European
Open Source
Academy

European Open Source Academy Magazine

January 2026

Funded by
the European Union

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The European Open Source Academy

The European Open Source Academy (EOSA) was established to unite distinguished individuals and organisations who have demonstrated exceptional commitment to advancing open source software and hardware across Europe. By recognising and celebrating excellence, the Academy serves as a platform for thought leadership, policy engagement, and community development in the open source software and hardware domains.

The Academy's mission is centred on public recognition — elevating and acknowledging outstanding contributions to open source software and hardware through a transparent, merit-based selection process led by its members. In doing so, the Academy promotes excellence, fosters collaboration, and advocates for the societal and economic value of Open Source and Open Hardware technologies.

The Excellence and Achievement Section

Daniel Stenberg - President

Daniel Stenberg, President of the Open Source Academy, is a Swedish Internet protocol expert and the Founder and Lead Developer of the cURL project, one of the most widely used software components in the world. With 30 years of dedication to open source, Daniel has made lasting contributions through software development, protocol work within the IETF, and authorship of key texts on cURL, open source, HTTP/2, and HTTP/3. A frequent public speaker and currently employed by wolfSSL, Daniel was honored with the European Open Source Achievement Award in 2025.

Catharina Maracke - General-Secretary

Catharina is a senior legal and policy expert with more than 20 years of leadership in intellectual property and open source governance. She began her career directing Creative Commons' global license porting project and later founded the Software Compliance Academy to support organisations in their open source journey. Currently serving as Nokia's Head of Standardisation Policy, she also brings experience from the the World Economic Forum where she served on the Council for the Future of the Intellectual Property System.

Denis Jaromil Roio - Treasurer

Jaromil (Denis Roio) is a software developer, philosopher, and entrepreneur, known for authoring the first 100% free live CD in 2001 and contributing to numerous open source projects. He is director of the Dyne.org foundation, co-chair of the W3C Security Interest Group (SING), and co-founder of the Italian Association of Cryptographers De Componendis Cifris. He received the Vilém Flusser Prize at Transmediale in 2009 while leading R&D at the Netherlands Institute of Media Art (NIMk), was named European Young Leader (EYL 40under40) by Friends of Europe in 2013, and listed among the Top 100 social entrepreneurs by Purpose Economy in 2014.

European Open Source Academy

The Business and Impact Section

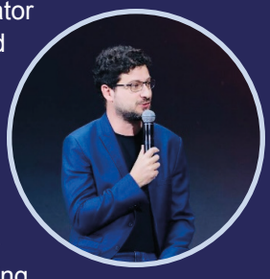
Amandine Le Pape - Head of the Business and Impact Section

Amandine Le Pape, Head of Section – Business & Impact at the Open Source Academy, is the COO and co-Founder of Element, a secure and interoperable open source communication platform built on Matrix – the open standard she also co-founded. Element enables sovereign communications for complex organisations that cannot depend on commercial cloud solutions or unencrypted platforms, serving millions of users including NATO, the UN, the German Armed Forces, the US Navy, and companies like Mozilla. In 2025, she received the Business & Impact Award for her role as a disruptor in open source innovation, with the Matrix project addressing fragmentation in communication technologies like Chat, VoIP, VR, and IoT.

Dries Buytaert - Academy Member

Dries Buytaert is the Founder and Project Lead of Drupal, one of the largest and most active Open Source projects in the world. Drupal is a widely adopted platform for building websites and digital experiences, powering approximately 2% of all websites globally and one in ten in the enterprise sector. Each year, nearly 10,000 people contribute to Drupal. Dries has been leading the development of Drupal for over two decades.

Jean-Baptiste Kempf - Academy Member



Jean-Baptiste Kempf is the creator of the VideoLAN non-profit and a key figure behind VLC media player. Heavily involved in the past 20 years in the open source ecosystems, he is the maintainer of dozens of open source projects, has founded multiple start-ups in the multimedia and gaming space, advised VCs and numerous start-ups and has led large engineering teams at scale. After being CTO/VP Engineering of several startups and scale-ups, he is currently CTO of Scaleway, where he focuses on building a true sovereign European cloud provider. He is also the creator and leader of Kyber, a new open technology start-up made to control machines, drones and robots in real time.

The Advocacy and Awareness Section

Lydia Pintscher - Head of the Advocacy and Awareness Section

Lydia Pintscher, Head of Section – Advocacy & Awareness, is the Portfolio Lead for Wikidata at Wikimedia Deutschland e. V. and a passionate advocate for free software and open knowledge. With over 18 years of experience contributing to free software projects, she studied computer science at the Karlsruhe Institute of Technology and serves as Vice-President of KDE e.V. In her role at Wikimedia, Lydia has been instrumental in leading Wikidata to become one of the most influential open data projects globally, working to democratise access to structured knowledge for developers, researchers, and the wider public. Her dedication to the open knowledge movement and efforts to foster inclusion and diversity have inspired a global community to embrace transparency and collaboration. She was awarded the Advocacy & Awareness Award for her ongoing impact during the Inaugural European Open Source Awards.

Javier Serrano - Academy Member

Javier Serrano is the Deputy Group Leader of the accelerator Controls Electronics and Mechatronics group at CERN, the European Laboratory for Particle Physics. An engineer and physicist by training, his work on controls and data acquisition for particle accelerators was recognised in 2017 through the ICALEPCS Lifetime Achievement Award. He specialises in very precise synchronisation solutions such as White Rabbit, an extension of Ethernet whose reference implementation is fully open source hardware, gateware, firmware and software.

The Skills and Education Section

David Cuartielles- Head of Skills and Education Section

David Cuartielles, Head of Section – Skills & Education at the European Open Source Academy, is the Founder of Arduino and Head of the Masters in Interaction Design at Malmö University. With a PhD in Interaction Design and an MSc in Telecommunications Engineering, David has dedicated his career to advancing education in interactive art, creative coding, interaction design, and embedded technology. He founded Malmö University's IOIO Lab in Design and later established the Full Scale Prototyping Laboratory to bridge engineering and design. As a co-founder of the globally influential open source platform Arduino, he has played a pivotal role in democratising access to hardware and programming skills.

Isabel Drost-Fromm - Academy Member

Isabel Drost-Fromm is Member of the Apache Software Foundation, co-Founder and Member of the InnerSource Commons Foundation. Interested in all things search and text mining with a thorough background in open source project management and open collaboration she is working at Europace AG as Open Source Strategist.
True to the nature of people living in Berlin she loves having friends fly in for a brief visit - as a result she co-founded and is still one of the creative heads behind Berlin Buzzwords, a tech conference on all things search, scale and storage. Additionally, Isabel is a co-founder of FOSS Backstage, a conference on all things related to governance, legal, and security in FOSS projects.

The code we write together: editorial note from the Academy President

When I started writing the code for what would become cURL around thirty years ago, I didn't set out to build a cornerstone of the Internet, or a technology that would go on to be used in nearly every Internet-connected device on Earth. I was a tinkerer and a hacker. All I wanted to do was solve a problem, and to do so in a way that others could use, improve, and build upon.

That's the essence of open source: practical solutions, shared openly, evolving iteratively through collaboration. This collaborative ethos has made open source technologies dominant, pervasive, industry-leading, and high-quality.

Today, open source is more than a development model; it's the backbone of innovation, particularly in Europe, which lacks the global tech firms of the United States. Open source is now a strategic imperative for Europe's digital sovereignty. The software we rely on, from the smallest embedded systems to the largest cloud infrastructures, are largely built on open source.

This isn't just about code; it's about control, transparency, and innovation without being locked into proprietary ecosystems. It's a model that can work, but only if public institutions support the open source ecosystem, and vice-versa.

That's why I accepted the role as President of the European Open Source Academy when my work was recognised at the European Open Source Awards one year ago, I was given the chance to help share what I've learnt and learn from others through the Academy - to help drive impact and promote the interests of the global open source ecosystem for the benefit of Europe.

This is what we want to highlight with the first edition of the European Open Source Academy Magazine. Our first edition, which you will find in the following pages, doesn't just talk about open source, it shows how it has become the necessary foundation for Europe's technological independence.

Inside, you'll see real-world open source projects that power innovation today, meet the communities rolling up their sleeves to build tomorrow's solutions, and get straight talk on how policy can turn code into digital building blocks that promote user choice and sovereign control. Less fluff, and more focus on the tools and stories that matter.

Remember: open source isn't just for developers. It's for policymakers, educators, businesses, and citizens who believe in technology that serves the public good. The best code is the code we write together. And while open source collaboration is global, read on to find out how Europe is leading the way.

Daniel Stenberg

President, European Open Source Academy

Founder and Maintainer, The cURL Project

A message from the European Commission

Dear Community, dear Friends,

As Acting Head of the Cloud and Software Unit at the European Commission, I am proud to introduce this inaugural edition of the European Open Source Academy (EOSA) Magazine.

The European Union is now standing at the threshold of a new digital era, and it is the Commission's responsibility to encourage the open source initiatives that will fuel our digital future and secure the continent's technological sovereignty, cybersecurity, and competitiveness. We are in a crucial period in history where our shared digital future is being shaped. This is a moment when digital sovereignty goals, regional and continental innovation potential, and economic resilience ambitions are not only aspirations but also imperatives for the EU's prosperity and sustainability.

In a world where almost every aspect of our society relies on digital infrastructures, Europe's ability to manage its technological independence relies on our collective capacity to adopt, contribute to, and maintain open source projects, products and ecosystems. Open source software and hardware are more than just tools, they are drivers for autonomy, innovation, and ultimately economic growth. The Commission has embraced open source as a strategic imperative, most notably through the Next Generation Internet initiative, our Open Source Software strategy, our Open Source Programme Office and the European OSPO network. The forthcoming Open Digital Ecosystem Strategy will show our commitment to this innovation model.

This is why the leadership of the Academy, which in January 2026, at the time of this publication, will host the 2nd Annual European Open Source Awards, is so vital. It offers a beacon for public recognition and thought leadership around the success and legacy of the open source ecosystem in Europe, as well as its ongoing relevance. Showcasing this innovation is at the heart of this effort to produce the first EOSA Magazine.

From concrete applications in the medical sector, to the economic impact of open source software and the critical role of open standards for open hardware, this first edition's articles highlight the wide potential of open source initiatives. They showcase real-world examples, provide policy insights, and give public recognition to the important contributions of open source to Europe's digital policy ambitions. It is our hope that these examples will help the broader public recognise the immense societal impact of open source innovations and the people behind them, as well as lift up their relevance and concrete contributions to ongoing future technology policy and practice in the European Union.

While reading through these pages, I invite you to reflect as I did on the great challenges and opportunities ahead, and to think about the enormous potential offered by open source initiatives and the people that devote their lives and energy to them. As you do so, think about how you join us in building a more open, sovereign and innovative Europe, and take a moment to celebrate the dynamism, energy and innovation of an important part of the digital ecosystem we all rely on. I know I will.

Manuel Mateo Goyet

Deputy Head of Unity - Cloud and Software

Can open source be the catalyst for Europe's digital sovereignty?

Open source and the future of Europe's digital sovereignty

By Jutta Horstmann, Co-CEO of the Heinlein Group

Across Europe, the question of who controls our technology has become more urgent than ever.

Digital sovereignty is no longer a theoretical concept discussed in policy papers, it defines how we protect our values, our economies, and our democracies in a connected world.

Europe's ability to act independently depends on something fundamental yet often overlooked: code. Who writes it, who owns it, who controls it, and who can access the data behind it?

Today, most of Europe's digital infrastructure is still based on technologies that are governed by US law. Software that we rely on every day, in government, education, healthcare and business, can, under certain circumstances, be used to violate our own principles of privacy, transparency and accountability.

This is not a theoretical risk. Even when data is stored in a secure data centre in the heart of Europe, it may still fall within the jurisdiction of U.S. authorities.

The invisible influence of U.S. law

Imagine storing confidential data in a European data center: GDPR-compliant, ISO-certified, physically protected. And yet, through U.S. legislation such as the CLOUD Act, Patriot Act, and Foreign Intelligence Surveillance Act (FISA), that same data can be requested and accessed by American agencies.

These laws apply not only to U.S. companies but also to their European subsidiaries and partners.A single corporate link across the Atlantic is enough to trigger legal obligations, often without the knowledge or consent of the affected organisation.

The result is a subtle restriction of sovereignty: European organisations that rely on U.S. cloud providers effectively relinquish control over their own data.In hearings before the French Senate, Microsoft confirmed that it cannot guarantee that European public sector data will remain beyond the reach of U.S. authorities. Similar concerns have been raised in the Netherlands and Denmark, where government audits found that contractual safeguards alone cannot prevent potential data access under foreign law.

Why this matters

Confidentiality, compliance and legal certainty are essential for public authorities, critical infrastructures and regulated industries.

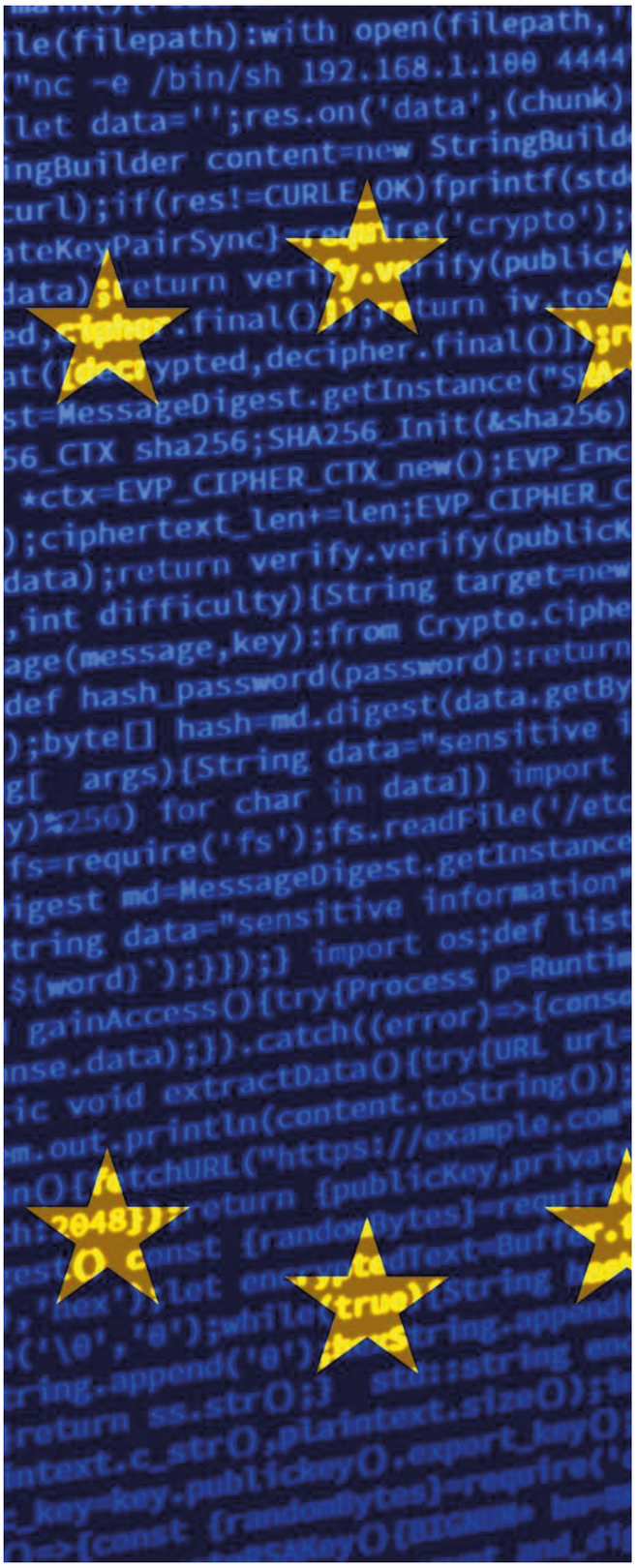
If access to sensitive data can be enforced under foreign law, digital sovereignty and thus democratic autonomy is at risk.This dependency is not only a legal problem, but also a strategic vulnerability.

As other countries consolidate their technological spheres of influence, Europe must ensure that its own infrastructure remains trustworthy, controllable and resilient.Digital sovereignty is therefore both a question of security and competitiveness.The EU has already recognised these challenges.

Initiatives such as NIS2 and the Cyber Resilience Act define clear requirements for secure and resilient digital infrastructures.National strategies like Germany's "Deutschland-Stack" or the proposed EuroStack aim to translate these principles into practice – yet between policy vision and operational reality, a gap remains.

Sovereignty is not a question of symbolism.

It is the practical ability to design, operate, and develop Europe's technological foundations in accordance with European law and in line with European values.



The proven European alternative

For decades, Europe's open source community has been building exactly what is needed: transparent, interoperable, and verifiable alternatives to proprietary technologies. From operating systems and cloud infrastructure to collaboration and communication tools, open source provides the technical foundation for genuine independence.

Equally important, it represents a governance model aligned with Europe's principles – openness, accountability, cross-border collaboration, and respect for privacy.It allows institutions to retain full control over their architecture, data, and direction – without hidden dependencies or vendor lock-ins.

Across the continent, open source foundations,research projects,and companies contribute daily to secure,interoperable digital infrastructure.Together, they show that technological sovereignty is achievable through cooperation, not isolation.

From strategy to implementation

The transition from political ambitions to concrete results is already visible in some European regions.

In Schleswig-Holstein, the state government has introduced the open source video conferencing platform OpenTalk, which is operated entirely locally in a BSI-certified data centre and is used jointly by all ministries and authorities. After a six-month pilot phase, more than 2,000 public sector employees now use a data protection-compliant and sovereign alternative for their daily communication.

In Thuringia, the administration took a similar approach during the pandemic. By involving state ministries early on in the development of new features and applying the principle of 'public money, public code', the project created reusable results that other administrations can adopt.

Berlin also recently took an important step towards open source. In December 2025, the Berlin Senate officially adopted an open source strategy that defines open source not only as a technological decision, but as a strategic lever for strengthening the digital sovereignty of public administration.

Comparable approaches can be found beyond Germany. In 2025, Lyon announced a shift away from proprietary U.S. software in order to reduce dependencies and strengthen digital sovereignty. Lyon is replacing Microsoft with open source solutions, operated in regional data centres and awarded primarily to French and regional companies.

These examples show that sovereignty is not achieved through theory alone, but through collaboration, common standards and long-term commitment.

What needs to change

Real sovereignty comes only through transparency, verifiability, and shared ownership – principles that define open source. Europe now needs political alignment and clear procurement criteria that make the open source model the default for public infrastructure.

Germany's "Deutschland-Stack" initiative reflects an important ambition: to rebuild the state's digital foundation on open standards, interoperability, and transparency.The direction is right, but execution still lacks focus and consequence.

Europe now needs clear priorities and the courage to act: use existing open source solutions instead of reinventing them, keep Big Tech lobbyists out of public infrastructure, and accelerate implementation.The geopolitical situation does not wait for perfect concepts, it demands readiness.

The Heinlein Group demonstrates how this vision can already be implemented in practice.With mailbox, OpenTalk, and OpenCloud, the company delivers open source-based platforms that are designed to strengthen digital sovereignty in Europe.

The broader vision

Digital sovereignty begins with conscious decisions: identifying which systems are mission-critical, assessing dependencies, and building partnerships with providers who share European values.It is not achieved through isolation but through collaboration. Collaboration across borders, sectors,and communities.Open source enables exactly that: transparency where trust is essential, cooperation where resources are limited, and resilience where dependence would otherwise prevail.

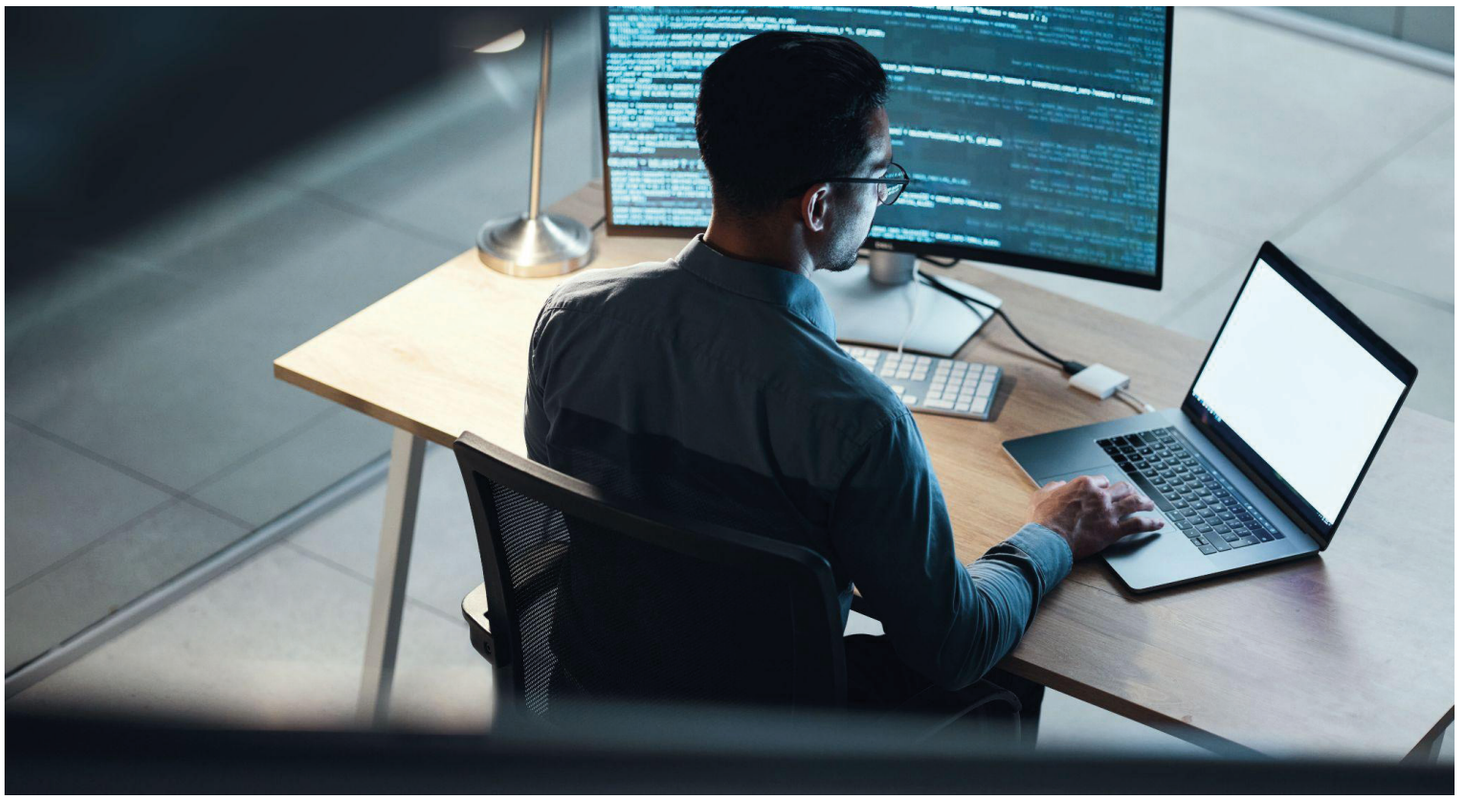
Europe's open source ecosystem already provides a strong foundation – mature technologies, capable providers, and a collaborative community.What is needed now is confidence and coordination to build upon it – and a clear, binding open source strategy – in Germany and across Europe.

About the Author

Jutta Horstmann is a computer scientist, entrepreneur, and open source expert. Since September 2025, she has been Co-CEO of the Heinlein Group, which enables companies and public institutions to achieve digital sovereignty, security, and sustainability. With more than 25 years of experience in IT and leadership, she is committed to digital resilience and open source technologies.

Open source: the code is open, but dependence remains

By Gaël Lago, Director of Open Source Software Assurance at LINAGORA



Myths and misconceptions

Proprietary software makes us dependent: on their vendors, their terms, their calendars.

Every update brings constraints, every migration a cost. Each time, it's the same story: we lose a little more control over our digital tools, our data, our choices.

In contrast, open source has emerged as a promise of autonomy. Open software frees us from these chains: the code is accessible, modifiable, reusable. We can adapt tools to our needs, choose our hosting infrastructure, and retain control over our data. On paper, everything seems in place: freedom, transparency, control.

We are told that through open source, we will finally regain our digital sovereignty. **It's false**.

Open source was never designed to guarantee a state's sovereignty. It was born from the will to pool efforts, promote transparency, and build digital commons. These commons are valuable, but they do not confer power. Sovereignty is not decreed by a licence. It is earned through the capacity to influence governance, to shape direction, and to invest durable skills and resources.

Using free software does not make you free. Dependence does not disappear with open code. It shifts toward those who write that code, who maintain it, who decide its priorities. When the main contributors to Kubernetes, RHEL or Chromium are American, our freedom remains conditional. We use open code, but decisions are still made elsewhere.

A project being open source does not make it neutral. Behind every major platform stand companies, foundations, and power dynamics. The United States understood long ago that open source is not an alternative to software cap-

italism, it is one of its instruments. They invest massively in it. They place their engineers, fund projects, and structure governance. What they gain from it is influence and leverage.

Europe, meanwhile, consumes.

The reality of dependence

This posture of a mere consumer is untenable. It amounts to hiding behind a collective ideal without assuming responsibility for it. If we want open source to serve our sovereignty, we must stop treating it as a patch or an escape route from cloud giants. We must make it a pillar of our industrial and political strategy.

And that requires one simple thing: acting together. No European country, alone, has the critical mass to rival the United States or China. France, Germany or Italy can multiply national initiatives; they will remain scattered islands facing continental digital powers.But if we join forces to build European commons, if we participate collectively in the governance of major global open source projects, then we can once again become a force.

This union must not be limited to declarations of intent.It must translate into an effective presence where the direction of the software we rely on is decided:in the foundations, technical committees and consortiums that define standards.Open licenses allow us to copy code.Sovereignty requires us to decide its future.

Because dependence does not stem only from code, but from what surrounds it. Software forges, build chains, package registries, CI/CD or security analysis platforms. Most are hosted outside Europe.GitHub,Docker Hub, NPM: all belong to non-European actors.

We opened the door to the code but handed the keys of the house to someone else.

A path to action

Regaining control of our information systems begins here with the vital organs. Operating systems, servers, collaborative tools, messaging platforms, CI/CD pipelines, deployment environments: these are what determine our ability to develop, evolve and secure our own solutions.

Public procurement is the most immediate lever. Public money must serve to regain control of the digital sphere, not to fund our dependence. Every public contract is an act of sovereignty: it must strengthen our commons, not those of others.

Europe must stop subsidising innovation while buying elsewhere. Every call for tenders should include upstream contribution clauses, reversibility, and open governance. Every euro spent on software widely used by European institutions should strengthen our collective capacity to influence its roadmap.

That means investing in continuity: funding European maintainers, guaranteeing long-term support, pooling resources within foundations capable of speaking on equal terms with major global open source organisations. It is not about making everything European, it is about no longer leaving the keys of our digital infrastructure in the hands of actors who do not share our interests.

While we debate sovereignty, our critical infrastructures already run on technologies designed, funded and governed elsewhere. Each day,our dependence takes a deeper root.

Yet Europe has the means to act. It has already built technological commons in other fields: data regulation, telecommunications standards, security certification. It can do so again in software. But that requires recognising that open source is not a technical issue: it is a political project.

Opening code is a necessary condition,but not a sufficient one. Sovereignty is measured by the ability to maintain, decide and replace without depending on others.And for that, we need engineers, funding, coherent public policies and a collective will.

Europe must shed the illusion that transparency equals independence.Openness protects nothing unless it is paired with a strategy of influence. Open source is not sovereignty but it can be a vehicle of it, if we reclaim the levers, govern our commons, and anchor them at the heart of our industrial strategy.

Now is the time for our technical leaders and public officials to act, to invest in open source, to contribute, and to reclaim the future of our digital commons.Open source is not the end of our dependence, but the beginning of our power.

About the Author

Gaël Lago is Director of Open Source Software Assurance at LINAGORA, where he leads initiatives to strengthen trust and governance in open technologies. With a background at the crossroads of technology and public policy, he advocates for a stronger European voice in digital strategy. A committed supporter of digital sovereignty, he actively promotes public investment, open collaboration, and the development of independent European digital infrastructures.

Protocols: Europe's next sovereignty frontier

By Kelly Roegies, Board of Advisors Member at Furt'her

Europe's digital sovereignty strategy is still built on industrial logic. The European Commission measures progress in chips produced, data centres built,and AI hubs launched.What it rarely measures is Europe's ability to shape the rules that keep these systems interoperable. True sovereignty in a networked world is not only about where infrastructure sits but about who participates in the design of the protocols that hold it together.

Protocols are the coordination layers that allow systems to communicate,verify information and exchange value.They are the shared languages that make the internet function. Yet they barely appear in Europe's strategic thinking about digital sovereignty.

The recent **Franco-German Economic Agenda**, which outlines a joint vision for digital sovereignty, refers to clouds and chips but not to the shared rules that make them interoperable. The Digital Commons EDIC aims to coordinate open source projects across borders, yet its scope stops short of the protocol layer.

This absence in strategy translates directly into how money is spent. The **Digital Europe Programme** and **Horizon Europe** allocate billions for infrastructure and research consortia but nothing for protocol governance or the shared infrastructure that continues once projects end. Europe funds applications and platforms while the coordination layers beneath them receive neither budget lines nor strategic attention.

This omission could prove costly. Europe could own every server on its territory and still depend on code and coordination logic written elsewhere. True digital sovereignty is not only achieved through hardware ownership but through participation in the design of the systems that bind everything together.

Building influence through participation

The first generation of internet protocols — TCP/IP, HTTPS, email — were public goods from the start. They were maintained by communities that included European universities,engineers and standards bodies. Europe once helped shape the open internet through contribution and collaboration rather than control. That tradition has not disappeared entirely, but it has lost institutional support and strategic direction.

A new generation of protocols has matured with the same governance principles. For example, **Ethereum**, launched in 2015, now coordinates distributed computation across thousands of independent operators. **Matrix** enables decentralised communication with production deployments in governments and militaries. **IPFS** supports peer-to-peer data storage at scale. These systems are governed through open discussion and technical consensus instead of corporate control. They raise questions that Europe claims to care about: who can participate, who verifies what happens and who decides when rules change.

Yet Europe's policy response focuses on regulating the services built on these protocols rather than participating in how the protocols themselves are governed. The EU mandates European Digital Identity Wallets through **eIDAS 2.0** but provides no funding for the decentralised identifier protocols— technical standards that let identity systems work across platforms without central control— that make them interoperable.It regulates crypto-assets through **MiCA** while staying absent from the governance of the protocols those assets run on. It explores a **Digital Euro** without meaningfully engaging with the communities building programmable money protocols.

The gap between policy and practice is not absolute. Europe has already proven it can lead in open protocols. France's Tchap connects 400,000 civil servants through

Matrix, one of the world's largest public sector deployments of decentralised communication infrastructure. Germany's healthcare system and military also chose Matrix over proprietary alternatives. These production systems prove large-scale public sector adoption of open protocols works.

These successes prove the model works.The challenge is replicating it.**Tchap** operates independently of EU digital sovereignty funding programmes. Germany's institutional adoption happened through individual procurement decisions rather than coordinated policy guidance. What Europe lacks is not capability but a strategic framework that treats protocol development as essential to sovereignty.

The moment to redefine sovereignty

The internet's first generation of protocols was treated as shared infrastructure. Europe helped shape that foundation through public research, standards bodies and academic collaboration. The next generation will decide how identity, data and value move across borders. If Europe wants to remain sovereign in this new phase, it must recognise participation in protocol governance as statecraft, not technical housekeeping.

Yet the **Summit on European Digital Sovereignty** last November showed how far Europe still has to go. It delivered landmark commitments on cloud sovereignty, AI infrastructure, and cybersecurity. France and Germany led with €12bn+ private investment pledges and launched a joint Digital Sovereignty Taskforce.Tellingly absent was any recognition of open protocol governance as public infrastructure on par with chips and data centres.

That choice will shape the kind of digital power Europe becomes. Building data centres and factories may strengthen capacity, but it will not secure autonomy. Real sovereignty depends on Europe's willingness to maintain the commons it already relies on. Funding open protocols, taking part in their governance and embedding their principles into public procurement would signal a new kind of power: not ownership, but stewardship. That is where Europe's sovereignty will be tested and earned.

About the Author:

Kelly Roegies is a Brussels-based Policy Communications Strategist with over a decade of experience and is currently working for a European trade association. Outside her professional role, she writes and speaks about the role of open blockchains as digital public infrastructure and their potential to strengthen European digital sovereignty. She also serves as a Board Advisor at Furt'her an organisation supporting women in Web3 and AI, and contributes to the EU-funded Women in Digital Forum.

The power of many: how open source foundations multiply their impact on CRA implementation through the Open Regulatory Compliance Working Group

By Gaël Blondelle, Chief Membership Officer at Eclipse Foundation

The Cyber Resilience Act (CRA) marks a turning point in how Europe approaches the security of digital products. For the first time, it sets clear,horizontal rules across all sectors, requiring that hardware and software placed on the market meet essential cybersecurity requirements. This is a positive and necessary step toward improving trust in digital technologies, but it also introduces challenges for the open source ecosystem.

The CRA was designed primarily with traditional manufacturers in mind. Its requirements for security, documentation, and accountability were written for commercial supply chains, not for globally distributed communities of volunteers and foundations building open source

software.This mismatch created uncertainty across the ecosystem: *How could open source contributors, who often work without direct commercial intent, fit into a regulation that assumes there's always a "manufacturer" at the top of the chain?*

It's in this complex space that the Open Regulatory Compliance (ORC) Working Group, hosted by the Eclipse Foundation, has emerged as a key forum for collaboration, learning, and action. ORC brings together over 60 institutions, including, for the first time, 20 different open source foundations to work on one shared goal: making CRA compliance understandable, achievable, and aligned with the reality of open source development.

Together, they are demonstrating that the most effective way to reduce compliance friction is through cooperation. With the right collaboration and shared understanding, it can become a catalyst for quality, security, and trust. The ORC Working Group has become the platform where foundations can exchange best practices, identify gaps in standards, and help regulators understand how open source actually operates.

Why foundations are essential to CRA implementation

The CRA introduces new expectations around vulnerability handling, documentation, and security assurance. For individual developers or small projects, these requirements can seem challenging. However, open source foundations are uniquely positioned to provide structure, continuity, and governance that make compliance possible at scale.

As open source software stewards, foundations already serve the communities managing legal frameworks, ensuring project sustainability, and supporting secure development practices. Organisations such as The Apache Software Foundation, OWASP, the Python Software Foundation, Eclipse Foundation, and many others exemplify this role. By providing governance structures, coordinated security policies, and long-term project continuity, these foundations enable developers and organisations to work confidently within shared frameworks.

This collective approach avoids fragmentation and helps ensure that by organising early and speaking collectively, open source foundations can help shape how policy is implemented rather than simply reacting to it. The collaborative model established by ORC provides a template for how the open source ecosystem can continue to thrive under new regulatory realities: grounded in transparency, built on trust, and guided by shared responsibility. As the CRA moves toward implementation, the message from the open source community is clear: we are ready to en-

gage, to adapt, and to help build the resilient, secure, and innovative digital future that Europe envisions.

In summary, the Cyber Resilience Act challenges us to think differently about how open source and regulation can coexist, and also how the open source foundations need to coordinate to collaborate, share learning, and have mutual respect among all stakeholders (foundations, developers, and policymakers).

When open source foundations work together, compliance becomes not just possible, it becomes an opportunity to strengthen the entire digital ecosystem.

Learn more about the work ORC is doing, find CRA resources, or engage directly with our community at **orcwg.org**.

About the Author :

Gaël Blondelle is an open source advocate with 20 years of experience. He joined the Eclipse Foundation in 2013 and is now Chief Membership Officer. In 2024, he joined the board of the Open Source Initiative where he serves as Secretary. Previously, Gaël co-founded an open source start-up where he served as CTO, and led open source business development for a systems integrator. At the Eclipse Foundation, his mission is to help organisations embrace open source, fostering innovation through openness and collaboration. Learn more about Gael's work : **https://orcwg.org/**

From initiatives to individuals: open source champions amongst the European open source community

The Architecture of Influence: the CNLL and the industrial maturation of France's open source ecosystem

By Stéfane Fermigier, Founder and CEO of Abilian

This article presents a case study of the "Conseil National du Logiciel Libre" (CNLL), France's representative body for the open source business sector. From our founding in 2010, our organisation has undergone a significant evolution, transitioning from a nascent federation of regional clusters of small and medium-sized enterprises (SMEs), into a strategic actor in national and European digital policy.

We argue that this maturation was not accidental but the result of a deliberate, multi-phase strategy focused on three pillars: first, building a coherent industrial identity through federation; second, developing instruments of influence based on empirical data and targeted legal action; and third, scaling our advocacy to engage with complex European regulations.

Our experience offers a transferable model for how national open source ecosystems can organise to achieve substantive policy recognition and contribute to a more resilient European digital economy.

Phase I (2010-2015): From regional strengths to a federated force

By 2010, France already possessed a vibrant open source ecosystem, with dynamic business clusters in several regions, some counting over a hundred members. This regional vitality was our core asset, but our fragmentation was a weakness. To confront a market defined by systemic vendor lock-in, which limited opportunities for our members and constrained client autonomy, our initial objective was not political influence but industrial organization. The CNLL was formed as a federation of ten of these regional clusters to create a unified entity that could aggregate this regional power and project it onto the national stage.

This foundational phase was characterised by internal ecosystem development, organising events like the "Printemps du Libre" ("Open Source Spring") to foster a shared industrial consciousness. This internal cohesion provided the necessary platform for our first forays into public policy.

Ahead of the 2012 presidential election, we engaged all major candidates with a detailed questionnaire, successfully positioning open source as a topic of political relevance. This effort contributed to the issuance of the "Ayrault Circular" in September 2012, a key administrative directive that formally encouraged the use of free software within the French administration.

Our legislative efforts during this period taught us that progress is rarely linear, and that securing policy is a multi-front battle. A hard-fought campaign to embed our principles in the "Loi sur la refondation de l'école" (School Refoundation Act) resulted in failure, defeated by powerful, concerted pushback from incumbent lobbies, notably AFDEL (a software vendor association heavily financed by Microsoft) and Syntec Numérique. Yet, this defeat was followed by a landmark success in 2013, when we successfully advocated for an amendment to the law on Higher Education and Research (ESR), which enshrined the principle that "free software is to be used in priority."

In 2016, our engagement with the Digital Republic Law yielded a more complex, partial success. We secured Article 16, which mandates that public bodies must "encourage" the use of free software to preserve the "maîtrise, pérennité et indépendance" (mastery, sustainability, and independence) of their information systems. The law's fatal flaw, however, was that this "encouragement" came with no enforcement mechanisms. To make things worse, no significant budget or dedicated team, and no substantial operational support was ever allocated to translate this principle into practice.

This vacuum ensured that the default behavior—procuring familiar U.S. solutions—continued unabated. This phenomenon has a name in French policy circles: corruption

des esprits, or a 'corruption of the mind.' It describes a deep-seated institutional bias where decision-makers, saturated by decades of marketing and lobbying, reflexively equate dominant, non-European solutions with quality and inevitability, even when superior local alternatives exist. Article 16 gave us a legal argument for sovereignty, but it did nothing to cure the underlying condition.

This period also culminated in a strategic rebranding of our members from "SSLL" (Société de Service en Logiciel Libre, or Free Software Service Companies) to "ENL" (Entreprise du Numérique Libre, or Digital Open Businesses). This was a move designed to dismantle a persistent and damaging misconception: that sustainable business in open source is limited solely to service delivery.

By championing a term that encompassed software vendors, integrators, and consultants alike, we were making a clear economic statement that product-based and hybrid models are also central to our industry's value proposition.

Phase II (2015-2019): Developing instruments of influence

Having established a coherent identity, our next phase focused on building the tools necessary for sustained and effective advocacy.This involved a deliberate shift towards an evidence-based approach and a more assertive defense of our sector's interests.

First, we prioritised economic quantification. We began commissioning regular, independent market studies to empirically measure our sector's contribution to the national economy. Our 2015 study, conducted with Pierre Audoin Conseil (PAC), estimated the French Open Source market at €4.1 billion, employing 50,000 people. Subsequent studies confirmed this trajectory, with the market reaching €4.5 billion by 2017 and over €5 billion by 2019.

This data allowed us to frame our arguments not in terms of technological preference, but in the language of economic growth, job creation, and industrial competitiveness. Our sector's growth rate consistently doubled that of the overall IT market, a fact that gave our policy recommendations significant weight.

Second, we demonstrated a willingness to engage in legal and public confrontations to uphold principles of fair competition and open standards. Two cases are illustrative. In 2015, through the "Edunathon" collective, we initiated legal action against a major partnership between the Ministry of National Education and Microsoft, arguing it violated public procurement law and distorted the educational technology market.

In 2019, we publicly challenged the French patent office (INPI) for mandating the proprietary .docx format for submissions, a clear violation of the government's own General Interoperability Framework (Référentiel Général d'Interopérabilité or RGI v2), which recommended the open standard ODF. These actions established our reputation as a vigilant watchdog, willing to hold public institutions accountable.

Third, we created platforms to promote the successes of our ecosystem.The annual "Acteurs du Libre" awards were established to recognize excellence in open source strategy, commercial development, public-private collaboration, and other categories established subsequently, providing tangible examples of the sector's maturity and innovation.

Phase III (2020-Present): Engaging with strategic regulation on the European stage

The current phase of our evolution is defined by two major shifts: the centrality of "digital sovereignty" in the political discourse and the increasing locus of determinative regulation at the European level. Having spent a decade advocating for what we then called "technological independence" and "autonomy," we were well-prepared for this new strategic context.

Our engagement with the EU's Cyber Resilience Act (CRA) exemplifies our matured approach. Our initial analysis identified the proposed regulation as a significant threat to the open source development model, with the potential to impose disproportionate compliance costs on SMEs - costs the European Commission's own impact assessment estimated could be as high as 30% of development expenses.

Our response was multi-faceted. We published detailed position papers, engaged in direct lobbying with French and EU officials, and coordinated our actions with European partners through APELL, the European federation of like-minded open source business organisations we co-founded in 2020.

Additionally, we moved beyond opposition to constructive engagement. Recognising the legitimacy of the regulation's security objectives, we commissioned a "CRA Compliance Guide" in late 2024. This guide provides practical, actiona-

ble advice for open source actors to navigate the new legal framework. This proactive stance demonstrated our industry's commitment to security and positioned us as a necessary partner in the implementation of the regulation.

This strategic posture now informs all our high-level advocacy. Our legal challenges to the hosting of the national Health Data Hub on Microsoft Azure were framed as an analysis of the data security risks under extraterritorial laws like the US FISA and CLOUD Act. This shift from defense to offense is best embodied by our support for industry-led, bottom-up initiatives. Beyond our work with APELL, we are active supporters of the EuroStack initiative. Its formal mission is to promote "the sustainable growth of the digital economy in Europe and establish Europe's strategic independence from non-European digital infrastructures."

To this end, it has articulated a strategy, operationalised through three core pillars—'Buy European,' 'Sell European,' and 'Fund European'—all underpinned by 'openness as policy' as a foundational principle. Our support for this initiative is the modern expression of principles we have championed for over a decade: these 3+1 pillars directly echo many of the core tenets of our own "10 Propositions for an Industrial Policy for Free Software," first presented to the French government back in 2012.

Conclusion

The evolution of the CNLL over the past fifteen years demonstrates a clear trajectory: from internal federation to the development of sophisticated instruments for national influence, and finally to strategic engagement with European regulation.

Our market studies have been instrumental, providing the empirical foundation for our advocacy. Our latest data from 2022 pegs the French market at nearly €6 billion, with 64,000 jobs and a projected need for 26,000 new professionals by 2027, confirming France's status as a leading open source economy in Europe.

Our experience demonstrates that for an open source business ecosystem to achieve meaningful policy recognition, it must organise itself as a coherent industrial sector. It must ground its arguments in credible economic data, be willing to defend its market through targeted legal and public action, and possess the maturity to engage constructively with complex regulation at the highest political levels.

The core objective remains what it has always been: to secure a level playing field where open, transparent and interoperable technologies can thrive. Our journey in France offers a tested model for working towards that goal.

About the Author

Stéfane Fermigier is a French tech entrepreneur and a prominent open source advocate. He is currently the Founder and CEO of Abilian, a company that develops enterprise information management solutions with open source software. Previously, he founded Nuxeo in 2000. A graduate of ENS Paris with a PhD in mathematics, Fermigier has been instrumental in fostering the open source ecosystem in France and Europe. He has co-founded and led several key organisations, including AFUL, GTLL, CNLL and APELL. He is also a co-founder of EUCLIDIA and EuroStack, and of numerous open source projects, mostly in Python.

Our Website: **https://cnll.fr/**
Les Acteurs du Libre Awards: **https://lesacteursdulibre.com/**

Gaël Duval on fighting for our right to digital freedom

By Katharina Wagner, Communication Assistant at Murena

Gaël Duval is well known in the tech world as the creator of Mandrake Linux (later Mandriva Linux) – one of the first Linux distributions designed to make open source operating systems accessible to a broader audience beyond technical experts.

Over the years, he became increasingly aware of how extensively Big Tech companies were exploiting personal data - including his own. Driven by the desire to regain control over hispersonal information, protect his family and empower others to reclaim their digital privacy, he decided to create an operating system of his own.

It was the birth of /e/OS: an open source, AOSP-based operating system designed to break free from surveillance-driven business models.

/e/OS is a privacy-first, deGoogled mobile OS built to detect and prevent tracking on smart devices - protecting users' fundamental right to privacy.

Unlike many other privacy-focused operating systems, it offers an intuitive, user-friendly interface that makes it accessible to everyday users from day one. To further his mission of giving users back control, Gaël founded Murena: a company that provides smartphones with /e/OS pre-installed, ready for anyone who values digital freedom and personal privacy.

By also providing Murena Workspace, the privacy-friendly online office suite, Murena created a privacy-first ecosystem that today empowers nearly 100,000 users worldwide to take back control of their data.

We asked Gaël 3 questions to find our more about his mission and why Murena matters today.

I. What have been the biggest challenges in building /e/OS and promoting digital freedom beyond Big Tech?

There have been, and still are, challenges at different levels.

From the very beginning, the biggest challenge has not been technical, but cultural. Big Tech companies are deeply anchored in our society; their products have become symbols of status and convenience. Many users stay within the same ecosystem without questioning it - we are creatures of habit, and few take the time to reflect on what this dependency means.

Most people still don't realize how deeply their personal data is collected and monetized by Big Tech. For many, the problem doesn't seem urgent enough to take action. Some even think we're exaggerating, while the reality of constant digital surveillance is undeniable. Helping users understand that privacy is not just technical, but a matter of freedom and democracy, remains a core part of our mission. Anoth-

murena

choose freedom

er challenge is technical: ensuring mobile application compatibility with /e/OS is sometimes challenging in a world where we have only two ultra dominant mobile operating systems publishers who don't want to play fair and put everything in place to prevent the mobile OS market to be truly open to competition. Still, awareness around digital sovereignty is growing and luckily, regulation (DMA) is supporting our journey to a better and citizen-supporting digital world. More users now see that having a real choice - outside the Big Tech duopoly - is essential for a healthier digital future.

2. What would you say to users who claim, "I'm just a regular person, I don't care if Google is watching me – I have nothing to hide"? Why should they care?

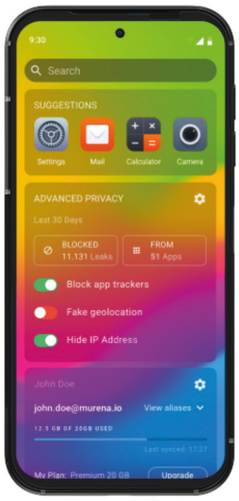
Privacy isn't about hiding but about having control over what you own and who you are. Even if you're not a public figure, your personal data has value. It tells companies who you are, what you like, and how you think. With today's algorithms, this information can be used to influence your behavior, your opinions, and even your choices as a voter or consumer.

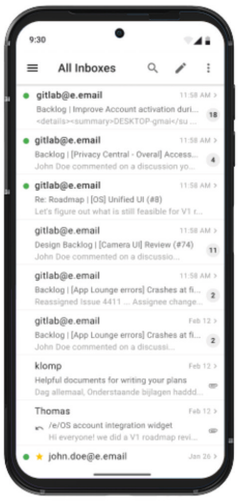
We often forget that our photos, messages, and search histories form a detailed portrait of our lives. You may not know where your private pictures end up, or how your personal data is being used. Privacy is a fundamental right - the right to think, to speak, and to share (or not share) freely. Everyone deserves the freedom to decide what to make public and what to keep personal. It's not about hiding - it's about preserving human dignity, digital freedom, and the ability to form and express your own opinions on your own terms.

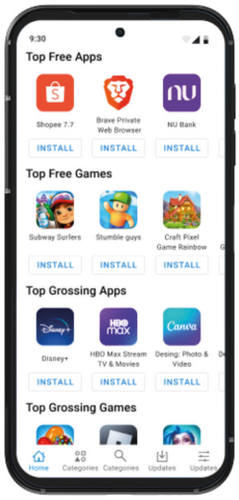
3. Why does your project matter for European digital sovereignty and why should we actually care about European digital sovereignty at all?

Digital sovereignty is about the ability to decide - as individuals, organizations, and nations - how our data, infrastructures, and technologies are controlled. Today, most of Europe's digital backbone relies on foreign providers. From cloud services to mobile operating systems, key parts of our daily lives depend on a handful of non-European companies. This dependency makes us vulnerable, not only economically but politically. Imagine if, overnight, access to essential public data - from hospitals or administrations - was restricted because a foreign company or government decided to block it. This is not hypothetical: when Microsoft blocked the International Criminal Court prosecutor Karim Khan's email account following U.S. sanctions, it showed how quickly a public institution could lose access to its own communications - and how fragile our autonomy really is.

/e/OS matters because it proves that a different path is possible. By offering a complete, privacy-respecting ecosystem independent from Google or Apple, it demonstrates that Europe can build and maintain its own technological infrastructure. True digital sovereignty begins with individuals regaining control over their data. When citizens are empowered to use technology on their own terms, Europe as a whole becomes more resilient, innovative, and free. It's time for governments and other European public institutions to understand this and turn it into action - and they will, once the majority of people start asking for it.







The Twin Transition in open source: sustainably scaling open source projects for our climate targets

By Lisa Gutermuth and Claire Pershan (Mozilla Foundation)

Open source, community-driven technologies—projects designed with, not just for, the communities they serve—are essential building blocks of a better internet future. When people design and build for the problems they understand best, the results serve community needs more effectively and equitably.

However, these critical technologies face a systemic challenge: they consistently fail to cross the threshold from promising prototype to sustainable project.This “valley of death” claims countless innovations that could offer genuine alternatives to dominant technology paradigms.

This challenge is particularly acute for open source projects addressing the climate crisis and other pressing challenges. At a moment when Europe urgently needs ecologically sustainable technology solutions, the very projects that could help achieve climate targets may be struggling to find organisational sustainability. The market doesn’t yet adequately support mission-driven technologies, even as policymakers recognise their strategic importance.

Traditionally, when the open source community talks about sustainability, we mean the long-term organisational model of the project. At Mozilla Foundation, we are focused on supporting open source, community-led projects addressing our greatest challenges like contributing to achieving climate targets. We need open source projects that can survive and thrive organisationally so they can deliver on their environmental mission at scale.

Europe’s Twin Transition, a call for open source

According to the **European Environmental Agency**, Europe is the world’s fastest warming continent. European policymakers know that they need to address the green and digital transitions together. The Twin Transition was a cornerstone of the 2020 Commission Work Programme, and in the current Commission, Executive Vice-President Teresa Ribera Rodríguez, Commissioner for a “Clean, Just, and Competitive Transition”, is mandated to lead Europe towards ecological sustainability, technological innovation and social justice all at once.

Meanwhile, European policymakers across the institutions no longer take it for granted that digital is always green; they are now also grappling with how to address the environmental impact of technology itself. Through upcoming initiatives like the Cloud and AI Development Act and the Strategic Roadmap for Digitalisation and Artificial Intelligence, the Commission is setting out its aims for the energy efficient and sustainable use of technologies.

Europe’s climate imperatives and digital resilience goals must reinforce each other. Certain digital technologies will be critical for the EU to meet its climate targets—from smart grids to emissions monitoring to resource optimisation. Meanwhile, intelligent software, efficient computing, and increased transparency can help in reducing the energy impact of our technology solutions across sectors.

Our digital technologies themselves must advance, not compromise, our environmental goals. In the EU and around the world, concerns are mounting about the resource consumption of tech, especially given the rise of generative AI, which is dramatically more resource intensive than other forms of computing. Alongside the growth of cloud computing, this trend puts international and European climate targets at risk. Rising energy demand and emissions will impact grid resilience and energy prices, and the availability of clean energy for other sectors and for domestic use.

Open source as an approach is uniquely positioned to help the EU achieve its digitalisation and climate targets, and to do so in a manner that ensures its strategic autonomy and resilience. Open source is underpinned by the belief that projects which are built, maintained, and continually improved by communities are stronger and more innova-

tive than those held behind lock and key, and that they will respond more precisely to the needs of their communities.

Open source is also driven by the logic that no one should waste effort unnecessarily if something can be shared or repurposed, and that software is made more effective and more efficient through widespread adoption. Put another way, inefficient energy consumption is a bug that many eyes can help to fix.

At Mozilla Foundation, we believe open source is a strategic approach to realise the Twin Transition. But to get there, we will also have to ensure that relevant open source projects make it through the valley of death. In this sense, environmental sustainability and project sustainability go hand in hand.

Mozilla Foundation's grantmaking at the intersection of climate and tech

For over 25 years, Mozilla has championed the principle that the internet should be a public resource, open and accessible to all. We built Firefox as a community-powered alternative at a moment when proprietary browsers threatened web openness. And through the work of Mozilla Foundation, the nonprofit behind Firefox, we've fueled an ecosystem that helps mission-aligned technologies beyond Firefox survive and thrive.

During the last decade, Mozilla Foundation's grantmaking has supported open source technologists whose work is helping to build a better tech future by working on issues like reducing the bias in and increasing the transparency of AI, and more recently addressing the critical data and transparency gap around AI's environmental impact.

For example, through our Mozilla Technology Fund and partnerships like the Green Screen Coalition, we've funded projects that make the invisible visible. CodeCarbon, a French open source project, enables developers to estimate the energy consumption and carbon emissions of their code by measuring hardware electricity consumption and combining it with regional carbon intensity data. Zeus allows for energy measurement and optimization of modern machine learning systems. Green Coding Solutions evaluates energy consumption in the Linux Kernel at the process level. These projects demonstrate that systematic measurement of software emissions is achievable, and that open source provides the transparency developers and policymakers need for informed decisions on resource allocation and tradeoffs.

Helping open source projects survive the 'valley of death': launching the Mozilla Foundation incubator

Through this work, we observed a consistent pattern: promising open source projects with real technical capability and genuine community need consistently struggle at a specific inflection point—the transition from promising prototype to sustainable project. This "valley of death" claims countless innovations that could serve the public good.

Traditional funding models push projects toward premature commercialisation or expect them to achieve sustainability through volunteer effort alone. Neither approach adequately serves mission-driven technologies, especially those addressing challenges like those in the twin transition, where public value may not align with immediate market returns.

Based on these learnings, Mozilla Foundation is launching an Incubator specifically designed to holistically support open source projects at this pivotal stage. We're bridging the gap between promising prototype and sustainable project, strategically directing our philanthropic risk capital to create pathways where none currently exist.

Our approach differs from traditional accelerators fundamentally: we focus on product-community fit rather than product-market fit. Traditional profit-driven models push projects toward rapid growth, commercialisation and market validation, often forcing compromises that undermine community values. For mission-driven open source projects, the sustaining resource isn't necessarily paying customers; it's a community of users, contributors, maintainers, collaborators, and aligned funders who believe in the project's public value.

We will help projects identify and build the specific communities they need to achieve their goals without compromising their values. We remain agnostic about organisational form-a project might become a nonprofit, a for-profit social enterprise, or a volunteer-run community effort. What matters is getting past the valley of death to sustainability at the scale optimal for impact, to help address the issues that matter most.

In this case, what we want is to ensure that open source software remains a driver of the Twin Transition. It should bring transparency and innovation in service of environmental sustainability, without mission compromise, and with sustained influence.

Read more about our new Incubator here: **https://www.mozillafoundation.org/en/what-we-do/grantmaking/incubator/**

About the Authors :

Lisa Gutermuth is a Senior Program Officer at the Mozilla Foundation where her work focuses on enabling community-centered tech projects move from prototype to sustainable project. Lisa is also Mozilla's representative member for the Green Screen Coalition, which seeks to build out the intersection of digital rights and climate justice, as well as the European AI & Society Fund.

Claire Pershan is the is the Mozilla Foundation's Brussels based Advocacy Lead. She connects Mozilla Foundation's community to policy discussions that affect them and to which they can contribute, in particular in the areas of data agency, privacy, and the open web.

Finding each other: discovery without walled gardens

By Benjamin Bellamy, Business Development Manager for AI Solutions & Community Management at LINAGORA

The last open frontier: how podcasting preserved the original internet spirit

In an era where algorithms determine what you see and whom you reach, podcasting stands as an unlikely rebel. While social media evolved into walled gardens, podcasting preserved the open, interoperable architecture of the early internet.

Podcasting's origins are distinctly European. French entrepreneur Tristan Louis proposed the concept in 2000, the first podcast appeared in 2003, and UK journalist Ben Hammersley coined the term "podcast" in 2004. Built on RSS and open standards – the radical idea that anyone can publish without platform permission – podcasting predates and thus escaped the social media platform trap.

The numbers are remarkable. As of 2025, approximately 4.5 million podcasts reach 584.1 million listeners globally – projected to hit 651.7 million by 2027. The industry is valued at nearly $40 billion, with podcast advertising expected to reach $4.46 billion in 2025.Yet this ecosystem operates without central authority, algorithmic interference, or platform gatekeepers.

This openness isn't nostalgic – it actively shapes how communities form and discover content differently than platform-controlled media allows.

RSS as the great equaliser: infrastructure for discovery without gatekeepers

At podcasting's heart lies RSS – Really Simple Syndication. While tech platforms spent billions on engagement algorithms, RSS enabled a different model: listeners choose what they want, creators reach audiences directly.

RSS is a standardized format allowing any podcast app to access any feed. Subscribe in Apple Podcasts, Spotify, or an independent app – you're not trapped. The same feed works everywhere. This interoperability is fundamental yet revolutionary compared to platforms where content, audience, and identity are locked to a single company.

There's no algorithm deciding whether episodes reach subscribers. No platform arbitrarily changing policies. No company deciding podcasting isn't profitable and shutting down the system.

This foundation evolves. In summer 2020, Adam Curry ("The Podfather") and Dave Jones launched Podcasting 2.0 to extend RSS while maintaining openness.The transcript tag exemplifies this: embedding transcripts directly in RSS feeds enhances accessibility for deaf/hard-of-hearing listeners, improves discoverability, and enables new navigation.

Open source platforms adopted it immediately – Castopod implemented transcript support in November 2020. When Apple Podcasts adopted it in March 2024, small open source teams had influenced the largest tech company. Innovation came from the community, not corporate headquarters.

Europe's vision: funding an alternative digital future

While the United States built its internet on data extraction and surveillance capitalism, Europe has quietly funded a different vision. Since 2020, the European Commission's Next Generation Internet (NGI) initiative has invested over €500 million in 500+ projects building blocks of a human-centric, privacy- respecting internet. This continues podcasting's European roots – from Tristan Louis's 2000 concept to Ben Hammersley's 2004 naming, European thinking has shaped open internet architecture.

Through NGI Zero, managed by Dutch foundation NLnet, the EU systematically supports the Fediverse – intercon-

nected platforms using open ActivityPub protocol where users on Mastodon follow and interact with PixelFed, PeerTube, or any other ActivityPub platform through one account.

European funding supports: Mastodon (end-to-end encryption, moderation), Pleroma (lightweight servers), PixelFed (privacy-focused photos), PeerTube (Framasoft's video platform with live streaming), Lemmy (federated Reddit alternative, funded June 2020), Mobilizon (event planning, launched October 2020), Funkwhale (music streaming), XWiki (federated wikis), Misskey (Japanese microblogging), GoToSocial (lightweight deployment), GNU social (pioneering federation). Beyond platforms: ActivityPub bridges to XMPP/Matrix, WordPress/Drupal plugins, mobile clients like PixelDroid, interoperability testing frameworks.

This isn't rhetoric – it's systematic infrastructure building operating on entirely different principles than Silicon Valley: no data harvesting, no algorithmic manipulation, no vendor lock-in.

Beyond broadcasting: the Fediverse brings two-way conversation to podcasting

The Fediverse represents open protocols' next evolution. With over 11 million users across thousands of independent servers, ActivityPub creates true interoperability: Mastodon users follow PeerTube channels, comment on PixelFed photos, join Lemmy discussions, RSVP to Mobilizon events, and interact with podcast episodes – all from one account.

This transforms one-way broadcasting into genuine community interaction. ActivityPub-enabled podcast platforms allow episodes to appear in Fediverse followers' timelines. Listeners comment, share, discuss – interactions flow back to podcasters without intermediary platforms controlling or monetizing conversation.

This differs fundamentally from Twitter or Instagram, where algorithms determine whether followers see announcements. On traditional platforms, audiences belong to the platform – rules change, reach is throttled, shutdowns happen. In the Fediverse, audiences follow directly via open protocols. Dislike your hosting provider? Move servers and keep your followers.

This architecture creates the conditions for genuine community formation rather than algorithmic engagement optimisation. Without systems designed to maximise "time on platform" through controversy and outrage, conversations can form around shared interests, curiosity, and mutual respect.

Community-centric vs. platform-centric: a cultural shift in media

The technical architecture of open podcasting creates different cultural dynamics than platform-controlled media. Algorithms optimising for "engagement" inevitably favor content triggering strong emotional responses – anger, fear, outrage. Communities forming around open protocols can develop their own norms based on shared values rather than platform metrics.

From my experience speaking at European conferences – FOSDEM, Open Source Conference Luxembourg, Journées du Logiciel Libre – I've observed how European digital sovereignty perspectives emphasise community autonomy and collective governance. These reflect fundamentally different assumptions about what the internet should be and whom it should serve.

Open infrastructure enables communities struggling on major platforms: niche interests, minority languages, accessibility features, local news, educational content. European funding for Fediverse platforms recognises that healthy digital ecosystems require diversity, not just massive platforms optimised for data extraction.

When French municipalities deploy PeerTube for educational videos, when Polish towns replace YouTube with their own instances, when universities host Mastodon for academic discourse, when podcasters choose ActivityPub-enabled hosting – these are assertions of digital sovereignty and community autonomy. The European Commission operating its own Mastodon instances demonstrates that alternatives are viable even at governance's highest levels.

The road ahead: can open protocols compete with platform convenience?

The challenge facing open alternatives is real: competing with well-funded platforms spending billions on user experience and network effects. Mastodon's signup process has been criticised as confusing. Discovery mechanisms remain less sophisticated than algorithmic recommendations.

Yet opportunities are equally significant. Growing awareness of platform risks — privacy violations, algorithmic manipulation, arbitrary deplatforming, psychological toll of engagement-optimised feeds – drives users to alternatives. The Fediverse added over 2 million users following major platform controversies.

European NGI funding has proven remarkably efficient at supporting innovation across the entire spectrum, from experimental projects to established platforms. This diversity creates resilience – no single failure can collapse the ecosystem.

As more services adopt ActivityPub – Ghost, Tumblr, Threads, Flipboard, WordPress, Discourse – the open web strengthens. Each participant creates value for all without central permission. A PixelFed photographer, PeerTube video creator, WriteFreely blogger, Mobilizon event organiser, and ActivityPub-enabled podcaster all reach and interact with the same federated audience.

For podcasting, Fediverse integration opens new possibilities. Episodes become centers of cross- platform discussion. Comments from Mastodon, shares via Pleroma, discussions on Lemmy, video responses on PeerTube flow together around podcast content – rich community interaction with decentralised control. RSS that served podcasting for two decades now connects with social protocols designed for the internet we need.

Choosing our digital future

The future of online community isn't predetermined. It depends on the choices we make – as individuals, communities, organisations, and societies – about which infrastructures we build, fund, and use.

In podcasting, we've seen that open architectures can not only survive but thrive for decades, creating vibrant ecosystems without centralised control. The question is whether we'll apply these lessons to the broader internet. Will we continue accepting that a handful of companies should control how we communicate, whom we reach, and what information we see? Or will we invest in alternatives that preserve the internet's original promise: a space for human connection, creativity, and community that serves people rather than exploiting them?

Europe's commitment to funding open source alternatives demonstrates that different futures are possible – and practical. The technologies exist. The communities are forming. The protocols work. What remains is choosing whether we want our digital public spaces to be shopping malls managed by corporations or commons maintained by communities.

Podcasting showed us the path. Now it's up to us to follow it.

About the Author

A passionate advocate for free and open source software, Benjamin Bellamy is Business Development Manager for AI Solutions & Community Management at LINAGORA, where he turns open, privacy-respecting AI into practical products and helps grow vibrant contributor communities. With over 25 years managing international technical teams across Europe, North America, and the Middle East, he founded Ad Aures, creator of Castopoda, free podcast-hosting platform empowering creators.

A decade of open science hardware: embedding openness in Europe's research ecosystem

By Julieta Arancio, Board Member at the Open Science Hardware Foundation

The promise of open science hardware

Open science hardware (OScH) - the use of open source hardware in scientific research - emerged in the mid-2010s in response to a paradox: as scientific knowledge was increasingly recognised as a shared public good, the instruments required to generate it remained proprietary, expensive, and opaque.

From open source microscopes and environmental sensors to modular laboratory equipment and biological materials, OScH aims to democratise the material conditions of research. Anyone, anywhere, should be able to access, modify, and build upon the blueprints of scientific instruments, as they are an inseparable part of knowledge production.

Since then, OScH has grown into a global network of practitioners, with dedicated academic journals, SMEs and a visible presence in open science policy debates. Yet the question remains: is open science hardware realising its transformative potential?

The 2016 Global Open Science Hardware meeting in Geneva and the subsequent 2017 Roadmap marked the field's foundational moments. They united makers, academics, nonprofits, and enthusiasts around a bold vision: that by 2025, open source hardware would be a ubiquitous, accessible component of science. Its promise has always been both practical and political: enabling research in resource-constrained contexts while freeing even the best-funded laboratories from the hassle of vendor lock-in and inefficiency.

A turning point came in 2021, when UNESCO adopted the Recommendation on Open Science, explicitly naming open source hardware as one of the four pillars of open science. This inclusion symbolically embedded OScH within international policy frameworks, institutionally legitimising what had been a grassroots movement claim. Policy uptake since then has been uneven but growing; the term still carries multiple meanings, reflecting the diversity and dynamism of the field itself.

What has changed?

In the past decade, OScH has shown tangible progress across several dimensions:

Epistemic innovation. OScH broadened what counts as a scientific output. Instruments, often viewed merely as tools, are increasingly understood as infrastructure whose openness directly affects reproducibility, access, and innovation. In an era where instruments are increasingly digital and cloud-based, OScH re-anchors attention to the material realities of data production.

Community and collaboration. The OScH community, including the Gathering for Open Science Hardware (GOSH), exemplifies transdisciplinarity, connecting academia, industry, participatory science, and maker culture. Projects such as OpenFlexure, the Open Source Imaging Initiative, OpenEphys, FieldKit or Reclone demonstrate how collaborative prototyping can yield robust, affordable tools for science.

Policy and funding visibility. The circulation of OScH as a policy concept, its integration into open science strategies, and its growing links with adjacent communities are significant milestones. Slowly, funding streams are beginning to recognise and support open source hardware projects in research. The Open Science Hardware Foundation (OSHF) now works to consolidate these efforts, providing coordination, administrative support, visibility, and advocacy for the field.

This growing visibility resonates with a broader EU policy landscape where open source is a cornerstone of digital sovereignty. Recent policy discussions emphasise the

role of openness as a governance model that strengthens competitiveness and autonomy across strategic technologies, from cloud and AI to semiconductors. Open science hardware can extend this logic into scientific instrumentation, positioning Europe to lead in transparent, interoperable, and sovereign research infrastructures.

Despite this progress, adoption remains uneven. Open source hardware thrives in small-scale and educational settings but struggles to penetrate high-precision and regulated domains such as biomedicine, aerospace, or industrial R&D. These limitations reflect both systemic barriers shared with other open science domains and internal challenges specific to the OScH ecosystem.

Shared challenges across open science

A central, persistent barrier lies in incentive structures. Research assessment frameworks continue to privilege publications and patents, leaving open design contributions invisible in career advancement and funding evaluations. Academic hardware developers often lack recognition and viable career paths, discouraging long-term investment in open source projects.

Sustainability is another systemic issue. Many open source hardware projects in academia depend on short-term grants and individual champions, making maintenance precarious.

Without proven business models, certification mechanisms and procurement pathways amongst others, continuity and reliability are hard to secure.

Finally, equity gaps persist. Although OScH promises to democratise access to scientific tools, disparities in fabrication capacity, import regulations, and institutional support perpetuate uneven participation between well-resourced and under-resourced contexts.

Challenges within the OScH community

Internally, OScH still faces the growing pains of a young field. Standardisation and interoperability remain limited: documentation formats, metadata structures, and licensing practices vary widely, hindering reuse and validation. The absence of shared certification frameworks for OScH creates fragmentation where collaboration should thrive.

Meanwhile, technology transfer and commercialisation pathways are out-of-date and underdeveloped. Most university technology transfer offices are built around proprietary IP models and lack the capacity or knowledge to support open source business strategies or utilise portfolios based on open source designs. This constrains the translation of academic innovations into sustainable ventures and limits OScH's visibility in innovation ecosystems.

As Europe seeks ways to increase standardisation with frameworks such as the Cyber Resilience Act and the AI Act, open science hardware can both contribute to and benefit from these debates. In certain fields such as biosecurity, science hardware such as DNA synthesis instruments and autonomous lab robots are at the centre of discussions around responsible research.

What does this mean for science?

The first decade of OScH has been defined as much by its achievements as by the opportunities it has yet to seize. While open access and open data have become institutionalized, open science hardware still lags behind. Early advocates proved that it was technically possible to build scientific tools collaboratively and at lower cost, but these successes rarely translated into procurement reform or sustained policy integration.

Fragmentation remains a critical issue. OScH has produced an extraordinary variety of instruments but lacks the shared infrastructure (repositories, registries, certification systems) that made open source software and data movements scalable. Without these, many projects remain invisible and disconnected from potential users or funders. This pattern echoes findings from a recent study by the Open Source Observatory (OSOR), showing its impact in the reuse of open source software across local governments.

For open science hardware, coordinated procurement and reuse strategies could play the same role: creating economies of scale, interoperability, and trust among research institutions, SMEs, and public authorities.

Equally, the field still lacks a coherent narrative linking

open source hardware to broader goals of science policy and innovation. Its potential to advance discovery, equity, and sustainability is clear to insiders but has not yet captured the imagination of funders or policymakers.

The road ahead

Ten years on, open science hardware stands at a crossroads. It has moved from the margins into policy documents, from prototypes to functioning ecosystems, from enthusiasm to legitimacy. Yet its foundational ambition remains only partially realised.

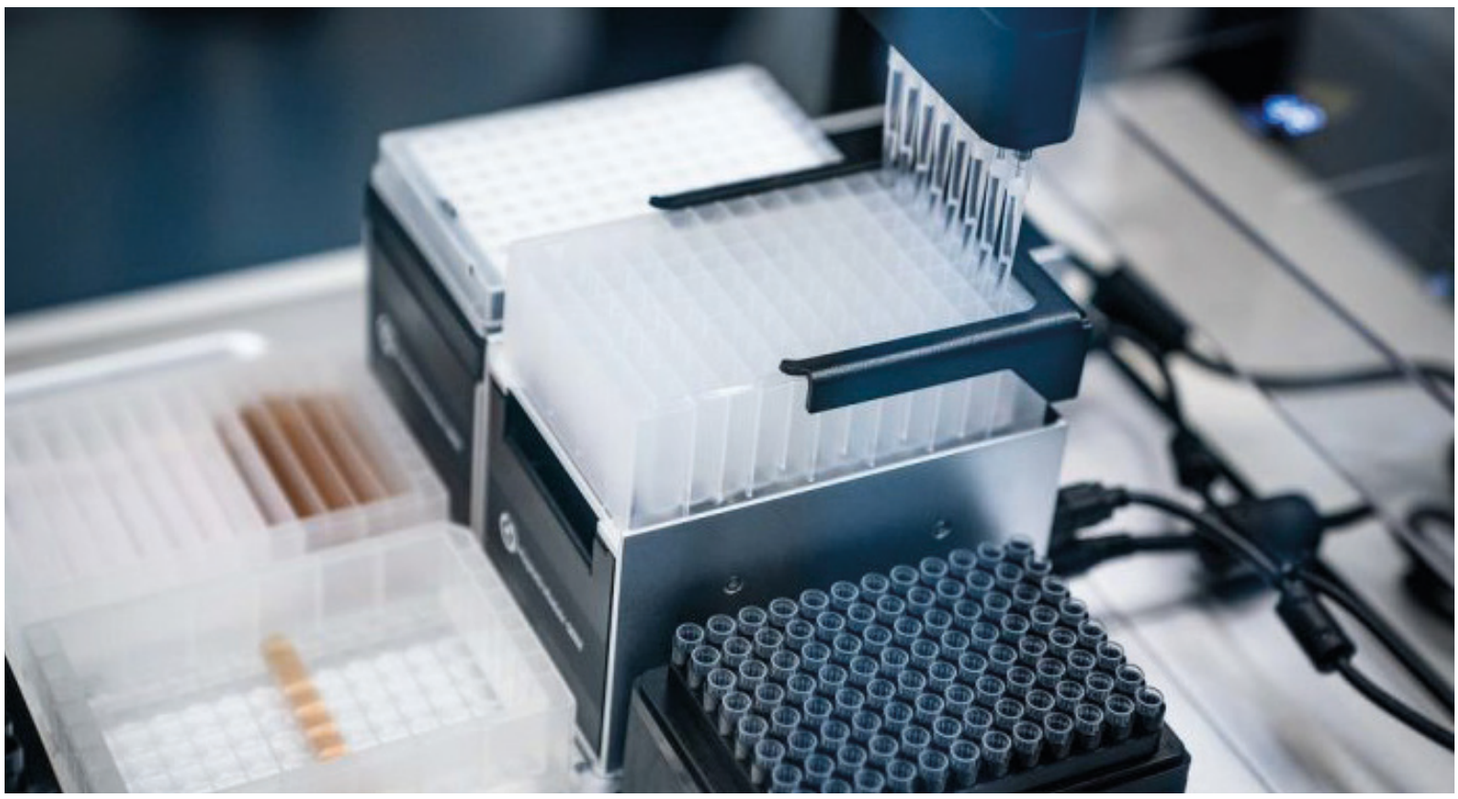
The coming decade will determine whether OScH becomes a fully institutionalised pillar of open science or remains a constellation of inspiring experiments. Achieving the former requires going beyond instruments, but the institutional architectures, standards, and narratives that make openness durable.

The European Commission can promote open science hardware in different ways - for example, integrating OscH calls in existing funding streams for open source software, both for emerging projects and professionalisation of strategic ones. The ecosystem can also be strengthened through support for initiatives bringing together communities of users, science funders and OscH-friendly companies, with the aim of developing and implementing interoperability, performance and safety standards.

These goals align closely with current policy debates that aim to ensure that EU's knowledge and infrastructure remain open, secure, and collaboratively governed. Embedding open science hardware within this vision can turn Europe's commitment to openness into tangible innovation capacity: not just for software and data, but for the material foundations of science itself. At the Open Science Hardware Foundation, we see the task ahead not merely as one of scaling, but of embedding openness itself: in infrastructure, in funding systems, and in the culture of scientific practice.

About the Author

Julieta Arancio is a Board Member of the Open Science Hardware Foundation (OSHF). OSHF is a global non-profit organization dedicated to advancing open source hardware for scientific research. It supports the creation, sharing, and institutional adoption of open tools that make science more accessible and reproducible. Through fiscal sponsorship, leadership development, and advocacy, OSHF strengthens the community and infrastructure around open hardware.



Embedding AI digital public goods into the digital sovereignty agenda

By Lea Gimpel, Director of Policy and AI Lead at the Digital Public Goods Alliance

The concept of Digital Sovereignty — the collective ability of states and communities to shape, govern, and safeguard the digital infrastructures, data, and standards that underpin their societies — is rapidly becoming a global imperative. As real-world incidents have shown, external control over fundamental digital infrastructure, data hosting, and service providers can create profound vulnerabilities, such as the October 2025 outage of AWS's US-East-1 Data Centre Cluster.

For countries seeking to strengthen their digital autonomy and reduce strategic dependencies, a focus on building critical capacities and embracing public-interest, open source solutions is essential. Digital Public Goods (DPGs) - open source software, open data, open AI systems and open content collections - are a vital piece of the puzzle in this quest, providing foundational, open, and accessible components that nations, communities and people can truly own, adapt, and control.[1]

Artificial Intelligence and the underlying technology stack on which user-facing applications, such as chatbots and agents, are built, is one of the key focus areas to enhance strategic autonomy and resilience as core components of digital sovereignty.

The case for openness in AI

As AI becomes increasingly ubiquitous in our daily lives, poised to power everything from healthcare diagnostics to public service delivery, the way models are trained and systems are built and deployed is becoming an essential question of trust, safety, accountability, and sovereignty.

Take the public sector: governments around the globe are compelled to integrate AI into their processes to make public services more efficient, effective, and responsive to citizen needs by automating processes, optimising resource allocation, supporting decision-making, and personalising services and citizen participation.According to an OECD report, 67% of OECD countries utilise AI to improve public service delivery.[2]

To ensure accountability, transparency, and fairness, while enabling long-term economic benefits and control over one's infrastructure, AI systems must be open, trustworthy, and free from proprietary lock-in or external jurisdiction.

That's where AI digital public goods come in. According to the UN's definition of DPGs, these products must be open source, do no harm by design and help attain the Sustainable Development Goals (SDGs). Achieving this designation is not merely about using open source licenses; it is a commitment to radical transparency and safety that directly enables control and trust. Hence, AI DPGs are a crucial component of sovereign AI. Moreover, open source and open science practices, including the sharing of papers, code, and model components, have driven significant progress in AI development over the past few years and form the basis for economic growth and competitiveness.[3]

To be recognised as a DPG by the Digital Public Goods Alliance, an AI system must adhere to the DPG Standard.[4], which dictates strict technical requirements to ensure that implementers, such as governments, companies and civil society, can thoroughly inspect, adapt, and reuse the technology without hidden dependencies.

1 https://www.digitalpublicgoods.net/digital-public-goods (accessed October 31, 2025)

2 OECD (2025), Governing with Artificial Intelligence: Ta crucial componenthe State of Play and Way Forward in Core Government Functions, OECD Publishing, Paris https://doi.org/10.1787/795de142-en

3 Linux Foundation, The State of Sovereign AI, https://www.linuxfoundation.org/hubfs/Research%20Reports/lfr_sovereign_ai_090525a.pdf?hsLang=en (accessed October 31, 2025).

4 http://www.digitalpublicgoods.net/standard (accessed October 21, 2025)

Component	DPG standard requirement
Data	The datasets) used to train, validate, and test the system must be **open and conform to the Open Definition**, meaning they must be appropriately licensed. This is a high bar, ensuring transparency and accountability and allowing users to verify the data's relevance and fit for purpose.
Code	The code for data pre-processing, training, validation, testing, and inference must use **OSI-approved open source licenses**. This guarantees the freedom to fork, modify, and manage the system locally.
Model	The model architecture and all parameters (weights, optimisers, coefficients, etc.) must be accessible under **OSD-conformant terms**. This eliminates the possibility of a "black box" system whose behaviour cannot be inspected by experts.

Picture 1: DPG standard requirements for AI systems

The DPG standard for AI systems: an aspiration for openness

It is essential to acknowledge that the DPG Standard for AI systems extends beyond the open source AI definition provided by the Open Source Initiative (OSI) and is aspirational in nature. The requirement for openness across all components, especially the underlying training data, sets a very high bar. We recognise that few AI solutions currently meet this comprehensive standard.[5]

However, this high bar is intentional. It represents the gold standard for public interest and trustworthiness. Our goal is not to exclude, but to encourage developers to build more openly. By adhering to the DPG Standard, even if a solution only meets some indicators today, developers contribute to a future where AI systems are truly shared digital assets, enabling greater digital sovereignty and realising public interest objectives worldwide. In addition, the high bar is also intended to strengthen the open data movement, making a case for the critical importance of open data in building trustworthy AI and encouraging the creation of open tools and datasets that power public interest AI.

The technical pillars of AI DPGs

To be recognised as an AI DPG, the DPG Standard requires openness across all core components of an AI system. The following must be provided:

Documentation and responsible AI: building trust and control in AI DPGs

Building trustworthy and auditable AI DPGs requires two non-negotiable prerequisites that are embedded in the DPG Standard: (1) transparent documentation and (2) do no harm by design through responsible AI practices. Transparent documentation enables reuse by requiring clear formats such as model cards and data sheets that cover the model overview, intended use, and known limitations (including biases and weaknesses), and provide detailed data provenance (source and quality).

Mandatory responsible AI practices ensure ethical compliance, aligning with frameworks such as UNESCO's Recommendation on the Ethics of Artificial Intelligence. This pillar focuses on risk mitigation and harm prevention by requiring disclosure on proportionality and impact on people, steps to address bias and fairness, validation tests and guardrails, and transparency regarding the model's logic and decision-making processes.

Sovereign AI beyond DPGs - the AI stack

Achieving genuine sovereign AI goes beyond models and systems. It also requires confronting the deep concentrations of power at the base of the "AI stack," namely the centralised cloud infrastructure and the critical hardware

5 https://git.new/dpg-wiki (accessed October 31, 2025).

oligopoly. The dominance of a few hyperscalers (Amazon, Microsoft, Google) in cloud computing, coupled with the overwhelming market share of companies like Nvidia in specialised chips (GPUs), creates a precarious dependence for any nation's digital future.

Incidents like major cloud outages reveal a democratic deficit in relying on Big Tech for core digital functions that power our collective ability to interact, share knowledge, and more. Furthermore, this consolidation of influence ensures that AI systems reflect the economic incentives of their creators, often eroding public oversight and democratic accountability. True sovereign AI at the infrastructural level is only possible by decoupling public interest technology from this proprietary infrastructure and building demand-driven public alternatives.

In response, the European Commission (EC) has launched policy initiatives, such as the AI Continent Action Plan and InvestAI Facility, which foresees investments in up to five AI Gigafactories (large-scale compute facilities focused on the development of highly capable AI models) as a step toward securing compute capacity and developing competitive European models. However, many questions remain, such as access management and conditionalities attached to using public computers.

The broader push for sovereign AI from the European Commission's side, with the ApplyAI Strategy, focuses on applications and seeks to mobilise resources comparable to those of major commercial AI labs. However, critics note that this approach to European sovereign AI risks mirroring the priorities of dominant commercial actors and focuses heavily on large-scale investment without a clear, explicitly defined public interest focus, potentially deepening dependencies rather than solving the problem of concentrated power.[6] Therefore, policy initiatives at the regional and national levels must prioritise public interest use cases and embed openness requirements, as reflected in the DPG Standard, into these investments to ensure they serve the common good and contribute to building lasting digital autonomy and resilience.

In a holistic view, any country aiming to build sovereign AI should also ensure that the enabling conditions are met, including regulatory frameworks that protect the fundamental rights of citizens and mitigate AI risks, solid institutions to enforce such regulations and ensure the security of such critical infrastructures, as well as an AI-literate population.

About the Author

Lea Gimpel is the Director of Policy and AI Lead at the Digital Public Goods Alliance (DPGA) with almost 15 years of experience at the intersection of technology policy and international development. Previously, she co-led the AI flagship initiative of the German development cooperation "FAIR Forward," a global effort to democratise AI development through open datasets and models.

6 Zuzanna Warso (2025), What does Europe Need and How to Achieve it, Tech Policy Press, **https://www.techpolicy.press/building-digital-sovereignty-what-does-europe-need-and-how-to-achieveit/** (accessed October 21, 2025)

Open source and the power of diverse communities in modern logistics

By Carina Tüllmann, CCO, Open Logistics Foundation

Logistics has always been a complex industry. Today, with global and digital supply chains, whose critical role in supplying households and industries worldwide became evident during the COVID-19 pandemic, that complexity has intensified to a point where no single company can solve the challenges of modern logistics alone. The scalable, interoperable, and resilient solutions that really matter emerge from communities of practitioners working together.

Open source provides the framework for industry-wide collaboration

More than just freely available software, open source in logistics is a way of working that embraces transparency and collective problem-solving. When multiple stakeholders across shippers, carriers, software developers, and regulators contribute to a shared codebase, they create tools that are more adaptable and widely usable. Solutions are therefore built with real-world conditions in mind, not just theoretical assumptions.

At the Open Logistics Foundation (OLF), we've seen this model in action, from the early days of defining our first project to today's vibrant community of 50+ partners across the logistics industry.From this experience, I can see four principles that define successful open source communities in logistics – and, indeed, in any complex industry:

- **Challenge assumptions**: When contributors bring different expertise and perspectives, long-held assumptions are questioned, and solutions are re-evaluated before they reach production.
- **Foster openness:** Transparent processes and open discussions encourage experimentation and enable collective progress faster than in isolated development.
- **Build resilient solutions**: A community that includes multiple perspectives can anticipate operational challenges and regulatory requirements that a single organisation might overlook.
- **Create shared standards:** When diverse participants contribute to the same project, the resulting tools and protocols are inherently more interoperable and adoptable across organisations and countries.

All four principles depend on diversity. While "diversity" is often considered as being primarily about representation in race, gender, etc., the OLF community also works toward a diversity of professions, experiences, geographies, and perspectives. That allows communities to identify risks, challenge assumptions, and innovate effectively. This diversity is especially powerful in Europe, where logistics is inherently cross-border. Regulatory frameworks, operational practices, and levels of digital maturity vary widely across countries. Open source communities provide a neutral space for dialogue and co-creation, where stakeholders from different nations and sectors work together on common standards and interoperable solutions.

A strong governance allows diversity and trust to be the main pillars of an open source community

The impact of this approach is evident in projects like the OLF-eCMR, the first open source implementation of the electronic consignment note in logistics. While this project is only one example, it illustrates how multi-stakeholder collaboration works in practice. Developers, logistics experts, regulators, and entire companies contributed to a shared codebase using standard open source practices (e.g., open APIs, modular architecture, continuous integration and iteration). Decisions were guided not by a single authority like the OLF Head Office or its Board but by a community governance model, ensuring transparency and inclusivity. The resulting software is technically robust and, crucially, widely applicable across the industry.

In logistics, where digital transformation often involves multiple stakeholders and complex processes, ignoring diversity and community input can lead to solutions that are brittle, fragmented, or unused. Open source provides both the methodology and the cultural framework to avoid these pitfalls.

Equally important is trust. Communities succeed not simply because participants contribute code or ideas, but because there is confidence that contributions will be treated fairly and respectfully. Trust allows for honest discussion and critical feedback for more rapid iteration. Yet maintaining that trust cannot be taken for granted. According to a 2021 study by the Linux Foundation, only 55% of open source contributors felt their opinions were valued by project leadership. This shows that while open source is built on openness by design, inclusion in practice still requires conscious effort.

The power of open source lies not in the code alone, but in the culture and mindset it creates

Another lesson from our open source community is the value of shared ownership. Unlike proprietary development, where the benefits accrue to a single company, open source distributes both responsibility and reward. Every participant has a stake in the outcome. Every perspective matters. This creates a collective accountability that encourages higher-quality solutions and faster adoption.

Ultimately, the message is clear: if we want to shape the logistics industry for the future, we need to embrace community and, within it, diversity and open collaboration. This is not optional, and projects like the OLF-eCMR show what is possible when these principles are applied. Open source offers a way to tackle complexity, engage diverse perspectives, and develop solutions that endure. For logistics, this means faster, safer, more reliable supply chains. For participants, it means an opportunity to contribute to something larger than any individual company. And for the industry as a whole, it means progress that is collectively owned, collaboratively developed, and widely beneficial.

If there is one lesson I would highlight for leaders, developers, and newcomers alike, it is this: Invest in your community, embrace diversity in all its forms, and apply open source principles rigorously. The results may be challenging from all sides – technical, operational, cultural – but they will be transformative.

About the Author

Carina Tüllmann, MBA, serves as CCO of the Open Logistics Foundation, leading business development, communications, marketing, and community development. Since 2010, she has been active in logistics and supply chain management collaboration. Her dedication to open source is rooted in the belief that it strengthens the European Union's sovereignty, resilience, inclusiveness, and innovative capacity.

Solving the AI data drought with community curated data

By Liv Erickson, Senior Product Lead at Mozilla Data Collective

As industries and organisations increasingly adopt AI and ML technologies, quality data becomes even more critical than ever before. Today's AI models, especially openly licensed models that make their training data available, have historically been trained on the corpus of information that is widely available online.

Improving and building new models requires new sources of data, but the lack of high-quality, representative sources of data that is publicly available on the internet creates a 'data drought' for developers who are looking to build the next generation of AI technologies. Platforms that enable and facilitate community-curated data sources offer a scalable and ethical solution, enabling a path forward for a more representative and democratic future for open source AI.

The costs and challenges of data production

Collecting, curating, and preparing data for use in AI/ML workflows is expensive. Accessing specialised data, especially in a way that respects the rights of the data contributor or creator, can inhibit or slow development. This has resulted in an AI ecosystem that relies heavily on unrepresentative data. Applications that utilise these types of data subsequently exacerbate systemic inequalities, reproducing biases found in the training data, which limits the usefulness and accuracy of the systems - sometimes with catastrophic consequences.

Other approaches may generate diverse data, but violate copyright and social norms of consent. As a result, data sources are increasingly being siloed, which creates barriers for developing open source and public interest AI, and for those who want to build transparent and observable systems. Today, many communities are faced with a false dichotomy of participation within the AI ecosystem: hand over their data entirely, or be excluded.

Many popular commercial AI applications have faced scrutiny and legal action over their use of copyrighted data in training their models, refusing to fairly compensate those whose work powers the systems generating them billions of dollars in revenue. Adapting the way that we think about the role of data stewardship and facilitating stronger relationships between data creators and data seekers shifts power back to those whose contributions are the actual source of "intelligent" machines.

Exploring sustainable sourcing through communal data governance

Enabling community curated and controlled sources of data is one potential solution for solving issues with data availability. There are existing proof points in crowdsourcing data through open source projects such as Common Voice, WikiData, and OpenStreetMap, all of which facilitate the collection and use of information from a wide community of contributors in service of creating high-quality resources for public use. Building new tools and platforms that facilitate curation and digitisation of global, community-curated knowledge can expand upon these ideas and shift our perspective to a more sustainable supply chain for human-generated data.

Centering global communities as the authors, stewards, and domain experts ensures that data is authentic and representative, which builds trust and accountability. This collective intelligence will be vital for the next generation of artificially intelligent software, and is especially critical given the increased amount of synthetic, AI-generated content that now makes up the majority of what we see online. For open source and public AI developers, increased access to diverse data sources will be key to creating alternatives to proprietary for-profit systems.

Equity through access and education

Ensuring that there are sustainable, accessible, and diverse sources of data for independent developers creates the necessary conditions to foster invention and innovation, grounded in the principles of human-centered AI set forth by the European Commission. Community-owned data collectives will enable a wider audience to participate in the development and deployment of AI technologies, leading to more equitable and inclusive outcomes and rep-

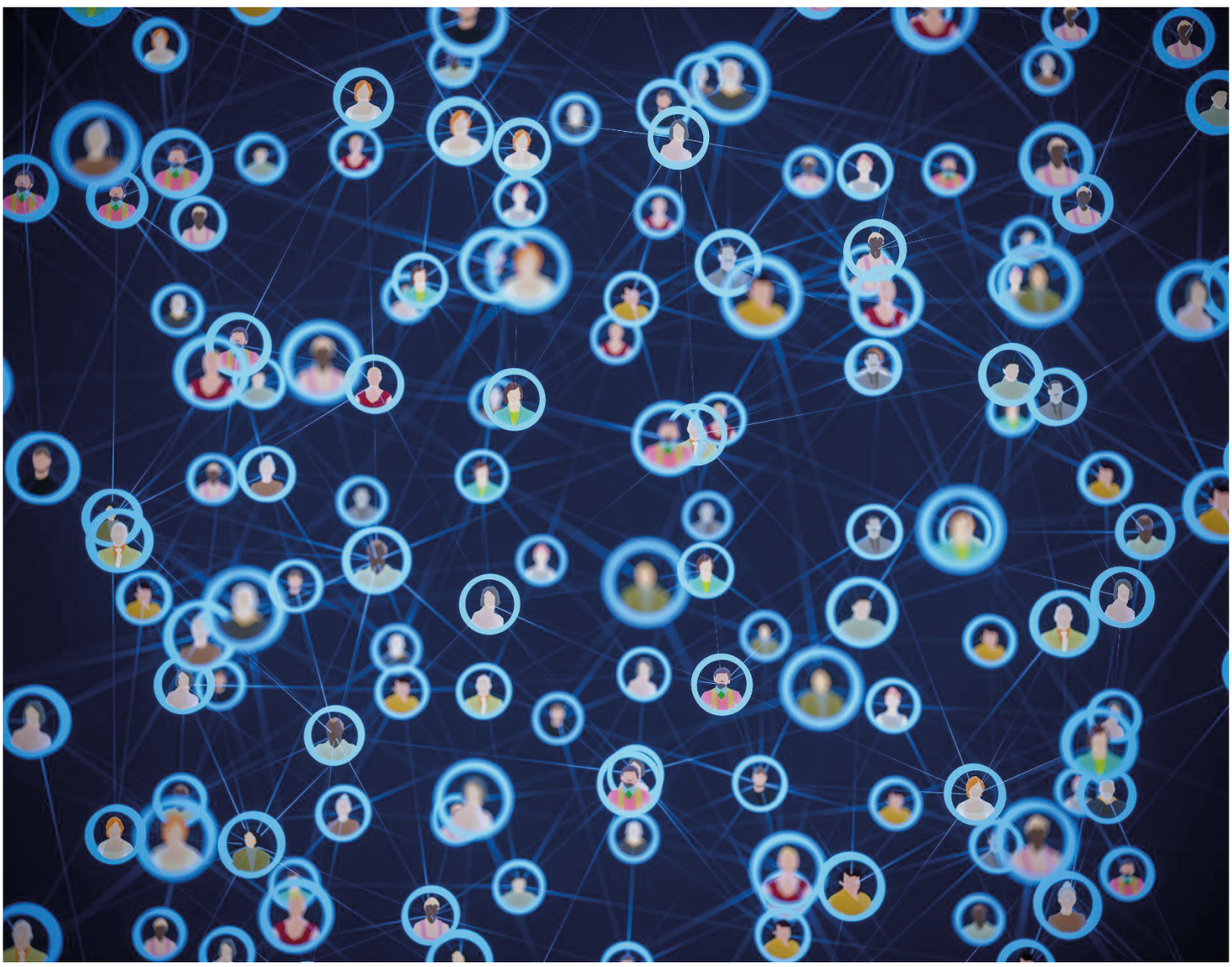
resentative models. Projects that enable this - like Mozilla Data Collective - in turn unlock additional opportunities for new applications to be developed by underserved communities themselves, removing dependencies on extractive commercial providers and proprietary algorithms.

To build a future where AI truly represents global human interests, it is imperative that we invest in community data stewardship, accessible tools, and ethical data governance practices. Encouraging participatory design for AI systems at the dataset layer through community curation and data management tools can help solve the ongoing challenges related to inclusive representation, global perspectives, and ethical procurement of data sources for machine learning.

Ensuring that communities are educated, trained, and equipped with data literacy and governance skills through the forthcoming EU AI Skills Academy efforts will expand access to domain, language, and culture-specific expertise necessary for next-generation AI innovations. These practices will push us to go beyond techno-centric solutionism, and re-ground AI development in service of the people who power it.

About the Author

Liv Erickson is a computer scientist, creative technologist, and technology policy advocate who has been working on experiential computing technologies since 2010. As the Senior Product Lead for Mozilla Data Collective, she supports product development of a community-oriented data governance platform.



Open standards for open source hardware and other high-cost-of-change domains: the missing framework

By Martin Häuer, Scientific Head for open standards at Martin-Luther-Universitaet Halle-Wittenberg

De jure standardisation in the digital era: trying to catch bees with a lasso

Over the past century, de jure standardisation, established by national and international standards bodies, has become a cornerstone of modern industrial societies. These organisations provide a robust and structured framework for developing representative consensus – meaning that technical standards reflect a broadly agreed-upon understanding across all relevant interested groups, capturing the state of the art in a formal and reliable manner.[1]

Due to their representativeness (and the respective mandate), de jure standards can be directly referenced in legislation, thereby becoming part of public regulation.[2] Consensus within this framework creates an environment where all actors are mutually dependent, preventing any single party from dominating the process.[3] This balance is further reinforced by the involvement and information of the general public.[4]

On a European level the Comité Européen de Normalisation (CEN), the Comité Européen de Normalisation Électrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI) provide a solid infrastructure to converge de jure standards across all member states.

However, this standardisation model is also characterised by long development cycles – typically measured in years – and a uniform approach to format and documentation. Since the advent of the information and communication technology (ICT) and information technology (IT) sectors, which operate under much faster innovation cycles, standardisation in these domains has increasingly moved away from standards bodies and toward open source communities.[5]

Open standards: hives making their own rules

Today, there is strong evidence that open source constitutes the dominant development model in the software domain.The market shares of open source software (OSS) are typically estimated between 70% and 90%,[6] and with indications of exponential growth extending back more than three decades.[7]

These communities operate on implementation-first principles: technical solutions are immediately applied, iteratively improved, and openly shared. Here, standardisation occurs not by consensus ahead of implementation but as an emergent property of real-world use, remixing, and adoption. This principle has been referred to as a meritocratic process in which actors continuously iterate on existing designs to produce “best-of-breed” solutions for their own use cases: The value of a solution is judged primarily by its feasibility and effectiveness and influence is

1 DIN EN 45020, 1.5
2 DIN 820-1, 5.1, “Normungsvertrag”; “New Legislative Framework - European Commission.
3 DIN 820-1,5.3
4 Ibid., 7.4.
5 Böhm and Eisape, “Standard Setting Organizations and Open Source Communities.”
6 Musseau et al., “Is Open Source Eating the World’s Software?”; Black Duck, Open Source Security & Risk Analysis Report
7 Deshpande and Riehle, “The Total Growth of Open Source.”

earned through contribution and technical merit.[8]

Within this model, there is a strong incentive to integrate design changes as close to their original source as possible: In the common analogy of a river, feedback, bug fixes, or feature requests originating from downstream users – i.e. implementers of a solution – travel upstream to the community of the respective component.[9]

As a result of the emergence of decentralised inclusive decision-making through open source communities, de jure standards bodies are becoming increasingly redundant in these sectors.[10] However, because open source ecosystems typically focus on solutions close to or at the product level, they do not inherently compete with them. Rather, they offer a complementary approach to technical standardisation. Several successful collaboration schemes between standards bodies and open source projects exist, while greater policy alignment would further enhance these efforts.[11]

8 Böhm and Eisape, “Standard Setting Organisations and Open Source Communities.”

9 Whitehurst, The open organisation

10 Böhm and Eisape, “Standard Setting Organizations and Open Source Communities

11 Blind, Thumm, and Böhm, The relationship between open source software and standard setting.

In part, these open source ecosystems are supported and moderated by dedicated standard-setting organisations (SSOs) offering a variety of (mostly) consortium-based processes. These SSOs adopt organisational structures similar to de jure standards bodies but do not require representative consensus, which also allows them to move more quickly and adaptively. However, this may come at the expense of a broad underrepresentation of essential stakeholder groups – for instance, users in the case of IT and ICT standardisation.[12] Stakeholders are free to choose the SSO whose policies best reflect their interests and circumstances, a practice sometimes referred to as "forum shopping."[13]

Limits of open standards: the hive should not govern the garden

The power-balance within these open source ecosystems – and so also the possibility to govern parts of it with industry consortia – mainly relies on two key factors:[14]

1. The freedoms granted by open source licenses, which give anyone the right to distribute modifications and remixes (forks);

2. A low cost of change, which enables as many communities as possible to put these forks into circulation, as software can be copied, modified, and distributed globally, almost instantly, and at negligible costs.

In contrast, for high-cost-of-change technologies – such as most hardware – these open source meritocratic mechanisms are unlikely to generate equivalent standardisation effects within the limited timeframe of a typical product life cycle.[15]

Furthermore, consortium-based standardisation in such fields is potentially problematic, as the high barriers for retroactive adjustments make these efforts more susceptible to dominance by individual actors[16] – such as those observed, for example, at the Internet Engineering Task Force.[17] Consequently, de jure standardisation remains the default method for ensuring representation and broad legitimacy in high-cost-of-change sectors.[18]

Open source hardware: a beast of two worlds

Open source hardware (OSH) falls into the crack between these two worlds. Similar to software, OSH development is primarily community-driven, taking place in online environments that enable large-scale collaboration under the absence of restrictive intellectual property (IP) policies.[19]

OSH also bears the potential to achieve faster and more cost-efficient development cycles compared to proprietary hardware (e.g. ranging around 90% cost savings in the domain of lab equipment), partly due to network effects and strong participatory elements,[20] while diversifying supply chains and thereby creating resilient technical solutions that can be sourced locally. The effects of a low barrier to entry can be seen in OSS development practices, where early-stage involvement of users often results in feedback cycles that are "an order of magnitude faster than most commercial software projects."[21]

However, these effects remain considerably more limited in the case of hardware. As with software, the timelines of de jure standardisation processes are misaligned with the pace of OSH development. Furthermore, the intentionally abstract nature of such standards precludes complex product-level specifications,[22] while the established workflows and IP regimes of standards bodies typically do not align with open source principles.[23]

At the same time, practices from the OSS domain cannot be directly transferred to OSH due to the structural misalignments outlined above, compounded by the fact that OSH remains primarily driven by volunteer- or research-led communities, with industry participation and market capitalisation still significantly lower than in the OSS domain.[24]

12 De Vries, Verheul, and Willemse, "Stakeholder Identification in IT Standardization Processes.
13 Lerner and Tirole, "A Model of Forum Shopping."
14 Böhm and Eisape, "Standard Setting Organizations and Open Source Communities."
15 Ibid.; Blind, Thumm, and Böhm, The relationship between open source software and standard setting.
16 Lerner and Tirole, "A Model of Forum Shopping."
17 Simcoe, "Standard Setting Committees."
18 Böhm and Eisape, "Standard Setting Organizations and Open Source Communities."
19 Moritz, Redlich, and Wulfsberg, "Best Practices and Pitfalls in Open Source Hardware.
20 Heikkinen et al., "Towards National Policy for Open Source Hardware Research."
21 Weber, The Success of Open Source
22 Even though Weber's study is over twenty years old, the underlying dynamics have likely remained similar
23 "DIN 820 Beiblatt 3," 5.1.
24 Blind, Thumm, and Böhm, The relationship between open source software and standard setting

Furthermore, just as definitions of open standards vary widely,[25] so too do the procedural rules for standardisation within OSS communities. Consequently, it remains unclear which procedures of open standardisation would be well-suited for the context of OSH. Although standardisation practices within the OSH community do exist – e.g. concerning technical documentation and metadata, [26] as well as, to a limited extent, on the product level [27] – these efforts remain isolated.

Collaborations with standards bodies[28] and with SSOs, such as CERN White Rabbit with the Institute of Electrical and Electronics Engineers (IEEE)[29] or RISC-V with the Linux Foundation,[30] provide further examples. However, there are as yet no dedicated SSOs or standardisation methods specifically tailored to the needs of OSH communities. Moreover, no systematic research has been conducted on the specific requirements for such methods.

Representative open standards for hardware and beyond

One of the projects at the Just Transition Center (JTC) of the Martin-Luther-Universität HalleWittenberg [31] aims to contribute to closing this gap without superseding existing infrastructures: The objective there is to develop an understanding of the needs of OSH communities in order to enable their effective initiation and management of, as well as participation in standardisation projects, while at the same time complementing existing schemes and fostering collaboration with established institutions and actors – principally de jure standards bodies and SSOs from the software domain.

The standardisation methods derived from the findings will be piloted and validated in close collaboration with OSH communities. However, OSH only stands as one example for high-cost-of-change issues that cannot afford the current iteration cycles of de jure standardisation. The author of this article suspects that this new standardisation method might be transferable to other domains that operate at the level of an imminent implementation, while relying on a representative consensus - for example, open reference technologies for public infrastructures or possibly even administrative and decision-making processes.

A hybrid approach, combining open source solutions at the implementation level with a structured and representative integration into overarching standards, would enable effective early stakeholder involvement in piloting new regulations, while simultaneously preserving the free exchange of practical experience that supports and accelerates consensus-based standardisation. If the topic outlined in this article resonates with the reader, they are warmly invited to reach out to the JTC project or the author directly. We look forward to connecting, exchanging ideas, and — in the spirit of open source — collaborating across disciplines to advance the development of open standards.

About the Author

Martin Häuer is the Scientific Head for open standards (JTC-C1) at Martin-Luther-Universitaet Halle-Wittenberg. He is deeply engaged in the open source hardware ecosystem, mainly focusing on project coordination, documentation and governance. Martin has been active in several communities, including Open Source Ecology Germany, that he chaired for three years and where he initiated and led the development of DIN SPEC 3105 and maintained the OKH metadata standard.

25 Moritz et al., “Value Creation in Open Source Hardware Communities.”

26 Díaz-Marta and Ferrandis, “Open Standards and Open Source”; Krechmer, “Open Standards Requirements.

27 Bonvoisin et al., “Standardisation of Practices in Open Source Hardware.

28 For instance the Freespireco project in the domain of open source ventilators; https://github.com/PubInv/freespireco accessed 2025-09-10T19:27:05+02:00

29 Bonvoisin et al., “Standardisation of Practices in Open Source Hardware.

30 Gamalielsson et al., “On Engagement with Open Source Software, Open Source Hardware, and Standard Setting.”

31 **https://www.linuxfoundation.org/press/press-release/the-linux-foundation-and-risc-v-foundation-announcejoint-collaboration-to-enable-a-new-era-of-open-architecture**

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