EuroStack – A European Alternative for Digital Sovereignty

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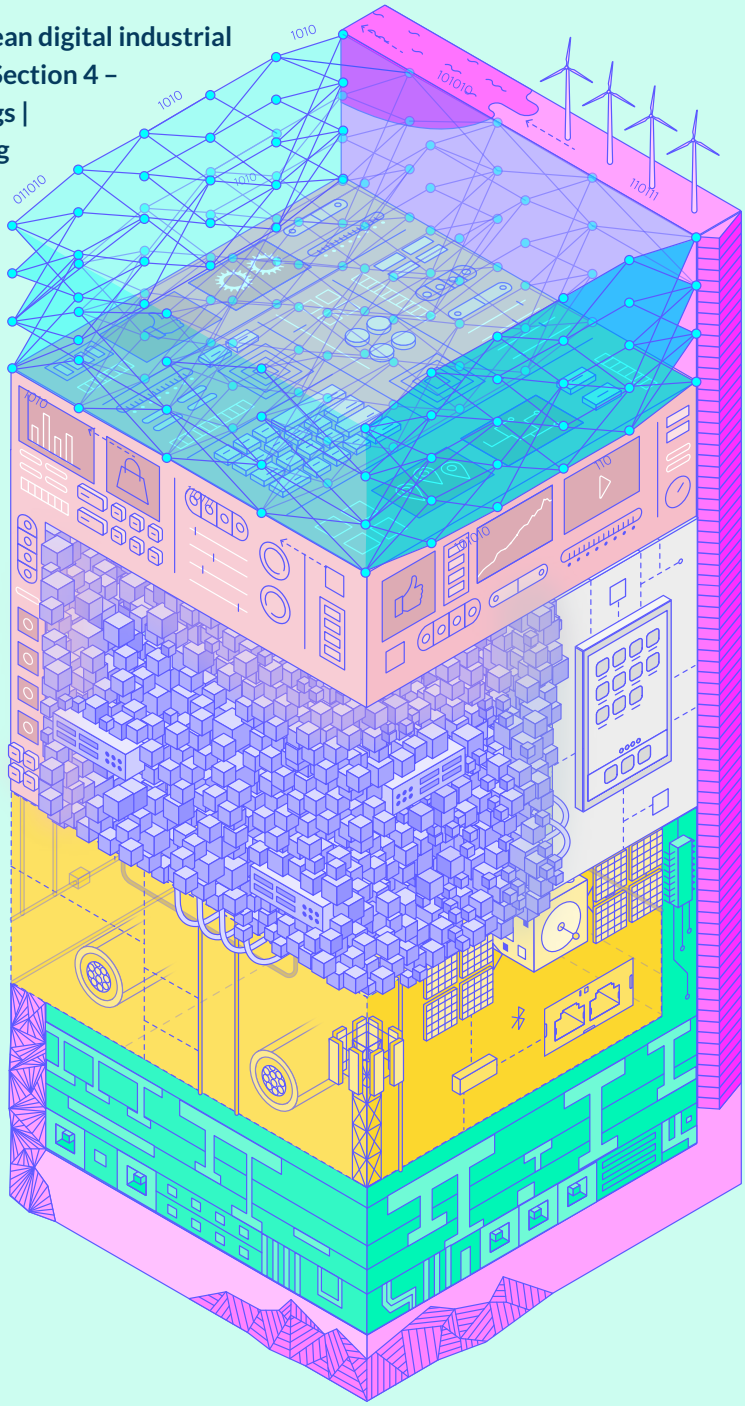

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Section 3 – European digital industrial policy blueprint

What worked, what failed, what's next

As the analysis of the competitiveness and strength of Europe's tech players and digital assets in section two reveals, Europe's digital policies have faced persistent challenges that have limited their effectiveness from an industrial policy point of view. Internal market fragmentation, characterized by complex regulations and excessive red tape, has stifled competition and restricted market access. A lack of coordinated commitment to market success has further hindered progress, with sectoral silos obstructing cross-industry collaboration and innovation.

Support for small and medium-sized enterprises has been inadequate, leaving these critical economic drivers struggling to scale. Simultaneously, short-sighted financial markets have resulted in chronic underinvestment and insufficient growth financing, restricting Europe's ability to retain top talent and foster transformative innovation. Opportunities to decentralize and diversify innovation by leveraging regional and local potential have also been largely neglected.

Globally, Europe's digital achievements have suffered from limited visibility due to under-resourced international diplomacy in this domain. Domestically, policy efforts have often been confined to mid-level technologies, rather than targeting the radical breakthroughs needed in deep-tech sectors. This issue is further compounded by the neglect of engineering and scientific talent development, leaving Europe ill-equipped to meet the demands of the digital age.

A reluctance to embrace EU-wide cooperation in industrial policy has also impeded progress, while disproportionate influence from larger member states, notably France and Germany, has undermined balance and inclusivity. Weak EU mandates and a shortage of digitally literate policymakers have exacerbated these structural weaknesses. Furthermore, policies have often prioritized short-term wins over the strategic, long-term planning necessary for sustainable growth.

Europe has also underestimated the geopolitical dimensions of technology, leaving itself vulnerable to dependencies and intensifying global competitive pressures. This vulnerability has become especially apparent amid rising trade wars, the resurgence of populist nationalism, and escalating geopolitical rivalries.

To address these challenges, Europe must adopt a unified, forward-looking digital industrial strategy that is ambitious, inclusive, and effectively implemented.

Analysis

Internal market fragmentation continues to stifle innovation across Europe. Divergent national regulations and inconsistent public procurement practices hinder scalability and competitiveness, particularly in critical areas such as data sharing, cloud standards, IoT, and security-by-design. This fragmentation is even more pronounced in defense and security markets, where decentralized policies and stringent security restrictions obstruct the scaling of vital technologies.

Three primary factors contribute to this persistent fragmentation. First, the inconsistent enforcement of harmonized implementation, even in areas where the EU holds a strong mandate, undermines cohesion. Second, the European Commission's Regulatory Fitness and Performance (REFIT) commitment to legislative simplification has not been pursued sufficiently, often leaving regulatory complexity unaddressed. Third, the EU's limited mandate in key areas such as taxation, public funding for health, social welfare, education, justice, and security – sectors that collectively account for approximately half of a country's GDP – further constrains its ability to act decisively.

Investment remains another major bottleneck. Europe has consistently fallen short in providing the risk capital necessary to scale innovative firms or adequately fund infrastructure for networks, semiconductors, and advanced manufacturing. This lack of financial and structural support has left Europe dependent on external providers, undermining its strategic autonomy. The disparity in investment capacity compared to global competitors has also allowed foreign investors to attract Europe's top talent, acquire startups, and capture scaleups. These foreign investments often amplify the resources initially allocated by European public and private funding, resulting in the loss of strategic European technological capabilities. Notable examples include the acquisitions of ARM and DeepMind, along with other innovative companies, which have shifted control of critical technologies outside Europe. This creates a glaring paradox: Europe possesses all the ingredients for success – world-class talent, a large internal market, innovative startups, and a vibrant scientific research ecosystem – yet lacks the mechanisms to protect, adequately fund, and scale its digital ecosystem. Addressing this gap is essential to safeguard and fully unlock the potential of Europe's technological and industrial capabilities.

At the same time, not everything has been a failure. The EU and its member states have demonstrated the ability to act decisively and achieve notable successes, as highlighted in the previous section of this report and further illustrated below. Understanding the underlying factors that contributed to both successes and failures is essential for shaping effective future policies. A thorough analysis must carefully disentangle cause and effect, considering a wide range of influences. These include neoliberal ideologies, geopolitical shifts, technological trajectories, and organizational as well as managerial changes within companies. While a fully comprehensive and universally accepted analysis may remain unattainable, state-of-the-art evaluations provide critical insights that can inform more effective strategies moving forward.

Building on these insights, the EuroStack initiative is uniquely positioned to address many of the challenges outlined above. By leveraging Europe's assets and learning from past successes and failures, the initiative can drive forward a robust and adaptive strategy. At the same time, it must remain flexible, evolving in response to new insights, shifting global dynamics, and technological advancements.

Europe faces significant gaps in innovation, implementation, and fairness within its industrial policy (Schwaag-Serger et al. 2024), Key contributing factors include the underutilization of synergies for innovation across sectors, particularly between digital infrastructures and user industries. Additionally, while significant attention is given to drafting regulations, there is insufficient emphasis on ensuring their proper and harmonized implementation. Another missed opportunity lies in underestimating the potential of regional and local levels, which act as critical intersections for supply and demand dynamics.[202] Mario Draghi (2024) identifies persistent fragmentation within the internal market and lagging productivity growth as critical challenges. These issues lead to the underutilization of Europe's domestic market potential, burdensome compliance efforts that hinder innovation, and a consequent decline in competitiveness in the global economy.

202 Sylvia Schwaag-Serger, Luc Soete, and Johan Stierna, "Scientific Report – For an Innovative, Sustainable and Fair Economy in Europe", 2024, https://doi.org/10.2760/0336180.

Such analyses do not solely attribute these challenges to past policy decisions at the EU and national levels. Instead, they acknowledge that the world has undergone significant changes over the past two decades. Awareness of the profound impact of geopolitics and Big Tech on industry, the economy, and technological development has only intensified in recent years. Strategic autonomy has only fairly recently emerged as a top priority – what Germans refer to as "Chefsache" (a matter for top leadership). Similarly, neoliberal ideology and the associated push for globalization have only rather recently been subjected to critical reassessment. This shift has created space for the development of new industrial policies, such as those proposed here, and for what Dani Rodrik (2023) refers to as "economic nationalism done the right way."

It would also be a mistake to overlook the successes of EU and national policies. The Single Market program has been a tremendous achievement, particularly during its peak decades. Past industrial policies have played a key role in creating global champions such as Airbus and ARM. Similarly, the EU's European Fund for Strategic Investments has had a remarkable impact, leveraging €35 billion in EU public funding to generate over €500 billion in total investment, particularly in physical infrastructure – a leverage factor of approximately 15.[203]

In high-performance computing, the EU has made significant progress, advancing from having no representation in the global top ten supercomputers in 2016 to securing three entries today. At the national level, supportive policies have fostered thriving, world-class startup ecosystems in cities such as Paris, Berlin, Stockholm, Amsterdam, Barcelona, Munich, Helsinki, Dublin, Tallinn, and others (StartupBlink, 2024). Additionally, Europe boasts a robust digital commons ecosystem and highly efficient, citizen-centric digital public services. Cities like Barcelona, Hamburg, Amsterdam, Helsinki, and Paris have been at the forefront of this transformation, leveraging digitalization to serve people and society effectively.

The EU has demonstrated remarkable decisiveness in times of crisis. In the early 2010s, it restored eurozone credibility by committing to do "whatever it takes" during the financial crisis. During the COVID-19 pandemic, the EU swiftly organized joint vaccine procurement and rolled out a unified COVID app within three months, despite its limited public health mandate. The creation of the Recovery and Resilience Fund (RRF) also broke the long-standing taboo on shared EU debt to address common, future-oriented goals.

The EU has also acted decisively in areas with limited mandates, such as reducing dependence on Russian gas and oil following the invasion of Ukraine. This was accompanied by a strong push for renewable energy and clean technologies across the continent. In cybersecurity, despite its strong connection to national security,[204] the EU adopted demanding laws, recognizing that cyber threats are too significant for any single country to address alone.

Furthermore, the EU has increasingly shifted from using Directives, which allow for national variations, to Regulations, which mandate harmonized implementation across member states. This shift ensures greater consistency in policy execution.

203 European Commission, "Ex-Post Evaluation of the European Fund for Strategic Investments, the European Investment Advisory Hub and the European Investment Project Portal", December 2022, https://commission.europa.eu/about/departments-and-executive-agencies/economic-and-financial-affairs/evaluation-reports-economic-and-financial-affairs-policies-and-spending-activities/ex-post-evaluation-european-fund-strategic-investments-efsi-european-investment-advisory-hub-eiah_en.

204 On national security Article 4(2) of the Treaty on the European Union states: "The Union […] shall respect their essential State functions, including ensuring the territorial integrity of the State, maintaining law and order and safeguarding national security. In particular, national security remains the sole responsibility of each Member State."

Examples

Case studies in the digital domain illustrate how future industrial policy can and should be improved.

The **GDPR** has undoubtedly strengthened personal data protection in Europe. However, as a standalone and relatively complex regulation, it placed significant burdens on smaller companies, which lacked adequate support to ease compliance. In contrast, larger firms with substantial resources found the Regulation easier and more affordable to implement. Moreover, the GDPR was not accompanied by an industrial policy aimed at ensuring that EU companies could thrive in the internal market opened up by their privacy-enhancing solutions, many of which are open source.

In **cybersecurity policy**, the EU is a global leader, at least in terms of regulation. The EU's Horizon Europe and Digital Europe Programmes provide substantial support for cybersecurity research and innovation (R&I). However, few EU-based cybersecurity companies have achieved global success. To scale, these companies often rely on risk capital from the United States, Israel, and Singapore. When approaching EU investors, these companies struggle to „make the investment case," facing challenges from fragmented implementation of security policies across the internal market and a lack of international promotion through EU cyber-capacity-building initiatives.[205] At the same time, there is considerable market potential. Critical infrastructure providers and governments are increasingly compelled to invest in cybersecurity solutions due to mounting espionage from China and sabotage by Russia. However, this demand is predominantly met by non-EU companies. As a result, while member states may buy resilience, they simultaneously risk selling out on sovereignty.

EU R&D programs have long adhered to the principle of being "open to the world." However, a more critical and strategic approach is now emerging. Economic security considerations are increasingly influencing the scrutiny of participants and restricting access to certain areas of Horizon Europe. Closer civil-military linkages, as well as stronger requirements for IP protection and FDI scrutiny, are also being considered. Nevertheless, a policy that effectively leverages synergies between public investment in R&D and public procurement remains far from widespread.

The **EU Chips Act** represents a more modern industrial policy, addressing not only supply-side interventions but also emphasizing international cooperation and incorporating economic security considerations. While the Act demonstrates geopolitical awareness, it lacks the flexibility to adapt to geo-economic developments, such as subsidy wars. Additionally, it has weak connections to demand-side industries, including automotive and telecommunications.[206]

What's next: Toward a new industrial policy

Fontana and Vannuccini (2024) define industrial policy as: "Industrial development involves the percolation of technologies across user industries and the provision of key inputs, such as critical raw materials and computing infrastructure that drive the digital economy and applications like artificial intelligence."[207]

While this definition highlights supply-side inputs and demand-side diffusion, the EuroStack initiative adopts a more integrated approach. It proposes an industrial policy that combines supply- and demand-side interventions with traditional

205 Paul Timmers, Matthijs Punter, and Claire Stolwijk, "Cybersecurity and Digital Sovereignty – Bridging the Gaps" (TNO, 2024), https://publications.tno.nl/publication/34643188/DvSKsfCM/timmers-2024-cybersecurity.pdf.

206 Paul Timmers, "Digital Industrial Policy for Europe | CERRE Report" (CERRE, 12 December 2022), https://cerre.eu/publications/digital-industrial-policy-for-europe/.

207 Olimpia Fontana & Simone Vannuccini, 2024. "How to Institutionalise European Industrial Policy (for Strategic Autonomy and the Green Transition)," Journal of Industry, Competition and Trade, Springer, vol. 24(1), pages 1-30, December.

industrial policy tools such as R&D and investment support, while also incorporating strategies for market access, trade, economic security, and international collaboration. EuroStack emphasizes coordinated action, the removal of internal market barriers, significant investment mobilization, and adaptability to evolving geopolitical and technological contexts.

This new industrial policy prioritizes removing market entry barriers and deepening market integration by aligning industrial, competition, and trade policies as complementary rather than conflicting. As the Letta Report on the future of the Single Market suggests, regulatory frameworks should enable innovation and entrepreneurship rather than merely constraining them.

EuroStack also adopts a "Europe-first" approach to ensure capability building and sovereignty in critical domains. Inspired by Mazzucato and Rodrik,[208] it introduces conditionalities for investments and procurement, such as equitable access, reinvestment mandates, data sovereignty, and shared risk-reward mechanisms. Public procurement follows a comply-or-explain principle to ensure investments generate public value and drive strategic autonomy for Europe.

By aligning stakeholders, fostering demand for European solutions, and enhancing interoperability across sectors, the EuroStack initiative aims to reduce dependency on external providers and reclaim leadership in critical technologies. This approach is essential for Europe's resilience and competitiveness in the global digital economy.

A need for new instruments?

Over the past decade, the EU and member states have introduced a range of industrial policy instruments. In research and innovation, initiatives such as IPCEI, the EDIC, and the Strategic Technologies for Europe Platform (STEP), alongside joint undertakings through public-private partnerships, have been prominent. In the defense sector, NATO, partially in collaboration with the EIF, has introduced instruments such as the Defence Innovation Accelerator for the North Atlantic (DIANA). For deployment investments, EU financial instruments like the former European Fund for Strategic Investments, the RRF, and InvestEU have effectively leveraged public funding. The EU has also developed tools to support venture capital, including the EIC and the European Tech Champion Initiative, addressing the critical need for late-stage growth capital.

Some of these instruments, such as ESFI, have been evaluated and shown to deliver remarkable financial leverage. However, many others have yet to prove their effectiveness. The success of centralized vaccine procurement during COVID-19 highlighted the benefits of collective bargaining, inspiring the EU to explore similar approaches for other essential goods, such as critical raw materials and semiconductors. Proactive measures, including European Commission recommendations, legislative revisions, and cross-stack monitoring, are beginning to address regulatory inconsistencies and lay the groundwork for enhanced interoperability and market access. The European Commission has also announced that it is taking major steps forward in regulation-related simplification . Additionally, Europe's regulatory leadership, exemplified by the GDPR and sustainability-focused policies, has set global benchmarks, creating a competitive advantage in shaping the ethical use of technology.

Despite these achievements, many existing instruments remain slow, rigid, and overly complex, unable to keep pace with rapid technological, market, and geopolitical developments. This rigidity often impedes implementation and results in missed opportunities. Furthermore, Europe lacks integrated, agile, and coordinated industrial policy instruments capable of effective execution.

208 Mazzucato, Mariana; Rodrik, Dani; (2023) Industrial Policy with Conditionalities: A Taxonomy and Sample Cases. (Working Paper Series 2023-07). UCL Institute for Innovation and Public Purpose: London, UK.

The EuroStack initiative does not call for more bureaucracy. On the contrary, it advocates for an agile and innovative approach to equip Europe with the critical digital infrastructures essential for competitiveness, security, and democracy. Rather than waiting for existing instruments to overcome their challenges, EuroStack proposes a proactive strategy. It seeks to leverage existing tools, build on the institutional flexibility demonstrated during crises, and, over the longer term, contribute to improving the speed, flexibility, feasibility, and relevance of industrial policy instruments.

The proactive digital industrial policy proposed here is articulated around four main pillars that address Europe's key technology gaps:

1. From research and development to scaling European platforms and products

Europe has demonstrated excellence in research but struggles to translate innovation into globally competitive platforms. A lack of integration across the digital stack hinders its ability to scale and commercialize technologies, creating critical gaps. To address these challenges, Europe must:

- **Build competitive platforms:** Establish EuroStack to unify existing initiatives such as EuroHPC and the Quantum Flagship under a single governance framework. This would streamline innovation, set shared priorities, and ensure coordinated resource allocation to accelerate commercialization.

- **Leverage public procurement:** Use procurement strategically to prioritize European solutions, particularly in developing federated cloud systems and sovereign data spaces. A "Europe-first, comply-or-explain" framework can reduce reliance on foreign providers, while public incubators can support the early adoption and scaling of European technologies.

- **Close talent and investment gaps:** Address critical shortages in talent for AI, quantum computing, and HPC by offering competitive salaries, increasing R&I funding, and launching global talent attraction programs. Strengthening commercialization pathways will also attract private and institutional investors.

- **Set global standards:** Leverage Europe's leadership in privacy and ethical governance to establish standards in emerging fields such as quantum computing, edge computing, and AI. Independent governance models, shared IP frameworks, and open-source initiatives can promote collaboration and equitable innovation.

- **Strengthen cybersecurity:** Conduct a comprehensive cross-stack security audit, complemented by periodic reviews, to identify vulnerabilities and guide resilience-building measures. Robust cybersecurity frameworks will enhance trust and interoperability across all layers of the tech stack.

- **Align defense and space strategies:** Develop a unified EU defense and security market to foster innovation and scale critical technologies. Closer coordination between the defense and space industries will bolster Europe's strategic autonomy and support the broader goals of the EuroStack initiative.

By addressing these critical gaps and building on its existing strengths, Europe can transform its innovation ecosystem, secure digital sovereignty, and assume leadership in the global digital economy.

2. Bridging the investment gap: The case for a European Sovereign Tech Fund

Europe's venture capital ecosystem must scale significantly to remain competitive on the global stage. For instance, in 2023, the United States invested €62.5 billion in AI startups, compared to Europe's €9 billion.[209] This critical disparity undermines Europe's ability to lead in high-tech innovation. The European Commission's Coordinated Plan on AI aims to address this issue by committing

209 Maslej, et al., "AI Index Report 2024 – Artificial Intelligence Index".

€1 billion annually from EU programs, with the goal of scaling public and private investments to €20 billion annually by the end of the decade.

According to Atomico, there is a €375 billion shortfall in European deep-tech growth-stage funding compared to the United States. Of this gap, €75 billion is currently filled by foreign capital, highlighting Europe's reliance on external resources.[210] To bridge this investment gap, particularly in critical technologies such as AI, semiconductors, and IoT, a coordinated and robust approach is essential. Existing programs like VentureEU – a partnership between the European Commission and the European Investment Fund – aim to mobilize €6.5 billion for startups and scaleups. Similarly, public-private partnerships offer the opportunity to pool resources and expertise, accelerating innovation.

National governments and institutions such as the European Investment Bank also play a pivotal role in reducing fragmentation and driving investment. InvestEU, with its €26.2 billion in guarantees, aims to attract investments in key areas such as research commercialization, industry digitalization, and the scaling of innovative companies. However, bridging Europe's competitive gap requires more than these fragmented efforts. The Draghi Report estimates that an additional €150 billion in investment will be needed between 2025 and 2030 for Europe to position itself as a global leader in digital technologies. Achieving this will require targeted support for foundational technologies such as cloud infrastructure, data management, and advanced semiconductors, alongside efforts to develop European platforms and products capable of competing on the global stage.

While initiatives such as the European Innovation Council are promising, they must evolve to be more mission-oriented, akin to DARPA in the United States. Aligning these efforts with the EuroStack initiative would focus innovation on strengthening Europe's strategic autonomy and achieving technological sovereignty.

The case for a European Sovereign Tech Fund

To address these systemic gaps, the establishment of a European Sovereign Tech Fund is imperative. This fund would consolidate funding mechanisms, streamline efforts, and align investments with Europe's strategic priorities. Its objectives would be twofold:

1. Short-term scaling
Provide patient capital to startups and scaleups in critical sectors such as AI, IoT, and cloud-edge infrastructure. This approach would ensure innovations scale effectively and reach the market.

2. Long-term strategic investments
Focus on transformative technologies, including quantum computing, next-generation semiconductors, and advanced AI. These investments would secure Europe's leadership in high-impact fields.

An initial capitalization of €10 billion would serve as a catalyst for early progress. Over five years, investments would scale to €150 billion, ultimately reaching €300 billion over a decade, aligning with the EuroStack vision. Funding would be pooled from EU member states, the EIB, national promotional institutions, institutional investors, and private capital. Public-private partnerships would amplify the impact and mitigate risks.

As a cornerstone of the EuroStack vision, the European Sovereign Tech Fund would address critical gaps in Europe's innovation pipeline. By fostering industrial champions, reducing dependencies, and bridging short-term scaling needs with long-term strategic investments, the fund would position Europe as a global leader in the digital economy while ensuring its technological sovereignty.

210 Niklas Zennström, "European Tech's Confidence Crisis Is Its Biggest Challenge", 10 December 2024, https://atomico.com/insights/european-techs-confidence-crisis-is-its-biggest-challenge.

3. Addressing Europe's talent and innovation gaps

Europe faces critical challenges with regard to its shortage of skilled talent in key fields such as quantum computing, AI engineering, and semiconductor design, and the loss of IP to global competitors. Addressing these gaps requires a coordinated European strategy that strengthens innovation, retains IP and talent within Europe, and ensures public investments support economic and strategic autonomy.

Germany's Federal Agency for Disruptive Innovation (SPRIND) offers a compelling model for bridging these gaps. By focusing on high-risk, high-reward projects, SPRIND fosters breakthrough innovations capable of creating new markets or transforming industries. Its approach combines long-term funding, rapid decision-making, and interdisciplinary collaboration to accelerate transformative ideas. Scaling this model to the European level could significantly enhance the continent's innovation capacity. A European Disruptive Innovation Agency would pool resources from multiple countries, create a pan-European network of innovators and researchers, and align disruptive technologies with the EU's strategic goals. Integrated into the EuroStack framework, such an agency could prioritize breakthrough areas like AI, quantum computing, and advanced biomaterials, positioning Europe as a leader in next-generation technologies.

To build the skills pipeline necessary for the EuroStack's success, such agencies should prioritize competitive salaries, substantial research grants, and advanced training and acceleration programs in emerging technologies. Mobility initiatives should foster cross-border collaboration, creating dynamic hubs of innovation across Europe. EU funding mechanisms, including the Digital Europe Programme, Horizon Europe, and the CEF, must embed conditionalities that prioritize digital skills development while leveraging AI-enhanced EuroStack technologies to reduce the demand for highly specialized skills. Security-by-default market requirements will further incentivize the development of technologies that minimize advanced skill dependencies.

Safeguarding European intellectual creations is crucial. Publicly funded innovation outcomes must be valorized within Europe, supported by open standards and shared IP frameworks that encourage ethical, collaborative development while preserving sovereignty. To secure long-term strategic autonomy, the European Commission and the EIB should take equity stakes in companies of critical importance – including startups and scaleups – in sectors such as semiconductors, AI, quantum computing, and cloud infrastructure. This approach would enable these companies to scale globally while ensuring European control over essential technologies and products.

By addressing talent shortages, protecting intellectual property, and aligning investments with strategic priorities, Europe can secure its position as a global leader in innovation. This coordinated approach is critical to ensuring the success of the EuroStack initiative and safeguarding Europe's digital sovereignty in an increasingly competitive landscape.

4. Reducing dependencies and building sustainable interdependencies

Europe remains heavily dependent on foreign suppliers for semiconductors, cloud infrastructure, AI, and critical raw materials. These dependencies expose the region to significant vulnerabilities, particularly in the context of geopolitical tensions and supply chain disruptions.

To mitigate these risks, Europe must strengthen domestic capacity while forging sustainable interdependencies with resource-rich nations such as Argentina, Australia, and China. Joint ventures and co-investments in sustainable extraction and processing technologies, aligned with the EU Critical Raw Materials Act, can improve supply chain resilience. However, Europe must accelerate its efforts to match competitors such as the United States and China, which are rapidly

securing resources through direct and transactional agreements.

Domestically, the European Chips Act must prioritize high-value niches, such as AI-optimized and energy-efficient chips, leveraging Europe's strengths in advanced semiconductor manufacturing, exemplified by global leaders like ASML. Addressing high capital costs and skilled labor shortages requires targeted public-private investments and robust training programs to support long-term competitiveness.

A cohesive economic foreign policy is vital to advancing the EuroStack initiative and increasing the global presence of European technologies. Limited EU support has hindered the success of European digital solutions in international markets. To address this, Europe must ensure its technologies are integrated into global initiatives like the Global Gateway, cybersecurity capacity building, international standard-setting, and trade agreements. Promoting European technologies requires active outreach. EU institutions, in collaboration with the private sector, should facilitate and support trade promotion missions to diversify the supply of critical goods and position EuroStack solutions on the global stage. This strategy will not only enhance Europe's competitiveness but also contribute to a fairer and more balanced global digital ecosystem. The success of the EuroStack initiative also depends on its ability to adapt to political, economic, technological, and environmental changes. The initiative must actively monitor and interpret external trends, ensuring alignment with broader EU priorities such as the green agenda, multilateral cooperation, and defense strategies.

Policy recommendations

Actions within the EuroStack

The EuroStack represents a modern industrial policy strategically designed to achieve digital sovereignty. Each industrial policy outlined here contributes to building the capabilities, capacities, and control necessary to enhance EU competitiveness, security, democracy, and environmental sustainability.

The EuroStack initiative prioritizes two forms of agency. Operational agency focuses on leveraging the EU mandate for the internal market, directing limited resources toward areas of strategic importance. Geo-economic agency aims to reduce dependencies on foreign technologies, foster sustainable interdependencies, and promote European solutions in areas where external dominance threatens strategic autonomy.

The EuroStack initiative does not seek to address all necessary actions within the digital domain – some are already being pursued in other initiatives, while others fall outside the scope of industrial policy. Instead, this report identifies four key areas of action:

1. **Strengthening capabilities within individual layers of the digital stack,** such as AI, semiconductors, and cloud infrastructure.

2. **Delivering synergies across layers** to create an integrated and interoperable digital public infrastructure.

3. **Ensuring coherence and consistency in EuroStack implementation and MVPs.**

4. **Aligning with broader agendas** in areas such as competition policy, trade, sustainability, and global digital governance.

Given the interconnected nature of the tech stack, where layers are typically linked by input-output complementarities, strengthening capacity in one layer often produces positive externalities and spillover effects on adjacent layers. For instance, bolstering the supply-side of a specific segment, such as cloud infrastructure, increases demand and improves market conditions for upstream suppliers and downstream application developers. This dynamic creates a virtuous cycle of investment and innovation across the ecosystem. Enhanced output and efficiency in one layer reduce per-unit costs and attract further complementary specialization in related layers, leading to aggregate productivity gains and improved competitiveness for the entire EuroStack. Ultimately, this cascading economic impact amplifies the benefits of industrial policy interventions. A strategic focus on a single layer reverberates throughout the interconnected network of digital capabilities, driving systemic growth and innovation.

1. **Policy action: Smart and sustainable resource stewardship**
   Set clear targets and provide financial incentives for optimizing energy, water, and critical raw materials within the EuroStack, aligning with EU Green Deal goals, and support these efforts through robust monitoring mechanisms.

- **Focus on efficiency:** Ensure EuroStack technologies achieve measurable reductions in energy use, water waste, and reliance on raw material imports.

- **Procurement standards:** Mandate energy-efficient, recyclable, and circular-compliant technologies at the national level to benefit from EuroStack support.

- **Investment alignment:** Link funding to clear climate and resource efficiency outcomes, leveraging EU instruments such as Horizon Europe and Green Bonds.

2. **Policy action: Strengthening advanced semiconductor capabilities to drive AI and HPC innovation**
   Focus on advancing semiconductor technologies and integrating ecosystems to reduce dependency, enhance Europe's digital sovereignty, and drive innovation in AI and high-performance computing.

- **Invest in advanced nodes**
  - Prioritize open hardware architectures, providing incentives for advanced manufacturing in areas such as RISC-V, photonics, neuromorphic chips, and quantum chips.
  - Prioritize cross-stack synergies by promoting collaboration among European chipmakers, software developers, and cloud providers to align design and manufacturing capabilities.

- **Stimulate demand through public procurement**
  - Require that 50% of processors and accelerators used in critical infrastructure, defense, public administration, and strategic systems be European-made by 2030. Use defense and strategic digital technology procurement to create sustained demand for domestic production.

- **Integrate supply and demand ecosystems**
  - Build and financially incentivize demand-supply partnerships that link semiconductor advancements to key sectors like automotive (37% of Europe's semiconductor consumption) and expand to emerging sectors such as biotech, gaming, space economy, and advanced manufacturing.

- **Safeguard strategic assets**
  - Strengthen FDI scrutiny and controls to protect critical European IP and startups, particularly in quantum and AI chips.
  - Establish a database of strategic assets within the EuroStack to ensure resilience and maintain European control over critical technologies.

3. Policy action: Strengthening industrial IoT and connected devices

To foster a secure and competitive IoT ecosystem within the EuroStack initiative, it is essential to implement harmonized regulations, establish robust cybersecurity measures, and assume leadership in global standards.

- **Ease the application of IoT-related legislation**
  - Simplify the application of EU IoT-related regulatory frameworks (e.g., energy, safety, security, privacy), aiming to reduce compliance costs for businesses by up to 20%.
  - Promote IoT trust labeling aligned with the Cyber Resilience Act, NIS2, and GDPR. Provide compliance assistance for SMEs through automated toolkits and centralized support platforms, and internationally advocate for a Trust-in-EU mark.

- **Enhance participation in global standards**
  - Allocate financial resources and encourage companies to increase EU representation in international IoT standardization bodies.

- **Support IoT innovation**
  - Incentivize the development of secure and innovative IoT solutions through Horizon Europe and Digital Europe programs, with the goal of achieving a 25% increase in EU IoT patents by 2030. Monitor and report the utilization of these patents in European and global markets.

4. Policy action: Enhancing sustainable competitiveness in the network layer

Strengthen EU telecom competitiveness, security, and sustainability through harmonized regulation, strategic investments, and synergies within EuroStack layers.

- **Promote cross-sector synergies**
  - Coordinate telecom security and resilience with defense, energy, and cloud sectors through a cross-border European Digital Infrastructure Consortium.

- **Accelerate 5G adoption and demand-supply synergies**
  - Cross-stack: Financially support large-scale pilots for standalone industrial 5G networks integrated with edge cloud technologies to achieve low latency and high availability. Target deployment in 80% of industrial hubs by 2030.
  - Cross-stack: Promote edge cloud integration in 5G rollouts, aligning with EuroStack's cloud layer actions. Position telecoms as a key consumer of semiconductors, applied AI, and secure quantum communications within EuroStack.
  - Promote SCION architecture: Advance the adoption of SCION, redefining how data is transmitted across the internet to enhance scalability, control, and security.

5. Policy action: Achieving strategic autonomy in the cloud layer

Develop a cohesive strategy to strengthen Europe's cloud ecosystem, prioritizing edge cloud development, strategic integration with HPC, AI, quantum technologies, and ensuring alignment with EU digital sovereignty objectives.

- **Implement a European sovereign cloud initiative**
  - Promote and, where feasible, mandate preferential public procurement for European cloud solutions using a comply-or-explain framework. The goal is to ensure that 50% of public cloud spending is allocated to EU-based providers by 2030. To support the initial phase of adoption and infrastructure development, governments should commit to €500 million annually over 5-7 years for the procurement of European cloud solutions.
  - Provide public procurement guidance to boost adoption of GDPR-compliant and energy-efficient EU-based solutions.

- **Promote an edge cloud paradigm**
  - Cross-stack: Financially support pilots for edge-enabled 5G networks tailored for industrial and public service applications, integrating them with decentralized cloud services.

- **Adopt decentralized edge solutions**
  - Establish a pan-European Multi-Provider Cloud-Edge Continuum (8ra Initiative) to reduce latency by up to 50% and improve resilience by decreasing reliance on centralized infrastructure.
  - Focus on critical sectors such as healthcare, public safety, and transportation, where decentralized solutions can enhance response times and mitigate operational risks.

- **Promote and require open API ecosystems**
  - Promote and require open APIs for cloud providers to ensure interoperability, support cross-border data flows, and prevent vendor lock-in, which currently affects over 75% of enterprises using proprietary platforms.
  - Align with EU initiatives for data sovereignty and digital interoperability, which are critical for enhancing cross-sector collaboration.

- **Strengthen linkages to HPC, AI, and quantum**
  - Cross-stack: Align cloud initiatives with HPC, AI, and quantum technology programs to enhance Europe's competitive edge in processing complex workloads.

6. Policy action: Building a sustainable software industry ecosystem

Strengthen Europe's open software ecosystem to enhance digital sovereignty, reduce dependency on proprietary solutions, and foster public trust and industrial innovation.

- **Adopt an open-source first policy**
  - Promote and, where necessary, mandate open-source software for public services and critical infrastructure by 2026 at both the member state level and (ideally) EU levels.
  - Prioritize European open-source solutions through preferential procurement and incentives for private adoption.

- **Govern key digital commons**
  - Establish public-private-commons partnerships to manage federated AI platforms, supported by €1 billion funding to ensure transparency and alignment with EU values, and continued support for common EU services.

- **Promote global standards leadership**
  - Advocate for open software principles in global standards-setting bodies to position the EU as a leader in shaping digital governance.

7. Policy action: Achieving AI sovereignty and harnessing data as a strategic asset

- **AI strategy**
  - Cross-stack: Develop a unified strategy integrating AI, HPC, AI cloud, AI chips, and data governance to create scalable, secure, and interoperable infrastructure. This approach ensures European leadership in AI and data while safeguarding digital rights, accountability, and sovereignty.

- **Public interest data as public good:**
  - Establish EU-wide Data Trusts to treat public interest data as a shared resource, enabling secure data pooling and public-private data sharing while ensuring GDPR compliance. Include data access requirements in public procurement contracts. While there is value in sharing public interest data, ensuring the protection of data is equally important, especially intrinsically sensitive types such as biomedical and geolocation data.
  - Cross-sector data sharing must adhere to impact assessments, data minimization protocols, and sector-specific guidelines while ensuring interoperability. Robust safeguards against surveillance and unauthorized use should include strict access controls, comprehensive audit trails, transparency reporting, and legal protections against unauthorized monitoring or profiling.
  - Ensure data transparency and accountability by including provisions in procurement contracts, public tenders, and licensing agreements that specify how data will be used for AI model training.

  - Build a European data ecosystem to support the training sovereign AI models, leveraging federated data platforms for cross-border and cross-layer data exchange of authorized data (e.g., IoT, cloud, AI). This effort should be linked to and reinforce the European Data Spaces Program, which aims to create sector-specific data ecosystems in health, finance, energy, and mobility. Prioritize interoperability and secure data exchange within these spaces to ensure collaboration, enhance innovation, and maintain data sovereignty across critical sectors.

- **Data as a European asset**
  - Clarify the use of large European data assets and evaluate the benefits of preferential access in EuroStack for European innovators.

- **Enable interoperable data exchange, speeding up data spaces execution**
  - Promote cooperation and provide incentives for the development and deployment of federated data platforms to ensure secure, sovereign data sharing across IoT, cloud, and AI ecosystems.

- **Unify governance across AI infrastructure**
  - Cross-stack: Link IPCEI projects in AI, quantum, chips, and HPC to ensure alignment with GDPR, the AI Act, and data sovereignty objectives.
  - Join-up already existing public-private collaborations to reduce fragmentation and accelerate development of AI hardware, cloud, and HPC infrastructure.

- **Build AI cloud and chips**
  - Cross-stack: Develop integrated platforms combining AI-specific HPC resources, sovereign AI cloud capabilities, and specialized AI chips to support compute-intensive applications like large language models.
  - Focus on strategic applications in healthcare, mobility, biotech, and public services while ensuring data remains secure and localized.

- **Federated and interoperable AI systems**
  - Deploy federated AI models that train on localized data without transferring raw data, ensuring GDPR compliance and minimizing risks of data misuse.
  - Integrate federated AI with edge cloud systems to enable real-time decision-making in critical sectors like manufacturing, smart cities, and public safety.

- **Establish a truly open public AI marketplace for Europe**
  - Develop a fully open AI marketplace powered by federated AI models and open APIs, utilizing public domain and CC0-licensed datasets. This platform will provide accessible, trustworthy AI tools for SMEs, public cultural institutions, and media organizations, fostering innovation across diverse sectors. The AI systems will be trained using the EuroHPC network, ensuring HPC resources are leveraged for European-led advancements.
  - Cross-stack: Integrate the marketplace with IoT, cloud, and edge systems to create a cohesive and scalable environment for innovation. Enhance real-time AI applications in industries like smart cities, healthcare, and cultural heritage digitalization.

- **Invest in AI- driven IPCEIs**
  - Allocate large-scale investments for AI infrastructure innovation, targeting HPC, quantum technologies, energy-efficient AI chips, and scalable AI applications in alignment with the European Sovereign Tech Fund.
  - Set a target for creating 500 AI startups, scaleups and SMEs by 2030 under the European Innovation Council, boosting competitiveness and innovation.
  - Strengthen growth fund investments and link scaleups to key industries via Corporate Venture Capital (CVC) and strategic industrial policy initiatives. Ensure the EIB and EIC take equity stakes in European AI champions, safeguarding their growth and preventing foreign takeovers of strategic assets.

  - Ensure AI leadership through integrated infrastructure: Promote open, transparent, and secure systems that align with European values to counter the dominance of Big Tech's proprietary ecosystems.
  - Advocate globally for data sovereignty and the adoption of open, accountable AI standards in line with the AI Act by leveraging EU leadership within international standards bodies.

- **European AI for All Initiative**
  - Launch a European AI for All initiative to democratize access to AI technologies and foster widespread adoption across industries and public services.
  - Establish a network of AI innovation hubs across EU member states that provides resources, expertise, and computing infrastructure for SMEs and public sector organizations to develop and implement AI solutions.
  - Develop open-source, pre-trained AI models and datasets tailored to European languages, industries, and use cases, thereby reducing barriers to entry for smaller organizations.
  - Launch an AI skills program to train and upskill the European workforce, focusing on both technical and ethical aspects of AI development and deployment.
  - Implement a voucher system for SMEs to access AI consulting services and cloud computing resources, thereby accelerating adoption in traditionally less digitalized sectors.

8. Policy action: Strengthening leadership in quantum technologies

Enhance EU leadership in quantum technologies by aligning supply-side innovation with demand-side adoption through targeted actions and coordinated governance.

- **Accelerate lab-to-market transition**
  - Expand EU quantum initiatives under the Quantum Flagship with €5 billion in EU funding by 2030 focusing on quantum computing, sensing, and secure communications.

- **Develop common procurement standards and Europe-first procurement:**
  - Establish shared public procurement specifications under a Quantum Act, beginning with secure quantum communications, to encourage the early adoption of EU-developed quantum solutions.
  - Implement a comply-or-explain framework within the Quantum Act, requiring governments to prioritize EU-funded quantum solutions unless justified otherwise.

- **Foster collaboration across stakeholders and stimulate demand**
  - Link the Quantum Flagship with national initiatives through a Europe-wide Quantum Innovation Network to facilitate the sharing of best practices, cross-border R&D, and pilot projects.
  - Cross-stack: Boost quantum adoption by linking quantum initiatives to critical sectors such as telecoms, cloud infrastructure, semiconductors, cybersecurity, and AI. Aim to achieve a 25% EU share of the global quantum market by 2035.

The EuroStack

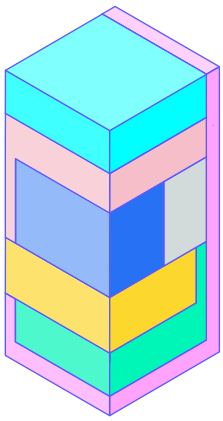
European policies shaping the stack

Legend

Policy type:

- *Strategy*
- *Funding program*
- *Investment*
- *Funding instrument*
- *Legislation*
- *Deployment*

1 Policies that apply to the entire stack



- Digital Decade
- A New European Innovation Agenda, European Innovation Ecosystems (EIE)

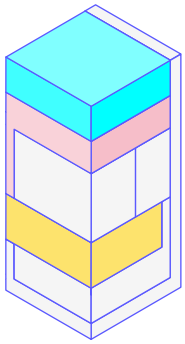
- Digital Europe Programme (DIGITAL)
- Horizon Europe

- InvestEU
- The Recovery and Resilience Facility (NextGenerationEU)
- VentureEU
- European Innovation Council (EIC) Fund
- European Tech Champions Initiative

- EU Cybersecurity Strategy, Cyber Security Act, Action Plan Cybersecurity and Health

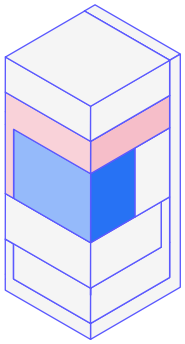
2 Policies that apply to multiple stack layers

Data and artificial intelligence, software, networks



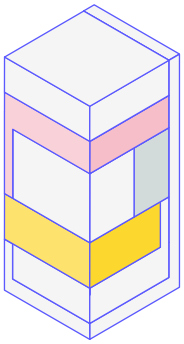
- The Common Security and Defence Policy (CSDP)
- European Defence Fund

Software, cloud



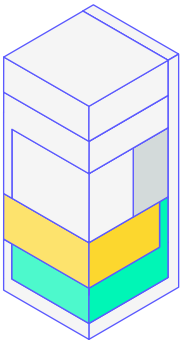
- Digital Services Act (DSA)
- Digital Markets Act (DMA)
- EU Cloud and AI Development Act

Software, internet of things & devices, networks



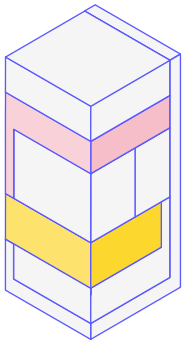
- Network and Information Systems Directive (NIS2 Directive)
- Digital Operational Resilience Act (DORA)

Internet of things & devices, networks, chips



- Quantum Technologies Flagship

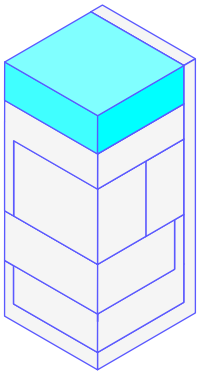
Software, networks



- Connecting Europe Facility (CEF)

3 Policies that influence specific stack layers

Data and artificial intelligence

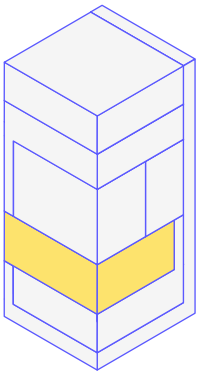


- European AI strategy (2021 Review)
- EU Artificial Intelligence Act
- AI Innovation Package

- Data Governance Act (DGA) + Data Act
- General Data Protection Regulation (GDPR).

- European Strategy for Data (European Health Data Space)
- AI Factories Initiative
- Apply AI
- AI in Science
- Data Union Strategies

Networks

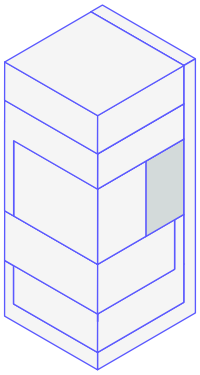


- European Quantum Communication Infrastructure (EuroQCI)

- CASSINI (Space and Defence innovation)

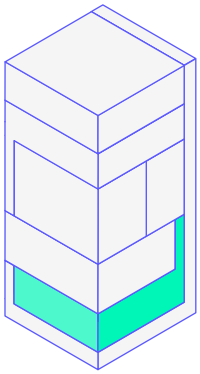
- 5G Action Plan
- 5G PPP
- European Electronic Communications Code

Internet of things & devices



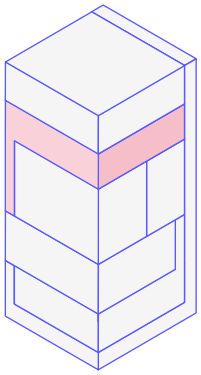
- Cyber Resilience Act

Chips



- Chips Act
- Chips for Europe Initiative

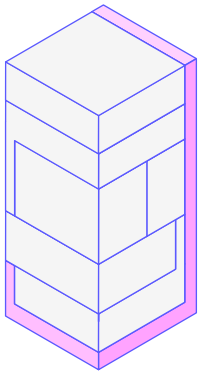
Software



- eIDAS 2.0
- EU Digital Identity Wallet (EUDI)

- The Common Foreign and Security Policy (CFSP)
- European Peace Facility (EPF)

Raw materials, energy, and water



- Critical Raw Materials Act

Cross-stack strategic initiatives

Along with demand-supply and Europe-first procurement strategies, the following cross-stack actions are needed:

1. **Unified compliance frameworks**
   - Simplify pathways for public-private partnerships within the EuroStack and enable SMEs to adopt legally compliant solutions more efficiently. Provide European Commission recommendations for streamlined compliance processes.

2. **Green by design**
   - Require energy efficiency across all layers of the EuroStack, ensuring alignment with EU Green Deal goals and targeting a 30% reduction in energy use by 2030. Require transparency measures, such as those outlined in the EU's Corporate Sustainability Reporting Directive. Sustain investments in renewable energy and carbon-aware computing technologies. Require AI companies to publicly disclose resource usage and emissions across their entire lifecycle, from manufacturing to training and inference.

3. **Cross-layer federated architecture and digital commons for Europe:**
   - Interoperable data exchange and data commons: Develop federated data platforms for secure cross-layer data sharing while maintaining GDPR compliance and ensuring data sovereignty. Establish related data commons with appropriate governance structures, such as the EU Health Data Commons for federated research in genomics and precision medicine, or EU Cities Data Commons for urban digital twins and interoperable local public services.
   - Public procurement for digital commons: Use smart public procurement to pool resources and fund collaborative digital commons initiatives.

4. **Cross-layer resilience framework**
   - Design a pan-European framework to address cybersecurity, redundancy, and resilience across all layers, fostering strategic autonomy in critical infrastructures.

5. **Empowering ecosystem players**
   - Support SMEs and startups: Provide funding, technical support, and compliance assistance to drive innovation and accelerate adoption across multiple layers.
   - Actively build and maintain digital commons: extensive repositories of digital public goods governed to ensure inclusivity, transparency, and protection from monopolistic capture. Digital commons include software, hardware, open data, educational resources, digital cultural content, and media. The policy shift is evident: the focus is no longer solely on fostering openness but on building sustainable platforms maintained by European institutions to support the development and maintenance of digital commons.

6. **Interplay with defense**
   - Integrate defense requirements into EuroStack layers through shared standards, pilot projects, and early adoption programs.

7. **Strategic investment: European Sovereign Tech Fund**
   - Set an ambitious target of €300 billion in investments over 10 years to drive innovation and secure Europe's strategic autonomy.
   - Initiate the European Sovereign Tech Fund with an initial €10 billion investment, prioritizing EuroStack common services and MVPs to ensure early, tangible outcomes, with incremental increases as implementation progresses.
   - The European Tech Sovereignty Fund should:
     - focus its investments on key areas to enhance Europe's digital independence and competitiveness. These include advanced semiconductor R&D, innovations in cloud and edge computing, GDPR-compliant infrastructure, sovereign AI models and applications, interoperable data platforms, and

digital commons. Examples of digital commons include the EU Health Data Commons, the EU Cities Data Commons, and the rollout of the EU Digital Identity and the Digital Euro. The overarching goal is to scale European sovereign products and platforms, ensuring they align with Europe's values of privacy, transparency, and inclusivity;
- co-invest with the EIB and EIC to scale 500 AI and quantum startups by 2030 and prevent foreign takeovers of critical assets;
- allocate funding for energy-efficient technologies, targeting a 30% reduction in stack-wide energy use by 2030.

Implementation roadmap

The EuroStack initiative presents a strategic, phased roadmap designed to transition Europe from technological dependency to digital strategic autonomy. At the core of this effort are the **EuroStack** digital infrastructure and its **MVPs**. This roadmap strikes a balance between ambition and feasibility, providing Europe with a clear and sustainable path to lead in digital innovation while safeguarding its independence. By integrating robust governance, strategic investments, and well-defined milestones, the plan consolidates fragmented efforts into a cohesive strategy for Europe's digital future.

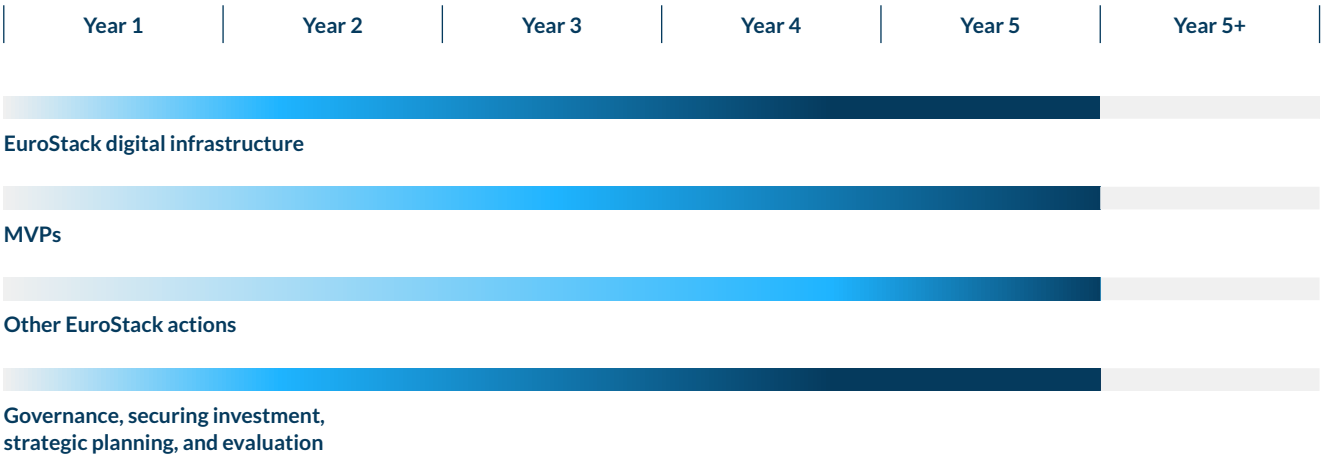
Crucially, the EuroStack roadmap operates through parallel streams that evolve over time. Implementation begins immediately, focusing on deploying mature solutions while concurrently pogressing research and development for more advanced contributions. Governance structures will also be established from the outset, designed to grow, adapt, and evolve in tandem with the initiative's progress.

Stream 1: EuroStack digital infrastructure (from year 1)

Objective: Establish the EuroStack Digital Infrastructure (EDI) to enable interoperable digital services, hardware, and software.

- **Develop, deploy, upgrade:** The EDI will evolve to meet the needs of digital strategic autonomy, starting with an initial set of services and technologies.
  - **Digital Euro:** Accelerate the rollout to enable secure, fee-free cross-border transactions across services.
  - **Sovereign Digital Identity Wallet:** Develop a privacy-preserving, interoperable wallet integrating electronic identification, payment systems, and access to public and private services.
  - **Federated data spaces:** Build GDPR-compliant platforms for secure cross-border data sharing

EuroStack implementation roadmap



in healthcare, education, mobility, and climate. Foster a coalition of cities and regions to adopt common procurement frameworks for implementing these standards.
  - **Sovereign cloud infrastructure:** Expand decentralized cloud systems, such as IPCEI-CIS and European Open Clouds, to ensure critical data remains within Europe's jurisdiction.
  - **Sovereign, federated AI:** Develop and implement sovereign AI solutions by prioritizing decentralized training of AI models across diverse hardware environments. This approach ensures resilience, adaptability, and energy efficiency while safeguarding data privacy and maintaining control over critical AI infrastructure.
  - **International partnerships:** Forge alliances with key global players, such as South Korea, Taiwan, Chile, and Brazil, to address supply chain vulnerabilities, particularly in semiconductors and raw materials.

- **Widespread adoption:** Leverage strategic public procurement and regulatory incentives to promote widespread adoption across public and private sectors. Align investments with EU market regulations and competition policy to curb monopolistic practices and foster competition.

- **Sustainability:** Invest in long-term maintenance of the EDI, notably sovereign AI models and infrastructure, decentralized platforms, and data commons to ensure resilience and reliability.

Stream 2: MVPs (from year 1)

Objective: Develop and deploy EuroStack digital MVPs in strategic sectors as they reach readiness, while refining their components. MVPs will evolve in stages, beginning with mature technologies (Technology Readiness Level [TRL] 9) and later integrating advanced solutions currently at TRL 6 or below.

- **Sectoral challenge for the EuroStack digital trailblazers or MVPs, the EuroStack Challenge:** Launch a competition to fund innovative ideas for running MVPs and use cases on top of sovereign EuroStack building blocks. Potential MVPs could address strategic priorities in sectors such as healthcare, education, climate and energy, fintech, media, and culture. Each deployment could focus on feasible collaborations, leveraging Europe's strengths in research, industry, and public institutions to advance sovereign digital services and ensure the success of the EuroStack MVP initiative.

- **Advanced development and testing locations:** Advance the MVPs in a range of locations, focusing on scalability and interoperability.

- **Expand capabilities:** Integrate post-quantum cryptography, QKD, advanced AI, and other gamechangers into the MVPs to secure data exchanges and enhance operational efficiency. Extend these applications to sectors like biotech and clean tech to ensure leadership in industrial IoT and renewable energy.

Stream 3: Other EuroStack actions within and across the stack

Objective: Advance the range of actions within and between individual layers of the stack and cross-stack actions.

- **Build commitments:** As the EuroStack community grows and investments increase, establish firm commitments to ensure the timely launch and execution of planned actions.

- **Advanced technologies:** Focus on next-generation AI, post-quantum cryptography, edge cloud solutions, advanced semiconductor technologies, and other emerging technologies to secure the future of EuroStack, enhance resilience, and strengthen Europe's innovation capacity.

- **Widespread adoption:** Use strategic public procurement and regulatory incentives to drive adoption across both public and private sectors. Align investments with EU market regulations and competition policies to curb monopolistic practices and foster competition.

- **Sustainability:** Invest in long-term maintenance to ensure resilience and reliability.

Stream 4: Governance, securing investment, strategic planning, and evaluation (from year 1)
Objective: Mobilize investment and funding commitments while ensuring alignment with long-term strategic goals of digital strategic autonomy. This includes fostering broad stakeholder involvement, establishing robust governance mechanisms, maintaining flexibility to adapt to geopolitical and technological developments, and conducting ongoing performance evaluations.

Governance

The EuroStack initiative is both a vision and an actionable plan, requiring the active participation of committed stakeholders. These stakeholders include industry leaders, innovators, civil society organizations, member states, and the European Commission, all of whom are called upon to support and contribute to the EuroStack initiative.

Several EuroStack actions can be implemented through extensions of existing initiatives, while others will necessitate the creation of new instruments or projects. These may be supported by EU programs focused on investment, deployment, development, or research. The success of EuroStack depends on broad collaboration, mutual commitment, and strategic leadership.

- Independent governance body: Establish a centralized governance structure, modeled after the European Central Bank, to oversee key aspects such as interoperability, public accountability, and the ethical implementation of digital technologies. A transitional governance body should be introduced at the launch stage and evolve into a permanent structure with broad support.

- Governance foundations: Following the initial phase, establish a EuroStack EDIC to coordinate member state efforts, set shared priorities, and ensure resource alignment.

Securing investment

As highlighted in the Draghi Report, an additional €150 billion investment is required between 2025 and 2030 to establish Europe as a global leader in digital technologies. Building on this foundation, the EuroStack initiatives aim to secure €300 billion over a decade through the establishment of a European Sovereign Tech Fund, ensuring Europe not only achieves digital sovereignty but also remains competitive in the global tech landscape.

To jumpstart this ambition, the EuroStack proposes the creation of an initial €10 billion European Tech Sovereignty Fund. This fund will be strategically allocated to develop EuroStack common services and MVPs, laying the groundwork for a self-sufficient and interoperable European tech ecosystem. The fund will pool resources from multiple channels, including Horizon Europe, the Digital Europe Programme, EIC investments, national contributions, and private investment ensuring a unified and efficient approach to resource mobilization and impact generation.

Strategic planning, monitoring, and evaluation

- **Maintain and update the EuroStack strategic plan:** Extend the current document to include more specific allocations of actors, resources, and timelines to ensure clear accountability and effective execution.

- **Adaptation:** Ensure the strategic plan remains responsive to geopolitical, market, and technological changes. Identify barriers and refine strategies to address dependencies and challenges arising from these developments.

- **Evaluation and Adaptation:** Conduct a comprehensive evaluation to assess user adoption, scalability, and economic impact. A mid-term evaluation is planned for year 3.

Section 4 – Additional readings

Readings on Europe's digital sovereignty for policymakers

ANRT FutuRIS. "Digital Sovereignty: Regaining Control in France and Europe," January 2024. https://www.anrt.asso.fr/sites/default/files/2024-03/ANRT_Digital_sovereignty_regaining_control_in_France_and_Europe_01.24.pdf.

Bria, Francesca. Open, Sovereign, Independent AI: Europe's greatest challenge?, December 2023 https://medium.com/@francescabria/open-sovereign-independent-ai-europes-greatest-challenge-6c8a899041ec

Bria, Francesca. "European Digital Independence: Building the EuroStack." AI Now Institute, 15 October 2024. https://ainowinstitute.org/publication/x-european-digital-independence-building-the-eurostack.

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Annex B – Ongoing EU policy actions and key stakeholders

The EuroStack flagship will build upon ongoing policy actions and initiatives in Europe such as the following:

Semiconductors

- Accelerate the development of 2nm and below technologies critical for AI and HPC, with the goal of increasing Europe's global chip production share from 10% to 20% by 2030 (EU Chips Act / EC + industry)
- Align procurement with EU regulatory frameworks, including the GDPR, AI Act, and Green Deal, to ensure compliance, incentivize innovation, and support sustainability (EU Chips Act / member states).
- Focus on AI-capable and energy-efficient chips, aligning with sustainability goals and supporting Europe's leadership in strategic industries (EU Chips Act / EC + industry + Joint Undertaking).
- Integrate semiconductor initiatives with the Green Deal to promote a sustainable digital transformation (EU Chips Act / EC).
- Advance a comprehensive strategy for chip design, production, and ecosystem collaboration, leveraging European strengths, such as expertise in EUV lithography (EU Chips Act / Joint Undertaking).

IoT and connected devices

- Prioritize IoT and connected devices in high-impact sectors such as smart cities and healthcare, which alone are expected to contribute €250 billion to IoT economic value in Europe by 2028 (Horizon Europe and Digital Europe Programme / EC).

Network layer

- Leverage EU funding mechanisms, using the STEP instrument and Cohesion Funds, for R&D and to scale deployment (EU R&D and Cohesion Programs / industry + member states).
- Advance work on open standards for standalone 5G networks to avoid vendor lock-in and ensure compatibility with edge computing and quantum-secure systems (EU Standardization / Industry and member states in ETSI+ GSMA in ITU).
- Facilitate the replacement of copper networks with fiber, reducing energy consumption by up to 85% (private sector funding / industry).
- Build redundancy and resilience in critical infrastructure by utilizing EU funding sources, such as the Connecting Europe Facility, and aligning efforts with the forthcoming Digital Networks Act (DNA) (DNA, CEF / EC + industry).

Cloud layer

- Target high-growth sectors with edge cloud such as healthcare and industrial manufacturing to demonstrate operational efficiencies (IPCEI / member states + industry).
- Encourage edge-native applications to reduce latency by up to 50% and improve resilience by

decreasing reliance on centralized infrastructure (IPCEI / member states + industry).

- Focus on critical sectors such as healthcare, public safety, and transportation, where decentralized solutions can enhance response times and reduce operational risks (IPCEI / member states).

- Align with EU initiatives for data sovereignty and digital interoperability to enhance cross-sector collaboration (forthcoming EU Cloud and AI Act / EC).

Open software industry ecosystem

- Roll out a unified Digital Identity Wallet by 2025, enabling seamless and secure access across public services and digital layers (eIDAS2 Act / EC + member states + industry).

AI and data

- Promote adherence to EU digital rights principles, including transparency, accountability, and privacy, to strengthen public trust (EU AI Act, Data Act, Data Governance Act, Open Data Act / EC).

- Focus on strategic applications in healthcare, mobility, and public services while ensuring data remains secure and localized (EU funding programs / EC).

Defense

- Foster technology transfer and align funding with dual-use technologies that address both defense and civilian needs (Horizon and European Defense Fund / EC + EDA).

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