

Open Digital Ecosystems as a Foundation for Technological Sovereignty, Security of Supply and Competitiveness

The European Union's open digital ecosystem faces a set of interrelated structural challenges that directly affect its capacity to achieve technological sovereignty, strategic autonomy and long-term competitiveness.

A first challenge is the structural mismatch between the EU's extensive reliance on open source software and the lack of systematic investment in its long-term maintenance, security and governance. Open source underpins a large share of Europe's digital infrastructure, yet its sustainability often depends on fragmented and under-resourced communities, creating latent systemic risk.

A second challenge concerns **security of supply**. Public administrations, critical infrastructure and industrial systems increasingly depend on software and hardware stacks that they cannot independently audit, maintain or evolve. This exposes the Union to geopolitical, legal and supply-chain risks arising from dependencies on non-EU jurisdictions and proprietary technologies.

A third, less addressed challenge is the **disconnect between open digital assets and Europe's industrial and manufacturing base**. Open source software, open hardware designs and open standards are rarely integrated into regional innovation, industrial design and production ecosystems. As a result, Europe remains dependent not only for software, but also for critical devices, embedded systems and manufacturing know-how.

Finally, the absence of coordinated institutional capacity at regional and local level limits systematic contribution, reuse and interoperability, reinforcing Europe's role as a user rather than a co-producer of the digital and industrial infrastructure it depends on.

Open Source as an Enabler of Technological Sovereignty and Strategic Autonomy

Open source is a foundational enabler of **technological sovereignty and strategic autonomy**, understood as the EU's capacity to control, adapt and sustain its critical digital and industrial infrastructures without unilateral external constraints.

By enabling transparency, auditability and the right to modify and redistribute, open source reduces dependency on proprietary vendors and mitigates the risk of service discontinuity or unilateral "kill switches". This applies equally to software, firmware and open industrial designs.

Crucially, open source enables sovereignty **without digital or industrial isolation**. It supports global collaboration, interoperability and shared innovation, while allowing Europe to retain control over critical layers of its technology stack in line with its values and regulatory framework.

The Role of the European Commission: From Digital Commons to Industrial Capacity

The European Commission should act as a **strategic coordinator and long-term steward of Europe's open digital and industrial commons**, ensuring coherence across digital, industrial, regional and research policies.

Beyond sustained support for critical open source software, the Strategy should explicitly promote the **establishment of Open Industrial Design and Manufacturing Labs in every EU region**, building on and complementing existing Digital Innovation Hubs, makerspaces and research infrastructures.

These labs should function as shared infrastructures where:

- open source software,
- open hardware and industrial designs,
- open data and open standards converge in real industrial contexts.

They would enable SMEs, startups, researchers, public administrations and citizens to co-design, prototype, test and locally manufacture interoperable, auditable and reusable products. In doing so, they would act as **regional anchors for technological sovereignty**, translating open digital assets into tangible industrial capacity and reducing dependencies in critical supply chains.

Public Procurement as a Strategic Lever

Public procurement should be reoriented to recognise open source and open industrial design as **strategic public assets**, rather than marginal technical options.

This includes:

- requiring that software, hardware designs and digital specifications developed with public funding are released under recognised open licences,
- mandating systematic reuse of publicly funded code and designs across administrations and regions,
- introducing “open source and open design first” assessments, particularly for mission-critical systems, devices and infrastructure.

Public procurement can also act as a **demand-side driver** for Open Industrial Design and Manufacturing Labs, ensuring that public-sector needs are met through open, locally adaptable and reusable solutions.

Ensuring Long-Term Sustainability and Security

Long-term sustainability requires moving beyond project-based funding towards **structural investment in maintenance, security auditing and governance** of widely used open source components, including their integration with hardware and industrial systems.

The establishment of a **European Sovereign Tech and Open Source Fund** should be complemented by sustained support for regional Open Industrial Design and Manufacturing Labs. Together, these instruments would ensure that open digital assets can be securely deployed, tested, adapted and maintained in real-world industrial environments, directly strengthening EU digital and industrial resilience and security of supply.

Competitiveness, Innovation and the Single Market

Open source, open standards and open industrial design are key drivers of **competitiveness**, particularly for SMEs and startups. They lower barriers to entry, enable interoperability and prevent vendor lock-in.

By linking open digital ecosystems with **distributed regional manufacturing capacity**, Open Industrial Design and Manufacturing Labs would:

- accelerate prototyping and time-to-market,
- support circular economy, repairability and sustainability objectives,
- enable European companies to scale innovation while keeping value creation within the EU.

Open digital ecosystems should therefore be treated as **horizontal enablers of the Single Market and Europe's industrial strategy**, not solely as ICT policy instruments.

Citizens and Individual Digital Autonomy

The Strategy should explicitly recognise **individual digital autonomy** as a complementary dimension of technological sovereignty.

Citizens should be empowered not only as users, but as participants in distributed digital and manufacturing ecosystems. Concrete actions could include:

- supporting open-source home servers and routers integrated with regional and European federated cloud infrastructures,
- enabling citizens and communities to contribute compute, storage and connectivity resources securely,
- linking these infrastructures with local Open Industrial Design and Manufacturing Labs, allowing citizens to co-create, repair and adapt devices and digital tools.

This approach strengthens democratic resilience, digital skills, local innovation and trust in European digital infrastructure.

Funding Open Industrial Design and Manufacturing Labs through EU Programmes

The establishment of Open Industrial Design and Manufacturing Labs in every EU region can be effectively supported through a **coordinated use of existing EU funding instruments**:

- **European Regional Development Fund (ERDF)**
To finance physical infrastructure, equipment, and long-term regional anchoring of the labs, integrate them into Smart Specialisation Strategies, and support SME competitiveness and industrial transition.
- **Horizon Europe**
To support the labs as experimentation and innovation platforms through collaborative R&I projects, living labs and pilot lines that develop and validate open industrial designs and manufacturing systems.

- **Digital Europe Programme**

To fund digital capacity building, integration with federated cloud, data spaces and AI platforms, deployment of open source digital tools, and advanced digital skills training.

The Strategy should explicitly encourage **synergies between ERDF, Horizon Europe and Digital Europe**, enabling labs to evolve across their full lifecycle: infrastructure, research and experimentation, deployment and skills.

The European Open Digital Ecosystem Strategy represents a critical opportunity to align **technological sovereignty, strategic autonomy, security of supply and competitiveness** within a single coherent framework.

By combining open source policy with industrial capacity building, regional cohesion and citizen participation, and by leveraging existing EU funding instruments, the EU can move from digital dependency to **shared control, shared innovation and shared resilience**, without digital or industrial isolation.