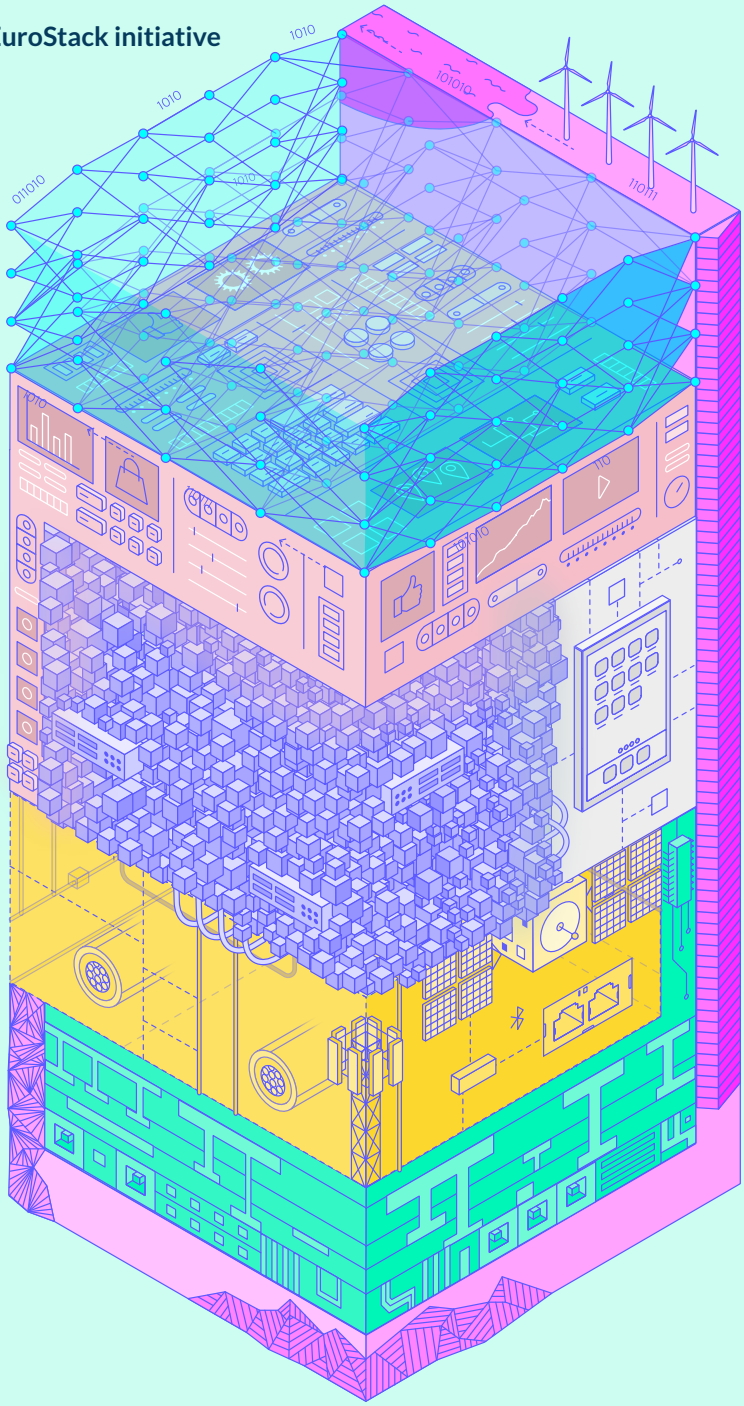
# EuroStack – A European Alternative for Digital Sovereignty

Section 1 – The EuroStack initiative



Supported by

CEPS

STIFTUNG MERCATOR

UCL IIPP Institute for Innovation and Public Purpose

Commissioned by

BertelsmannStiftung

## Legal notice


### Commissioned by
© Bertelsmann Stiftung, Gütersloh
February 2025

### Publisher
Bertelsmann Stiftung
Carl-Bertelsmann-Straße 256
33311 Gütersloh
Phone +49 5241 81-0
www.bertelsmann-stiftung.de

### Supported by
CEPS
Mercator Stiftung
UCL IIPP

### Project leadership and coordination
**Prof. Francesca Bria,** Fellow, Mercator Stiftung, Hon. Professor, UCL IIPP

### Lead authors
**Prof. Francesca Bria,** Fellow, Mercator Stiftung, Hon. Professor, UCL IIPP
**Prof. Paul Timmers,** WeltWert®
**Dr. Fausto Gernone,** UCL IIPP

### Responsible
**Martin Hullin,** Director, Bertelsmann Stiftung

### Project Management
**Teresa Staiger,** Bertelsmann Stiftung

### Infographics
Dirma Janse, The Hague

### Geographic mapping infographic, cartography
Tim Tensen

### Layout and Typesetting
Nicole Meyerholz, Bielefeld





### Image credits, page 6
Martin Hullin © Britta Schröder

### Image credits, page 7
Francesca Bria © privat
Carla Hustedt © Peter Gwiazda
Prof. Mariana Mazzucato © Tania Cristofari
Andrea Renda © Caroline Vandenbussche

### Recommended citation style
Bria/Timmers/Gernone (2025): EuroStack – A European Alternative for Digital Sovereignty. Bertelsmann Stiftung. Gütersloh.

### DOI 10.11586/2025006

# EuroStack – A European Alternative for Digital Sovereignty

**Prof. Francesca Bria**
**Prof. Paul Timmers**
**Dr. Fausto Gernone**

**Contributing experts**
**Dr. Andrea Renda**, Director of Research, CEPS
**Prof. Haroon Sheikh**, Fellow at the Netherlands Scientific Council for Government Policy (WRR), Professor Vrije Universiteit Amsterdam
**Dr. Pierre Bitard**, Innovation and Foresight Project Director, ANRT – Association Nationale de la Recherche de la Technologie
**Prof. Cecilia Rikap**, Head of Research, UCL IIPP
**Derk Oldenburg**, WeltWert®
**Georg Serentschy**, WeltWert®
**Dr. Christopher Fischer**, Research Fellow, CEPS
**Olesya Grabova**, Research Assistant, CEPS
**Martin Hullin**, Director, Bertelsmann Stiftung
**Dr. Felix Sieker**, Project Manager, Bertelsmann Stiftung

**Additional contributors**
**Sebastiano Toffaletti**, Secretary General (CEO), European DIGITAL SME Alliance
**Alberto Marti**, VP of Open Source Innovation, Open Nebula Systems
**Robin Berjon**, Technologist, and governance expert
**Dr. Alek Tarkowski**, Director of Strategy, Open Future Foundation
**Paul Keller**, Director of Policy, Open Future Foundation
**Adriana Groh**, CEO, Sovereign Tech Agency GmbH
**Sophie Bloemen**, Commons Network
**Rob van Kranenburg**, Senior Policy and Communication Specialist, Martel Innovate
**Vittorio Bertola**, Head of Policy and Innovation, Open-Xchange
**Francesco Bonfiglio**, CEO, Dynamo
**Denis Roio**, CEO Dyne.org

**Reviewers**
**Prof. Henning Kagermann**, Chair of the Board of Trustees, acatech – National Academy of Science and Engineering, Germany
**Prof. Johannes Meier**, Chairman, Mercator Foundation
**Prof. Cristina Caffarra**, Former Antitrust Consultant, UCL, CEPR Associate Fellow
**Pierre Pezziardi**, Entrepreneur, Advisor to the French Interministerial Directorate for Digital Affairs
**Dr. Evgeny Morozov**, Founder, The Syllabus
**Prof. Rainer Kattel**, Deputy Director, UCL IIPP
**Prof. Luc Soete**, emeritus professor, Maastricht University
**Rafael Laguna de la Vera**, Founding Director, SPRIND - German Federal Agency for Breakthrough Innovation
**Joerg Resch**, Innovation Manager, SPRIND - German Federal Agency for Breakthrough Innovation
**Dr. Stefan Heumann**, Managing Director, Agora Digitale Transformation
**Prof. George Danezis**, University College London & Mysten Labs
**Prof. Daniele Archibugi**, Research Director, Italian Research Council, Irpps, and Professor of Innovation, Governance and Public Policy, University of London, Birkbeck Business School
**Frank Rieger**, Technologist
**Udbhav Tiwari**, Director, Global Product Policy, Mozilla
**Prof. Cristian Hesselman**, Director SIDN Labs; University Twente
**Volker Stocker**, Weizenbaum Institute for the Networked Society, TU Berlin
**Axel Voss**, MEP, EPP Group
**Kai Zenner**, Head of Office and Digital Policy Adviser for MEP Axel Voss, The EPP Group
**Alexandra Geese**, MEP, The Green/EFA Group
**Matthias Ecke**, MEP, The S&D Group

Supported by

CEPS STIFTUNG MERCATOR UCL IIPP Institute for Innovation and Public Purpose

Commissioned by

BertelsmannStiftung

# Section 1 – The EuroStack initiative

## An infrastructural layered framework for digital sovereignty

Carlota Perez's techno-economic paradigms framework[19] highlights that each technological revolution progresses through phases, from early innovation to widespread deployment. In the current internet, communications and technology (ICT) revolution, we are in the deployment phase, where digital technologies are becoming integral to all aspects of society and industry. These drive a growing demand for robust infrastructure like broadband, cloud computing, and data centers. Emerging technologies further amplify this need, making digital infrastructure a cornerstone of economic, industrial, and societal transformation.

The EuroStack initiative organizes digital infrastructure into a cohesive system of interconnected layers, ranging from foundational technologies to advanced applications. It employs the stack model as a conceptual framework,[20] where each layer builds upon the capabilities of the one below it while dynamically interacting with all others. This design enables targeted actions, allowing policymakers and stakeholders to visualize and address specific areas of need more effectively.

Specialized "sub-stacks," such as those for cloud computing and AI, address specific needs but remain integral to the unified EuroStack system. The framework prioritizes interoperability, resilience, scalability, and adaptability to ensure seamless functionality across the system. These layers also underpin sectoral applications in biotechnology, advanced manufacturing, and public services, helping Europe remain competitive and self-reliant in the global digital landscape. Moreover, the EuroStack initiative includes cross-stack topics such as cybersecurity, emerging technologies, and competitive shifts that can reshape its structure and create new strategic autonomy opportunities.

### The layers of the EuroStack are represented as follows:

1. **Resources:** This foundational layer includes critical materials like rare earth elements, energy sources, and skilled labor. These elements form the bedrock of all digital infrastructure.

2. **Chips:** This layer encompasses processors and memory technologies, GPUs, and emerging quantum communication systems, all essential for powering digital infrastructure and ensuring secure supply chains.

3. **Networks:** This layer encompasses both digital and physical connections, including cell towers, fiber-optic networks, and undersea cables that link Europe to the global digital ecosystem.

19 Carlota Perez, "Technological Revolutions and Techno-Economic Paradigms", Cambridge Journal of Economics 34, no. 1 (2010): 185–202.

20 Haroon Sheikh, "European Digital Sovereignty: A Layered Approach", Digital Society 1, no. 3 (18 November 2022): 25, https://doi.org/10.1007/s44206-022-00025-z.

4. **Connected devices & IoT:** This layer includes everything from smartphones and laptops to Internet of Things (IoT) devices that enable real-time information processing and data collection.

5. **Cloud infrastructure:** This layer comprises secure data storage and computational power, both of which are central to data sovereignty and autonomy.

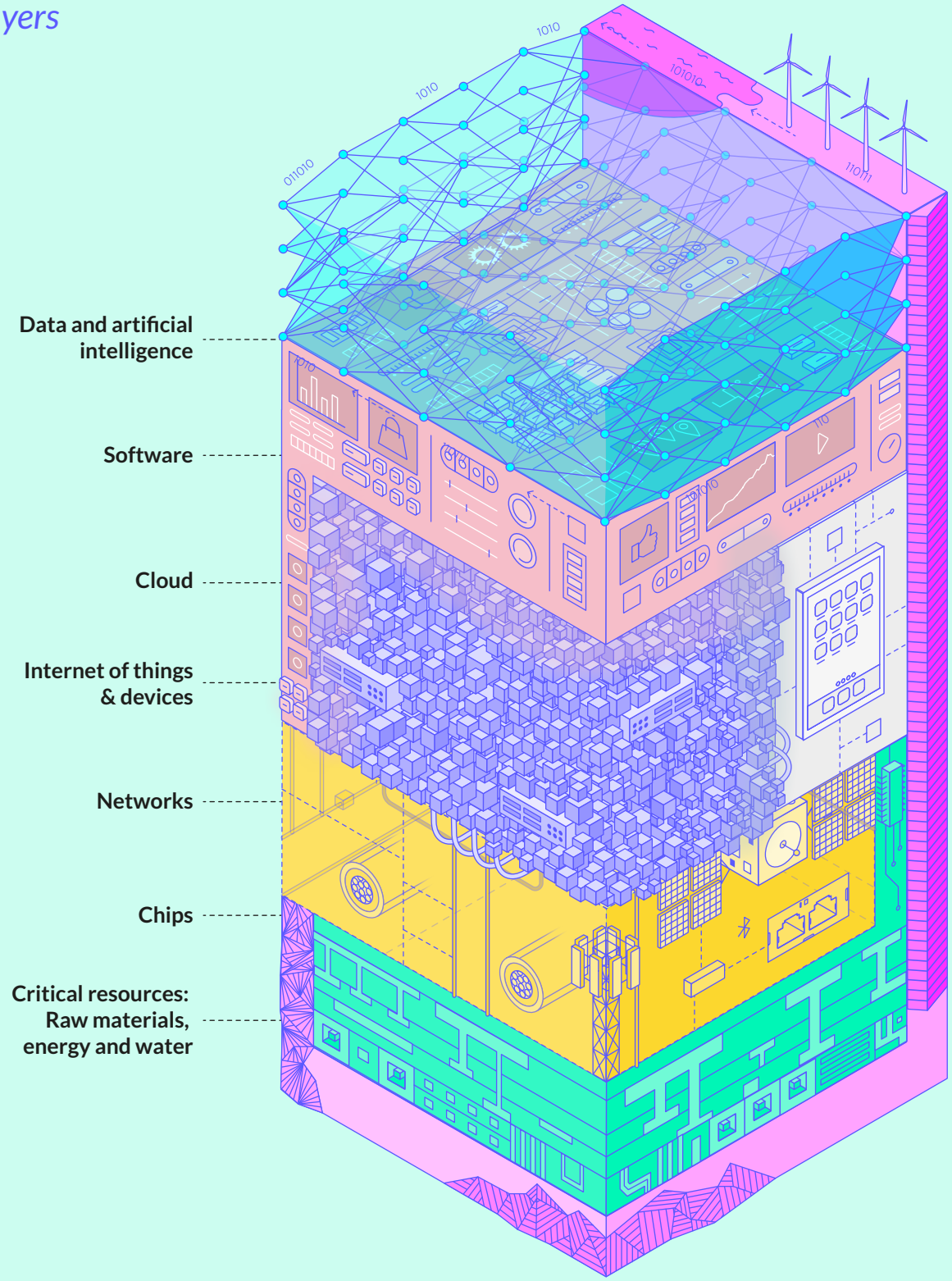
6. **Software platforms, applications, and algorithms:** This layer encompasses operating systems, applications, and cybersecurity frameworks that drive digital interactions.

7. **Data and artificial intelligence:** This layer processes data and generates insights, positioning Europe to build and control core AI capabilities for a competitive edge.

The EuroStack, illustrated here as a layered structure, should also be envisioned as a dynamic circular ecosystem. Each element functions as a node, highlighting the interdependencies and interconnected nature of digital technologies. This approach emphasizes the need for adaptability, allowing the model to evolve as new technologies emerge or priorities shift. It also visualizes the strengths of European capabilities in each area while identifying potential vulnerabilities or investment needs to strengthen the ecosystem further.

# The current digital stack

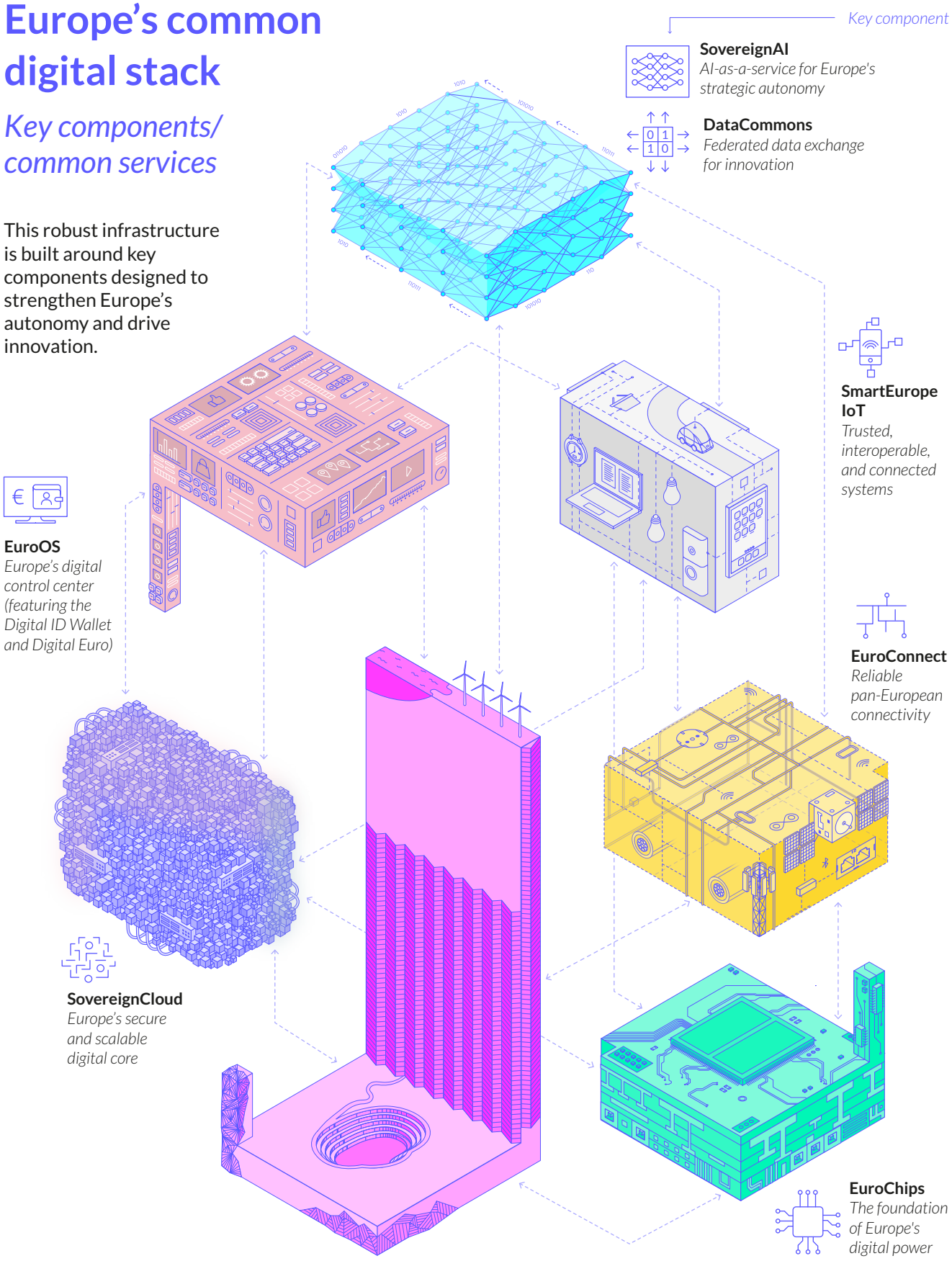
## *The layers*



# Europe's common digital stack

## *Key components/ common services*

This robust infrastructure is built around key components designed to strengthen Europe's autonomy and drive innovation.



## A vision tailored for Europe

The EuroStack initiative offers a bold and pragmatic vision for Europe's digital future, grounded in its industrial strengths, innovative capabilities, and unwavering commitment to democratic values. In a world marked by increasing geopolitical fragmentation, the initiative champions a federated and decentralized approach. This model reflects Europe's diversity while also ensuring resilience by fostering collaboration and aligning efforts across the Single Market. Unlike the centralized dominance of U.S. Big Tech or China's state-directed strategies, the EuroStack initiative leverages Europe's unique position within global supply chains. By embracing federation, Europe can maintain the benefits of international cooperation and interconnected markets while building the autonomy needed to safeguard its strategic interests. This approach balances regional autonomy with shared objectives, enabling Europe to navigate a multipolar world while driving innovation and sustaining its competitive edge.

Europe has solid assets to build upon. Industry leaders like ASML and SAP exemplify industrial and technological excellence, while innovative firms like ARM and DeepMind showcase Europe's potential for ground-breaking advancements – even though their acquisition by foreign investors underscore the need for greater attention to strategic autonomy. Advanced research centers and industries with strengths in advanced manufacturing, networking, robotics, chips manufacturing, and biotech provide a solid foundation for Europe to reclaim leadership in science and technology.

The EuroStack initiative is designed to leverage these strengths to reduce reliance on foreign technologies, nurture homegrown innovation, and revitalize Europe's industrial ecosystem. By focusing on interoperability, security, and sustainability, it aligns technological progress with societal needs while fostering inclusive growth and global competitiveness.

This vision is both actionable and grounded in clear principles. By integrating initiatives such as EuroHPC, IPCEIs, and the Quantum Flagship into a cohesive framework, the EuroStack streamlines innovation and accelerates the development of scalable platforms. The initiative emphasizes open-source technologies and cross-border collaboration among member states, ensuring that Europe's technological backbone reflects its values of transparency, accountability, and inclusivity.

The EuroStack initiative represents a distinctly European approach to achieving digital sovereignty. It provides the structure and governance needed to unify industry, policymakers, and investors, driving the development of critical technologies and reducing market fragmentation.

By addressing vulnerabilities across the tech stack and building on its industrial capabilities, the EuroStack positions Europe to compete effectively on the global stage. This initiative is not about overregulation but about empowering Europe's industrial top performers and fostering innovation. It aims to ensure that Europe remains at the forefront of a rapidly evolving global economy while upholding its commitment to democracy, sustainability, and shared prosperity.

The EuroStack initiative is built on the following six pillars:

1. **A vision tailored for Europe:** The EuroStack initiative embodies a bold yet achievable vision to enhance the EU's digital strategic autonomy. This vision leverages Europe's unique strengths – its diversity, democratic governance, regulatory leadership, and focus on industrial innovation and competitiveness. It is grounded in clear principles that align with Europe's long-term priorities and ensure its feasibility.

2. **A joined-up, modern industrial policy:** Investment, market regulation, R&D, standardization, trade and competition policies,

and international partnerships are all designed to work in harmony, consistently reinforcing one another to drive progress and innovation.

3. **The EuroStack digital infrastructure:** Serving as the backbone of Europe's digital services, hardware, and software, this infrastructure connects citizens, businesses, and governments through secure and interoperable systems. By integrating critical components such as networks, chips, cloud, IoT, data platforms, and AI, it ensures the viability of European innovation while democratizing access to advanced computing. Built with an emphasis on sustainability, resilience, and sovereignty, this infrastructure is designed to address Europe's immediate and long-term digital needs.

4. **Minimum viable products:** The EuroStack initiative introduces a set of scalable, interoperable digital services and applications designed for success within the Single Market. These MVPs act as operational trailblazers, meeting the immediate needs of citizens and businesses while showcasing the feasibility and value of Europe's digital sovereignty strategy.

5. **A growing open-source community:** At the heart of the EuroStack initiative lies a dynamic open ecosystem that brings together developers, researchers, SMEs, industry players, and innovators across software, hardware, and AI. This community collaborates with member states, European institutions, and private investors to build the EuroStack from the ground up, ensuring transparency, adaptability, and continuous innovation.

6. **A sustainable governance model:** To ensure lasting impact, the EuroStack initiative will adopt an accountable and independent governance framework. This framework will bring together public and private stakeholders to harmonize policies, monitor progress, and secure investments, fostering the initiative's long-term sustainability and growth.

## Principles of the EuroStack

The EuroStack is grounded in seven guiding principles:

1. **Sovereignty and security:** Guaranteeing that Europe's critical digital infrastructure remains under European jurisdiction, protected by robust security-by-design and privacy-by-design frameworks.

2. **De-proprietarization and interoperability:** Promoting integration across an open-source, federated tech stack, while reducing dependence on proprietary solutions from major tech corporations.

3. **Sustainability:** Building energy-efficient and resource-resilient systems that align with Europe's environmental and climate goals.

4. **Data as a common good:** Treating data as a shared resource to unlock innovation while safeguarding societal interests and fundamental rights.

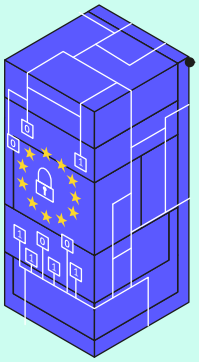
5. **Decentralized sovereign infrastructure:** Combining edge computing and centralized systems to improve efficiency and data sovereignty.

6. **Inclusive governance:** Establishing harmonized regulations and accountability mechanisms that balance short-term resilience with long-term autonomy.

7. **Strong democracy:** Advancing digital technologies that not only avoid harm but actively support and strengthen democratic societies .

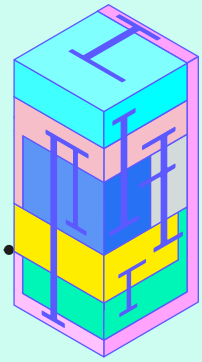
These principles ensure that the EuroStack operates ethically, remains resilient, and adapts effectively, delivering lasting value to stakeholders.

# The EuroStack
*Core principles*



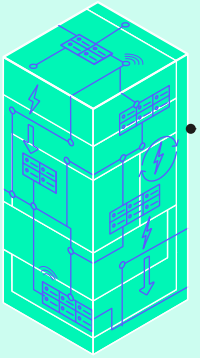
## Sovereignty and security

Guaranteeing that Europe's critical digital infrastructure is under European jurisdiction, and is protected by robust security-by-design and privacy-by-design.



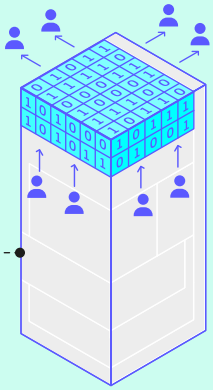
## De-proprietarization and interoperability

Promoting integration across an open-source, federated tech stack, while reducing reliance on Big Tech proprietary solutions.



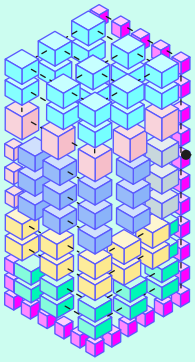
## Sustainability

Building energy-efficient and resource-resilient systems to meet Europe's environmental and climate objectives.



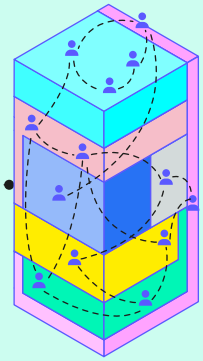
## Data as common good

Treating data as a shared resource to unlock innovation while safeguarding societal interests and fundamental rights.



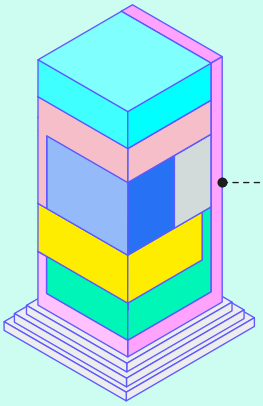
## Decentralized sovereign infrastructure

Combining edge computing and centralized systems for improved efficiency and data sovereignty.



## Inclusive governance

Ensuring harmonized regulations, accountability, and a balance between short-term resilience and long-term autonomy.



## Strong democracy

Digital technologies that do no harm and fundamentally strengthen democratic societies.

## Europe's common digital stack

At the heart of the EuroStack initiative lies its digital infrastructure, a foundational backbone that integrates Europe's capabilities across semiconductors, networks, cloud computing, IoT, data platforms, AI, and digital identity. Designed to secure Europe's digital sovereignty, this infrastructure ensures a resilient, interoperable, and scalable ecosystem that supports both public and private services, all while adhering to EU regulatory and ethical standards.

This robust infrastructure is built around key components, each designed to enhance Europe's autonomy and drive innovation:

### 1. EuroChips: The foundation of Europe's digital power

Semiconductors form the cornerstone of Europe's digital infrastructure. Through the European Chips Act, significant investments are being made in cutting-edge fabrication facilities and next-generation chip designs, with a focus on energy-efficient, low-power semiconductors. These efforts are bolstered by the adoption of RISC-V, an open-standard architecture that reduces dependency on proprietary technologies, fosters innovation, and strengthens Europe's technological independence. To enhance resilience, the EuroStack initiative supports expanded RISC-V development, the creation of a robust software ecosystem around it, and the establishment of secure, sovereign supply chains. These measures are essential to ensuring access to critical components, safeguarding uninterrupted production, and positioning Europe as a leader in the global semiconductor ecosystem.

### 2. EuroConnect: Reliable pan-European connectivity

The EuroStack's network infrastructure is designed to deliver secure, seamless communication across borders, enabling real-time data exchange essential for Europe's digital economy. The initiative promotes the development of standalone 5G networks and anticipates the transition to 6G technologies, ensuring Europe remains competitive on the global stage. Decentralized and localized edge operations reduce latency, improve resilience, and optimize performance, particularly for critical sectors such as healthcare, manufacturing, and smart cities. By prioritizing energy-efficient network technologies, EuroStack aligns with Europe's sustainability goals while minimizing environmental impact. To ensure resilience, the infrastructure incorporates redundancy, robust cybersecurity measures, and preparation for quantum technologies. Future-oriented initiatives such as adopting the Scalability, Control, and Isolation on Next-generation Networks (SCION) architecture (which enhances scalability, control, and data isolation) and strengthening the resilience of undersea cables and satellite connectivity will further strengthen Europe's digital autonomy.

### 3. SovereignCloud: Europe's secure and scalable digital core

Leveraging initiatives like 8ra and the Important Projects of Common European Interest (IPCEI)-CIS, the EuroStack advances decentralized cloud and edge infrastructures to reduce reliance on foreign providers, ensuring sovereignty and operational flexibility. The disruption in the AI cloud market presents a critical opportunity for Europe to lead by developing sovereign AI cloud infrastructure, mid-sized data centers, and AI Factories to support advanced AI development and deployment. By integrating public high-performance computing (HPC) centers and optimizing them for AI applications, EuroStack aims to establish a scalable, unified cloud infrastructure fully under European jurisdiction. This infrastructure will cater to sectors such as healthcare, energy management, and manufacturing, offering reconfigurable and tailored cloud services. A strong emphasis on sustainability and energy efficiency ensures alignment with Europe's climate goals, while redundant systems provide resilience and robust performance under high demand.

## 4. SmartEurope IoT: Trusted, interoperable, and connected systems

The EuroStack IoT platform enables the large-scale deployment of certified devices and services, driving innovation across smart cities, industrial automation, renewable energy management, advanced manufacturing, and robotics (e.g., Industry 5.0). Designed to comply with EU regulations like the Cyber Resilience Act and NIS-2 Directive, it ensures the highest standards of privacy and security. Built on EU-developed specifications like FIWARE and the work in the IPCEI-CIS, the platform fosters interoperability, allowing the seamless integration of IoT solutions across sectors. Scalable and adaptable, the platform supports diverse applications while maintaining alignment with Europe's regulatory and sustainability principles.

## 5. DataCommons: Federated data exchange for innovation

**Industry data exchange: Accelerating industrial innovation**

For industrial sectors, platforms such as Manufacturing-X and Catena-X create secure ecosystems for sharing industry-specific data, fostering collaboration, and driving innovation. These platforms enable manufacturers and supply chain partners to share data efficiently while maintaining data sovereignty and ensuring compliance with European regulations. They prioritize interoperability, allowing seamless integration of data across businesses and sectors. By fostering trust and transparency, these platforms enhance Europe's competitive edge in advanced manufacturing and industrial ecosystems.

**Public interest data as a public good**

Public interest data platforms treat data as a collective resource managed for societal benefit. Drawing inspiration from Finland's Suomi.fi and Estonia's X-Road, these platforms enable secure and ethical cross-border data sharing among public and private entities. They focus on critical public interest use cases, such as healthcare, urban planning, and environmental monitoring, while prioritizing data sovereignty and compliance with privacy regulations. By treating data as a public good, these platforms uphold European values, facilitating transparent, ethical exchanges that prioritize citizen rights and promote societal well-being.

Both frameworks emphasize interoperability, enabling data to flow seamlessly within and across sectors, while safeguarding trust, security, and regulatory compliance. Together, they form the backbone of Europe's data-driven economy, balancing innovation with ethical stewardship to harness data as both a strategic asset and a public good.

## 6. EuroOS: Europe's digital control center (featuring the Digital ID Wallet and Digital Euro)

Software forms the operational core of digital infrastructure, encompassing operating systems, application platforms, and algorithmic frameworks. It powers critical functions such as identity management, electronic payments, transactions, and document delivery, forming the foundation of digital public infrastructures. In this domain, U.S. companies dominate foundational tools, with Microsoft, Apple, and Google controlling over 90% of the European market for operating systems across desktops, mobile devices, and embedded systems. While Europe boasts global leaders in enterprise software, its presence in algorithmic frameworks, vital for innovation and developer ecosystems, remains limited and often reliant on U.S.-based platforms. Programs like the Next Generation Internet (NGI) initiative have developed alternative software solutions in Europe, but their scale has not yet reached the critical mass needed to compete globally.

The Sovereign Digital Identity Wallet provides secure, privacy-first authentication for citizens and businesses, ensuring seamless access to both public and private services across Europe. By overcoming the limitations seen in models like India Stack, which

rely on centralized biometric IDs and foreign cloud infrastructure, the EuroStack offers a federated, privacy-preserving platform. With a focus on privacy-by-design, cross-border interoperability, and user empowerment, the wallet ensures that citizens control their data, sharing only what is necessary while maintaining full compliance with EU privacy standards. As the gateway to Europe's digital infrastructure, the wallet enables seamless access while safeguarding privacy and sovereignty. Governments must ensure voluntary participation, protect against coercive enrollment and provide opt-out options to prevent service denial for non-participants. Clear procedures for withdrawing consent, deleting data, and conducting regular audits can ensure accountability.

The Digital Euro, to be issued by the European Central Bank, anchors trust and stability in Europe's monetary system as a central bank-backed digital currency. It offers universal access, ensuring all citizens and businesses, including those underserved by traditional banking, can fully participate in the digital economy. Fee-free transactions foster financial inclusion, reduce costs, and promote economic equity. With General Data Protection Regulation (GDPR) compliance at its core, the Digital Euro ensures secure transaction data processing exclusively within European jurisdiction, facilitating secure cross-border transactions while seamlessly integrating with public and private digital systems. This strengthens Europe's financial sovereignty, supports innovation, and fosters sustainable economic growth across the EU.

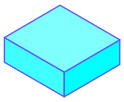
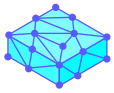
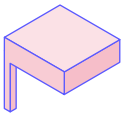
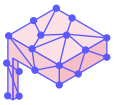
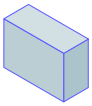
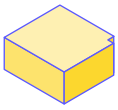
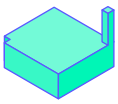
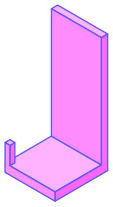
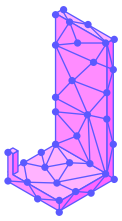
## 7. SovereignAI: AI-as-a-service for Europe's strategic autonomy

The EuroStack initiative's sovereign AI solutions aim to power critical sectors such as mobility, healthcare, education, and climate monitoring across Europe. By combining the scalability of large AI models with the precision of bespoke solutions, Europe is leveraging its growing ecosystem of AI labs, companies, and public HPC centers. Initiatives like AI Factories, OpenGPT-X, and LEAM-Large European AI Models utilize Europe's public compute infrastructure to develop large, multilingual AI models that reflect European values. Localized, smaller-scale AI models complement these efforts, offering tailored solutions for niche sectors while addressing regional and sector-specific needs. By embracing composite learning, a hybrid approach combining decentralized, distributed, and federated learning, Europe is building privacy-preserving, accountable AI systems that align with public interest goals, driving innovation while ensuring data sovereignty and ethical governance. A sound approach for Europe's AI development involves investing in specialized large-scale models that address its unique linguistic and cultural diversity, as well as domain-specific needs. Where feasible, these models should be made open source to foster transparency and collaboration. At the same time, agile application development is essential, as it leverages a mix of European-developed technologies and globally available models to accelerate deployment. Strategic funding and partnerships between government, industry, and academia will be crucial to sharing the costs and benefits of foundational AI investments, leading to robust, innovative, and competitive outcomes.

The EuroStack initiative represents Europe's commitment to building a secure, resilient, and sovereign digital ecosystem. Its goal is to establish European alternatives across the technology stack, building on Europe's core assets and industrial capabilities. Achieving this requires the formation of a coalition of European tech leaders to spearhead innovation and reduce dependency on foreign technologies. A critical step involves mapping Europe's existing assets in a dynamic, evolving joint catalogue that links and aligns industrial policy initiatives. By integrating these efforts and scaling existing alternatives, the EuroStack initiative can strengthen Europe's industrial competitiveness, foster innovation, and uphold digital rights, sustainability, and ethical governance. Positioned as a global alternative, the EuroStack initiative offers a uniquely European approach to thriving in the global digital economy.

# The EuroStack

## *Key companies, alliances, and networks*

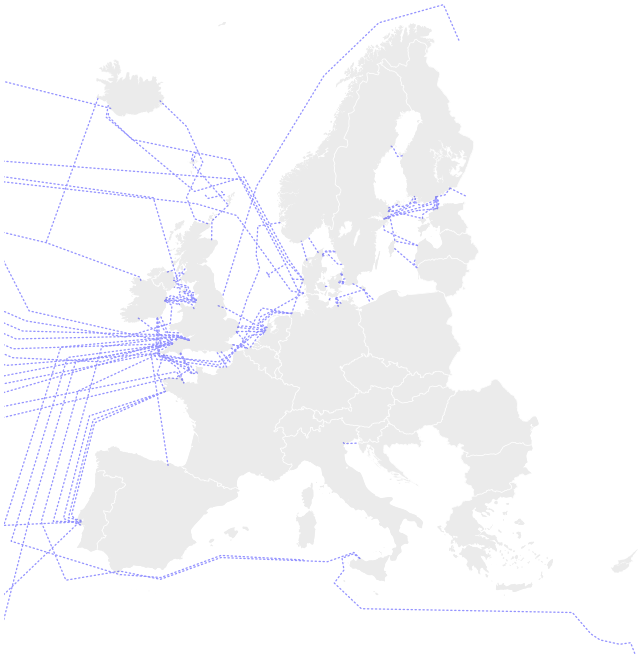
| | KEY COMPANIES | ALLIANCES AND NETWORKS |
|---|---|---|
| **Data and artificial intelligence**  | • Mistral (France)<br>• Aleph Alpha (Germany)<br>• Siemens (Germany)<br>• iGenius (Italy)<br>• UiPath (Romania)<br>• DeepL (Germany)<br>• Celonis (Germany) |  <br>• European AI Alliance<br>• AI4EU Platform<br>• Big Data Value Association (BDVA) |
| **Software**  | • SAP (Germany)<br>• Nextcloud (Germany)<br>• LibreOffice (Germany)<br>• Dassault Systèmes (France)<br>• Thales (France)<br>• Bitdefender (Romania) |  <br>• OpenForum Europe<br>• European Software Strategy Alliance (ESSA)<br>• Secure Identity Alliance |
| **Internet of things & devices**  | • Siemens (Germany)<br>• Schneider Electric (France)<br>• Bosch (Germany)<br>• Philips (Netherlands)<br>• Atos (France) |  <br>• IoT European Platforms Initiative (IoT-EPI) |
| **Cloud**  | • OVHcloud (France)<br>• Scaleway (France)<br>• Deutsche Telekom (Germany)<br>• Schwarz (Germany) |  <br>• European Alliance for Industrial Data, Edge, and Cloud |
| **Networks**  | • Nokia (Finland)<br>• Ericsson (Sweden)<br>• Alcatel Submarine Networks (France)<br>• Orange (France)<br>• Airbus Defence and Space (Germany/France |  <br>• 5G Infrastructure Public Private Partnership (5G PPP)<br>• Smart Networks and Services Joint Undertaking for 5G and 6G |
| **Chips**  | • ASML (Netherlands)<br>• STMicroelectronics (France/Italy)<br>• Infineon Technologies (Germany)<br>• NXP Semiconductors (Netherlands)<br>Key R&D innovators:<br>• Fraunhofer Society (Germany) .<br>• IMEC (Belgium) |  <br>• Important Projects of Common European Interest (IPCEI) on Microelectronics<br>• Silicon Saxony<br>• European Semiconductor Industry Association (ESIA)<br>• Industrial Alliance on Processors and Semiconductor Technologies |
| **Raw materials, energy, and water**  | • Umicore (Belgium)<br>• Boliden (Sweden) |  <br>• European Raw Materials Alliance (ERMA) |

# The EuroStack
## *Geographic mapping*

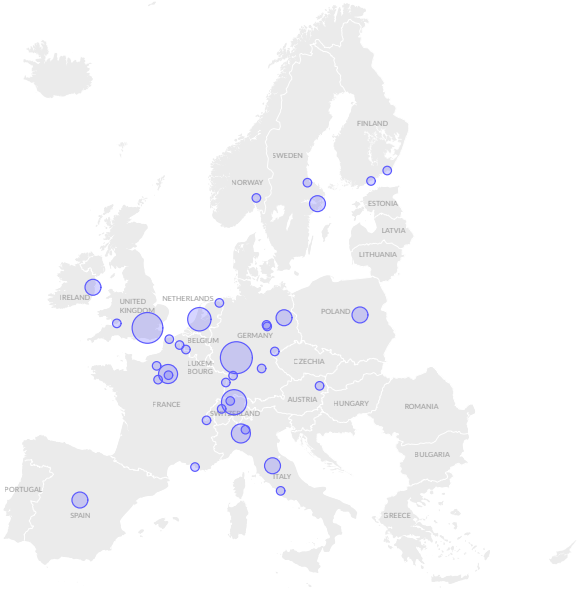
**Legend**


*Number of locations*

### Undersea cables

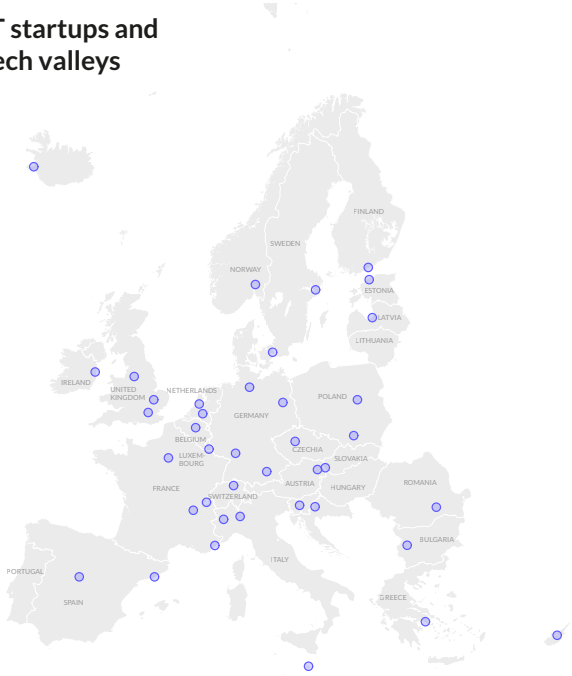


### Data centers for cloud services

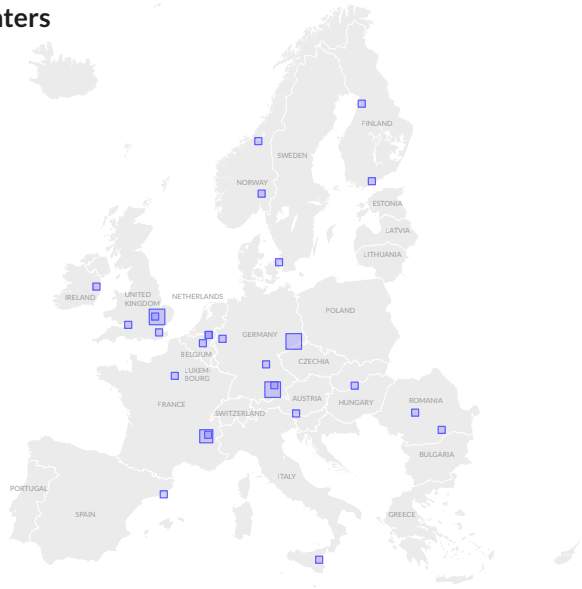



### High performance computing (HPC) facilities

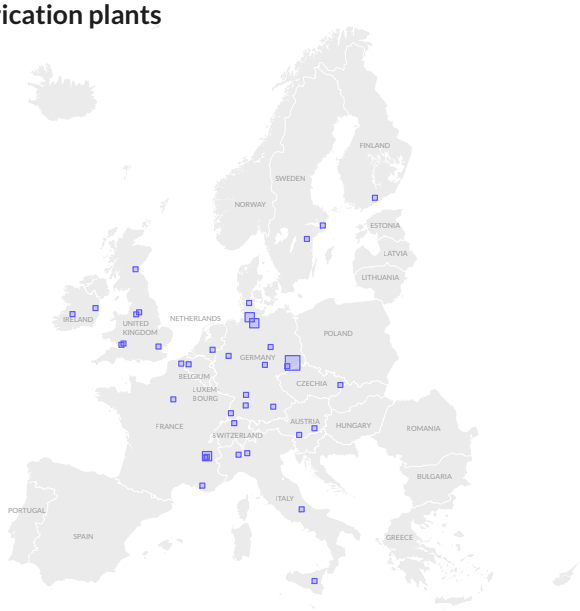

### IT startups and tech valleys



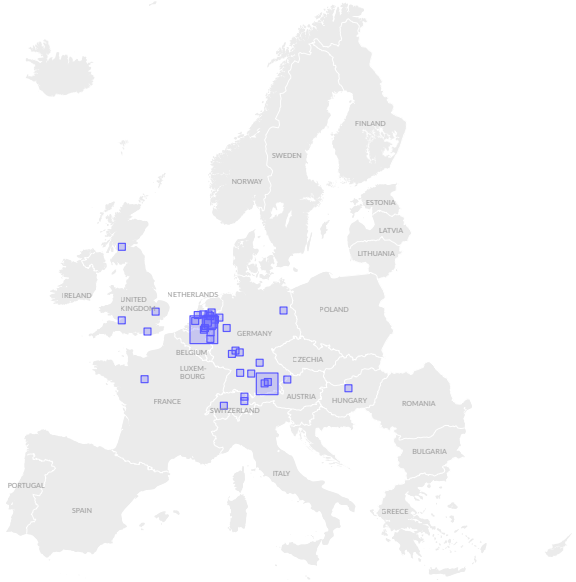
## Semiconductor design centers



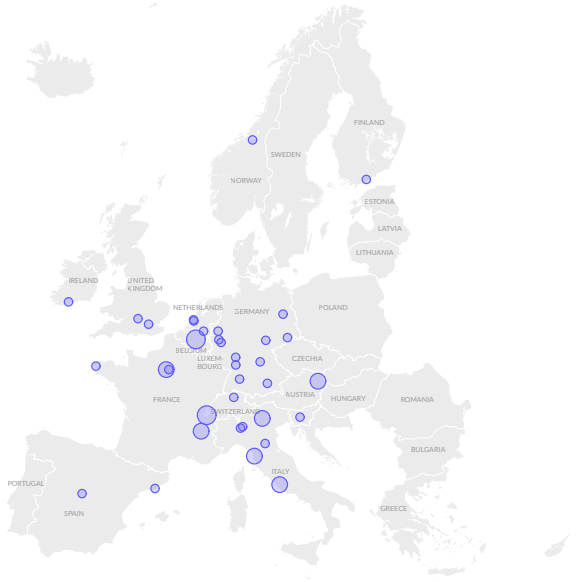

## Semiconductor fabrication plants



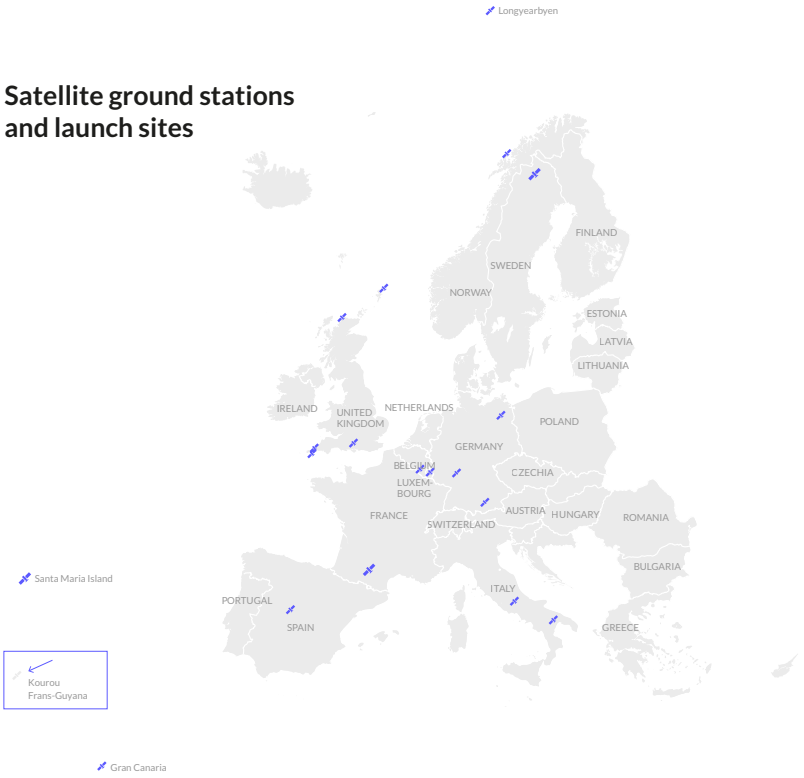

## Semiconductor equipment manufacturers



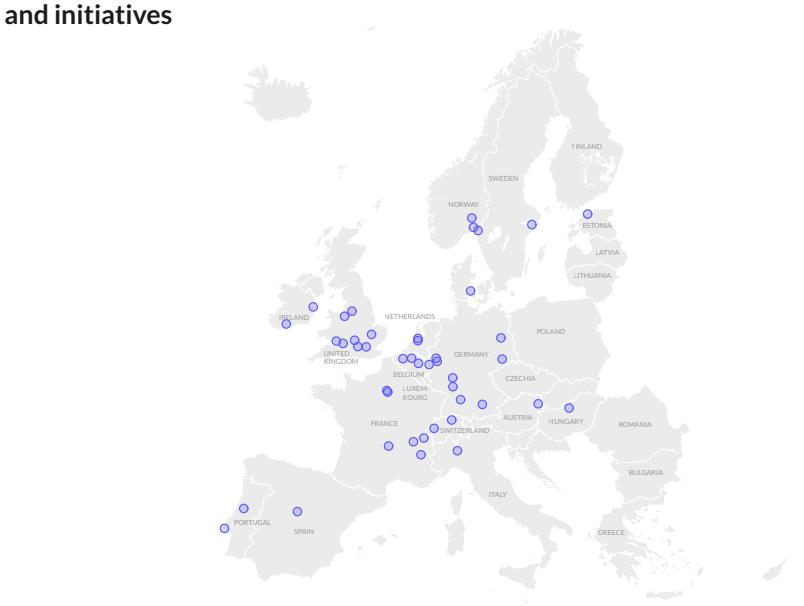

## Advanced research centers and digital innovation hubs



## Satellite ground stations and launch sites




## Key AI companies and initiatives




Source: Submarine Cable Map, Various

## The EuroStack Challenge: MVPs as highly scalable digital services

The EuroStack initiative introduces a measure – the EuroStack Challenge – to identify MVPs – sovereign, interoperable, and cross-border trailblazers of digital services that showcase the scalability, flexibility, market potential, and societal value of Europe's Digital Infrastructure Stack. These MVPs align with Europe's principles of openness, privacy, and sovereignty, proving the EuroStack's capacity to support transformative services in mobility, healthcare, manufacturing, and biotech.

To foster innovation and accelerate adoption, the EuroStack initiative will provide developers with open APIs, open reference implementations, and open-source development environments for building and deploying applications, customized AI models, and services. These resources will ensure an inclusive developer experience, enabling startups, researchers, and enterprises to harness the full capabilities of the EuroStack infrastructure without facing entry barriers.

The EuroStack Challenge will further accelerate innovation by inviting Europe's brightest developers, researchers, and entrepreneurs to create new services leveraging these tools. This initiative is designed to unlock Europe's talent pool, foster collaboration, and validate the infrastructure's ability to solve real-world challenges across key industrial sectors while expanding its ecosystem of open-source solutions.

By providing interoperable, privacy-first platforms and tools to enable rapid innovation, the EuroStack initiative creates the foundation for a resilient, unified European digital ecosystem. It empowers developers to contribute to Europe's digital future while securing long-term digital sovereignty, ensuring services that meet the needs of both citizens and businesses.

Comprehensive pilot testing will be conducted across diverse geographic and demographic contexts to ensure system robustness. This will include stress testing under various operational conditions and integration with existing infrastructure. Clear success criteria, combining quantitative metrics and qualitative user experience assessments, will be clearly defined prior to launch and regularly updated based on user feedback and technological advancements. A robust feedback mechanism will collect input from users, technical evaluations, and stakeholder consultations, ensuring a transparent and structured process for implementing improvements and reporting updates throughout the pilot phase.

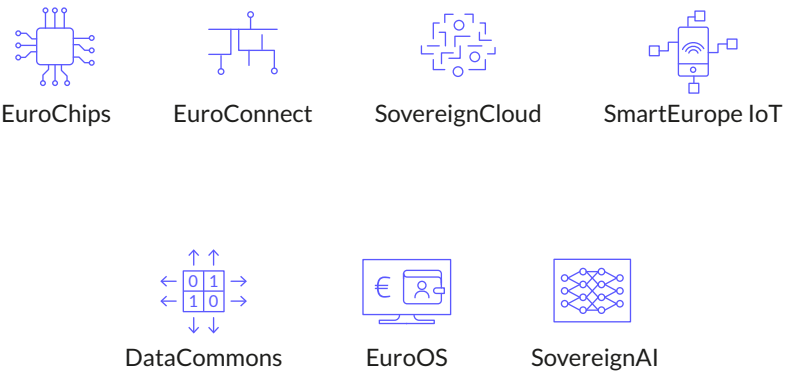
# The EuroStack Industrial Challenge

*Minimum viable products (MVPs) as highly scalable digital services*

## What are MVPs?

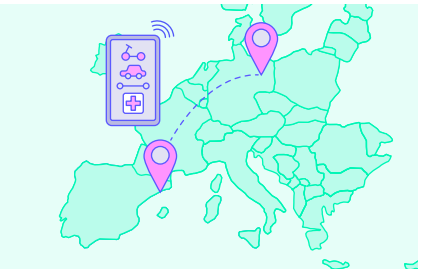
A set of highly scalable, interoperable pan-European, digital services, products, and apps designed to succeed in the Single Market. MVPs are operational trailblazers and will meet the immediate needs of citizens and businesses while demonstrating the feasibility and value of Europe's digital sovereignty strategy. **MVPs use the key components of the EuroStack**.

**Key components**

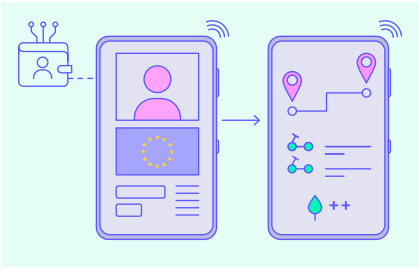


# Citizen-centric public services (Mobility and healthcare)

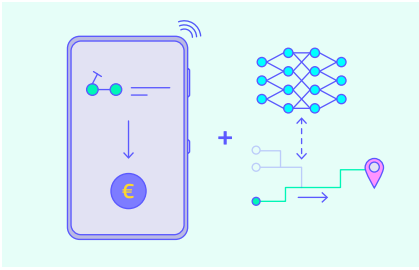
## *MVP example 1*



Clara, a Barcelona resident, travels to Berlin for a music festival, seamlessly accessing **EuroStack-enabled mobility and healthcare services**.

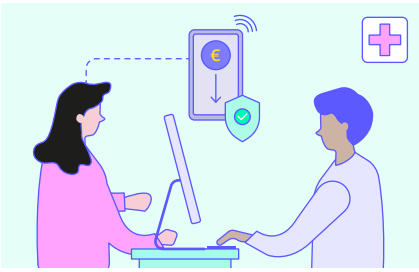


Using her **Sovereign Digital Identity Wallet**, Clara logs into a Berlin mobility app that securely verifies her identity. She receives personalized discounts for eco-friendly transport options, such as e-scooters.



She completes instant, fee-free payments via **Digital Euro. Federated AI** provides her with real-time updates on low-carbon travel routes.

Later, Clara visits a pharmacy for an emergency prescription. The pharmacist securely accesses her medical history through the **Federated Data Exchange**, ensuring GDPR compliance and safeguarding her privacy.



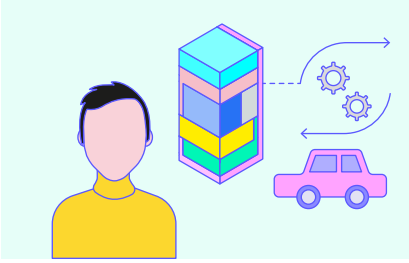
Clara pays securely with **Digital Euro**, and the transaction is automatically registered with her home healthcare insurance.

**What does this MVP illustrate?**

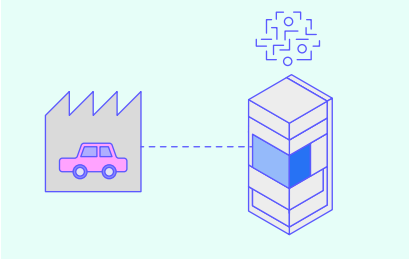
*This MVP illustrates how EuroStack creates **interoperable, privacy-first solutions** that improve citizen experiences, reduce administrative burdens, and promote sustainability and cross-border collaboration in mobility and healthcare.*

# Advanced manufacturing – transforming supply chains

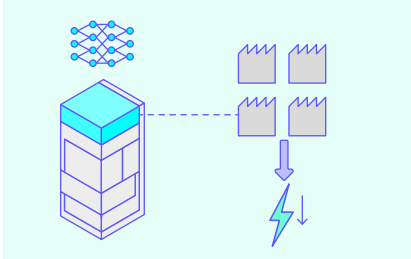
## *MVP example 2*



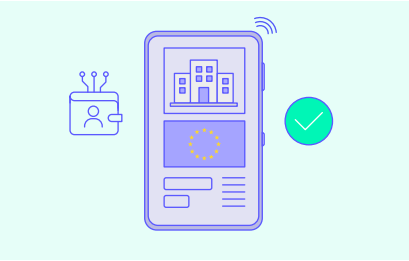
Markus, an automotive manufacturer in Munich, optimizes production with a Dutch supplier using EuroStack-enabled tools.



Markus's factory connects to the **EuroStack decentralized cloud**, enabling secure, real-time local processing of production data.

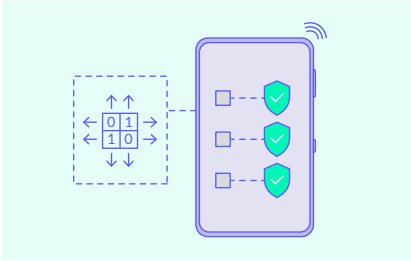


Federated AI analyzes data across EU factories, providing actionable insights to minimize waste and energy consumption in alignment with the EU Green Deal.



Supplier credentials are verified through the **Sovereign Digital Identity Wallet**, streamlining contract approvals and ensuring compliance.

Payments are processed instantly via **Digital Euro**, eliminating delays and transaction fees.



Material quality updates and delivery schedules are shared securely through the Federated Data Exchange, enabling predictive maintenance, and preventing disruptions. Markus's operations set a new standard for productivity growth in the sector.

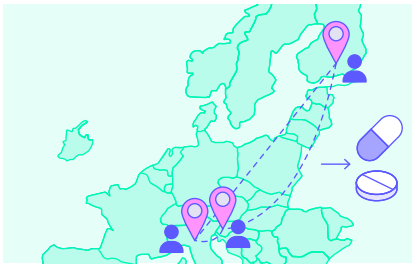


**What does this MVP illustrate?**

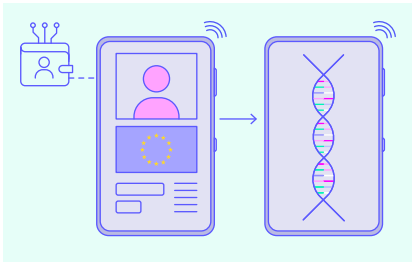
*This MVP highlights EuroStack's potential to enhance efficiency, sustainability, and resilience in Europe's manufacturing sector.*

# Cross-border genomic innovation for precision medicine

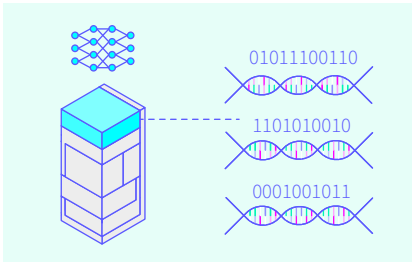
## *MVP example 3*



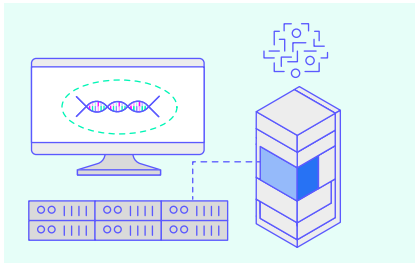
Maria, a biotech product manager in Ljubljana, collaborates with teams in Bologna and Finland to develop a precision medicine drug.



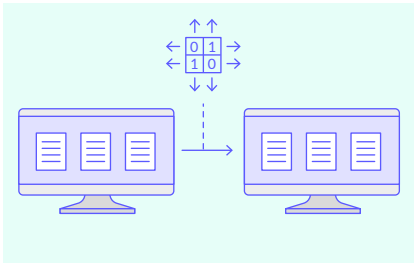
Using her **Sovereign Digital Identity Wallet**, Maria securely accesses sensitive genomic datasets stored in EU data infrastructures.




**Federated AI** analyzes distributed data without transferring raw information, identifying genetic markers while maintaining privacy.



Simulations are performed on Bologna's *Leonardo* and Finland's *LUMI* supercomputers via the **EuroStack decentralized cloud,** ensuring compliance and security.



Anonymized findings are shared through the **Federated Data Exchange**, allowing a healthcare provider in Denmark to ethically pilot the drug across borders. Maria's Ljubljana company consistently beats international competition in lab-to-market time.

**What does this MVP illustrate?**

*This MVP demonstrates EuroStack's role in accelerating innovation in precision medicine, enabling secure collaboration while safeguarding patient privacy.*

## A growing innovation ecosystem

The EuroStack initiative is more than just infrastructure – it is Europe's platform for talent, innovation, and collaboration. Designed to address Europe's critical talent gap, it empowers the continent's brightest minds to develop transformative digital solutions. At its core is a dynamic, expanding ecosystem of open-source developers, hardware designers, AI specialists, entrepreneurs, and researchers, working in tandem across the public and private sectors.

This ecosystem aims to create an environment where talent can thrive. Innovators are encouraged to create open-source software, hardware solutions, and sovereign AI models, strengthening Europe's leadership in ethical and accountable digital development. By connecting research centers, SMEs, large industries, and member states, the EuroStack initiative fosters a culture of innovation and collaboration that anchors Europe in the global technology landscape.

Guided by principles of transparency, adaptability, and community ownership, this ecosystem promotes long-term sustainability and impact. By mobilizing talent and aligning diverse stakeholders, the EuroStack initiative ensures Europe builds an innovation-driven future rooted in its democratic values and economic ambitions.

## A governance framework to deliver the EuroStack initiative

The EuroStack initiative is built on a governance model that combines agility with shared accountability, ensuring the effective coordination and scaling of Europe's digital infrastructure in an era of rapid technological change. This model is rooted in the principles of digital commons – collectively managed resources designed to serve the public good – and draws inspiration from successful industry-led and publicly backed initiatives. These include dynamic frameworks and instruments such as the 8ra model, the most effective Important Projects of Common European Interest (IPCEIs), and the European Digital Infrastructure Consortium (EDIC), which could be fast-tracked and scaled to accelerate implementation.

The evolution of the EU project management toolbox is essential, requiring the elimination of overly bureaucratic processes. It should transition toward a renewed product management approach that emphasizes short-cycle investment schemes, lean start-up methodologies, and the development of digital commons. This shift will enable more agile, efficient, and innovation-driven management of projects, better aligned with the rapid pace of technological change and the needs of Europe's digital sovereignty goals. The model envisioned here focuses on identifying and scaling key, high-impact use cases (what we refer to as MVPs) that drive value across the digital ecosystem. This approach marks a significant departure from traditional governance models. Rather than operating as a bureaucratic oversight body, the EuroStack governance structure is designed to act as an engine of disruption, accelerating Europe's progress toward digital sovereignty. It relies on collaborative governance and open innovation to ensure that Europe's digital infrastructure is not only globally competitive but also aligned with the values and needs of its citizens.

The successful implementation and sustainability of the EuroStack initiative require a robust and adaptive governance framework that ensures safety, security, and alignment with European values. This framework must balance strategic oversight, operational efficiency, and ethical considerations, while remaining flexible enough to accommodate emerging technologies.

### Strategic oversight and leadership

The EuroStack Steering Committee, comprising representatives from EU institutions, member states, industry leaders, academia and civil society, guide the initiative's strategic direction, approve major policies, and make critical decisions. Meeting

quarterly, this committee will ensure that the initiative remains aligned with Europe's values of inclusivity, transparency, and sovereignty, while fostering equitable access to innovation and resisting monopolization.

A Chief EuroStack Officer (CEO), appointed by the Steering Committee, will oversee day-to-day operations and ensure alignment with the initiative's strategic goals. Supporting the CEO, a EuroStack Advisory Board of independent experts will provide guidance on technical, ethical, and policy matters.

### Operational coordination and implementation

A EuroStack Program Office will be responsible for overseeing the initiative's implementation, coordinating stakeholders, and preparing progress reports for the Steering Committee. To maintain a results-driven focus, the Program Office will track systemic change using Key Performance Indicators (KPIs) such as adoption rates for cross-border digital services, energy efficiency improvements, and the development of scalable interoperable systems. Layer-specific Working Groups will focus on components of the EuroStack initiative, bringing together experts to develop detailed implementation plans and technical standards. A strategic emphasis will be placed on empowering startups, scaleups, and unconventional innovators through open innovation frameworks and funding mechanisms. This approach directly addresses concerns about disproportionately favoring entrenched incumbents.

### Agility and rapid response

The governance framework incorporates agile governance principles to adapt quickly to emerging technologies, including AI, quantum computing, and cybersecurity. Transparent technical audits and security assessments should follow standardized methodologies, with independent third-party verification and risk-based frameworks to ensure accountability and timely remediation. To prevent mission and function creep, systems must have explicit scope limitations, regular reviews to align usage with original mandates, and strict protocols for managing any expansion of capabilities or data use.

A Rapid Response Team will address urgent security or operational challenges, while a Policy Adaptation Mechanism will ensure that policies and standards evolve to reflect new developments and lessons learned.

### Transparency, accountability, and collaboration

Accountability will be ensured through radical transparency, with publicly available progress reports tracking KPIs such as innovation milestones and cost reductions. An annual EuroStack Conference will present achievements and gather feedback from stakeholders, while a Stakeholder Engagement Platform will foster ongoing dialogue with industry, civil society, and the public.

Leadership within the EuroStack governance model will be decentralized and collaborative, reflecting Europe's diversity and shared commitment to sovereignty and inclusivity. Member states, public institutions, industry leaders, and innovators will co-create and govern the initiative to ensure collective ownership of its success.

### Global partnerships and knowledge-sharing

Recognizing the global nature of digital technologies, a Global Partnerships Office will manage relationships with international partners, ensuring alignment with global standards while upholding European values. A Technology Transfer and Knowledge-Sharing Unit will facilitate responsible sharing of EuroStack innovations and promote the adoption of European standards internationally.

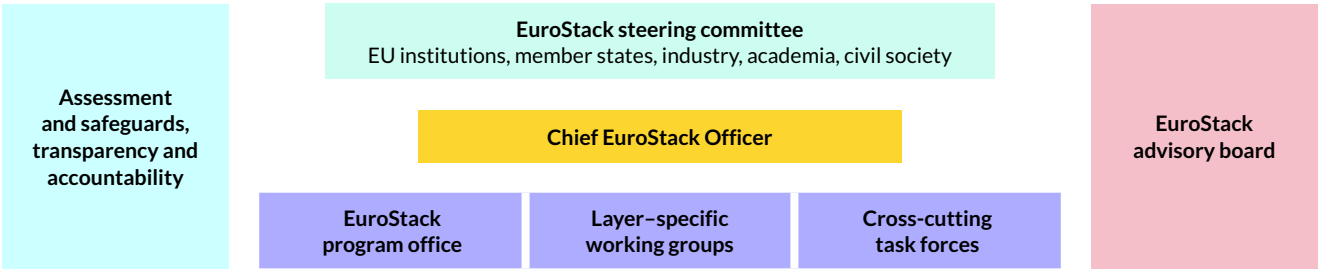
### Ensuring long-term success

This governance framework integrates strategic oversight, operational efficiency, and robust safeguards while prioritizing outcomes and accountability. The EuroStack execution strategy should incorporate sophisticated success metrics

beyond adoption rates, focusing on service quality through benchmarks for latency, uptime, and response times. These metrics should be complemented by user satisfaction surveys and real-time monitoring. To ensure inclusivity, metrics should track adoption across demographics like the elderly, disabled, and rural populations, alongside improvements in digital literacy and support for underserved communities. Privacy and security metrics should measure incidents of data breaches, transparency reporting, the effectiveness of consent management systems, results of penetration testing, and incident response times. Economic impact measures should assess job creation, innovation capacity, ecosystem growth, local technology development, and the expansion of European digital service providers.

By emphasizing agility, transparency, and collaboration, the EuroStack initiative positions Europe to lead in digital sovereignty and innovation, ensuring it remains aligned with its values and long-term objectives in a rapidly evolving digital landscape.

### EuroStack governance framework



## Contact

Bertelsmann Stiftung
Carl-Bertelsmann-Straße 256
33311 Gütersloh
Phone +49 5241 81-0
bertelsmann-stiftung.de

Martin Hullin
Director
Digitalization and the Common Good
Phone +49 5241 81-81864
martin.hullin@bertelsmann-stiftung.de

## Project leadership

Prof. Francesca Bria
contact@francescabria.com
https://www.francescabria.com

Supported by

CEPS

STIFTUNG MERCATOR

UCL IIPP Institute for Innovation and Public Purpose

Commissioned by

BertelsmannStiftung