invest to build the platform's infrastructure.

Accountability in AM at work

- The European Commission could extend the existing regulation for platform workers to all workers under AM. Furthermore, it is paramount to foresee the possibility for workers or their representatives to negotiate the conditions or the parameters established by the algorithms

as part of the social dialogue at the EU, member state and firm levels.

- A new accountability framework must be established to facilitate collaboration between regulators, labour institutions and private companies. This system should implement ex ante and ex post algorithmic impact assessments involving the trade unions and workers' representatives within the social dialogue at the firm level. The EU could invest in pilot projects that build the infrastructure needed for these intermediaries and experiment with data intermediation in the workplace.

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As Europe faces growing geopolitical tensions and increasing reliance on non-European tech giants, the need for digital sovereignty has never been more urgent. This policy study comprehensively analyses how the EU can strengthen its digital autonomy and build a resilient, secure digital future. Drawing on the successes of recent legislative achievements like the Digital Services and Markets Acts and the AI Act, the study emphasises the importance of enforcement, strategic investment, and innovation in securing Europe's place in the global digital economy.

The study advocates for developing a European Digital Industrial Policy (EDIP) to foster homegrown technological solutions and reduce dependency on foreign platforms. It also explores the potential of digital commons and highlights the importance of sustainable AI development, fair competition, and transparent governance. With actionable policy recommendations aimed at the European Commission, this study provides crucial insights into how to shape a European digital ecosystem grounded in democratic values and societal benefits.

In a world where digital infrastructure shapes economic and political power, the EU must act decisively to secure its digital future. This study is a vital resource for policymakers, industry leaders, and advocates committed to a sovereign, inclusive, and innovative European digital landscape.

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