

Progress and trends in the national **open source** policies and legal frameworks



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Executive Summary

This paper analyses the findings of 23 Open Source Software Country Intelligence Reports published by the European Commission's Open Source Observatory (OSOR). Of these reports, 19 were updates of existing reports and four were new, analysing Western Balkan countries. Using both quantitative and qualitative methods, this paper examines the adoption of open source software in European public administration through governance mechanisms, legal frameworks, reuse initiatives and cross-border collaborations.

Key findings:

- Legal frameworks have recently evolved towards greater integration of open source in legislation and digital strategies increasingly reference open source. However, implementation gaps persist as translation into practice remains uneven.
- While open source adoption remains primarily driven by top-down institutional leadership, institutional support remains inconsistent across European countries, limiting the effectiveness of open source software initiatives in many cases.
- Civil society tends to step in where institutional leadership is weak, though bottom-up approaches struggle with scale.
- Some countries are increasingly addressing this gap through growing collaborative partnerships with NGOs.
- Cross-border collaborations and shared code repositories progress has stagnated while open data catalogues are frequent. This situation leads to fragmented development and duplicated efforts.
- The analysis of Western Balkan countries reveals that despite the EU's significant influence, open source adoption is declining in the majority of the candidate countries.

Recommendations:

- This report emphasises the importance of fostering stronger partnerships and collaborative governance models. By combining institutional capacity with the role of NGOs in supporting open software development, partnerships between the public sector and civil society organisations can overcome institutional support gaps.
- Additionally, the creation of shared European code and development platforms, as well as the stimulation of cross-border collaboration mechanisms, can promote software reusability, interoperability and cost-effectiveness, while capitalising on the collaborative and international nature of open source.
- As candidate countries make foundational decisions regarding their digital infrastructure, the accession processes represent an opportunity to channel it towards open source adoption. Including Western Balkan candidate countries in EU open source and interoperability initiatives can

promote the adoption of open source software as a mechanism to boost interoperability with EU systems.

Many European countries have established policy foundations for widespread open source adoption, but must now strengthen institutional capacity, enable collaboration across borders, and strategically integrate open source into enlargement efforts to realise its potential.

Introduction

Background

The European Commission's Open Source Observatory (OSOR) is a platform on the collaborative Interoperable Europe portal. Started in 2008, it has evolved to be a central hub for the European public sector to discuss open source software. It provides IT experts and decision makers with guidelines, reports, studies and news articles, and engages actively with the community through webinars, workshops and other events.

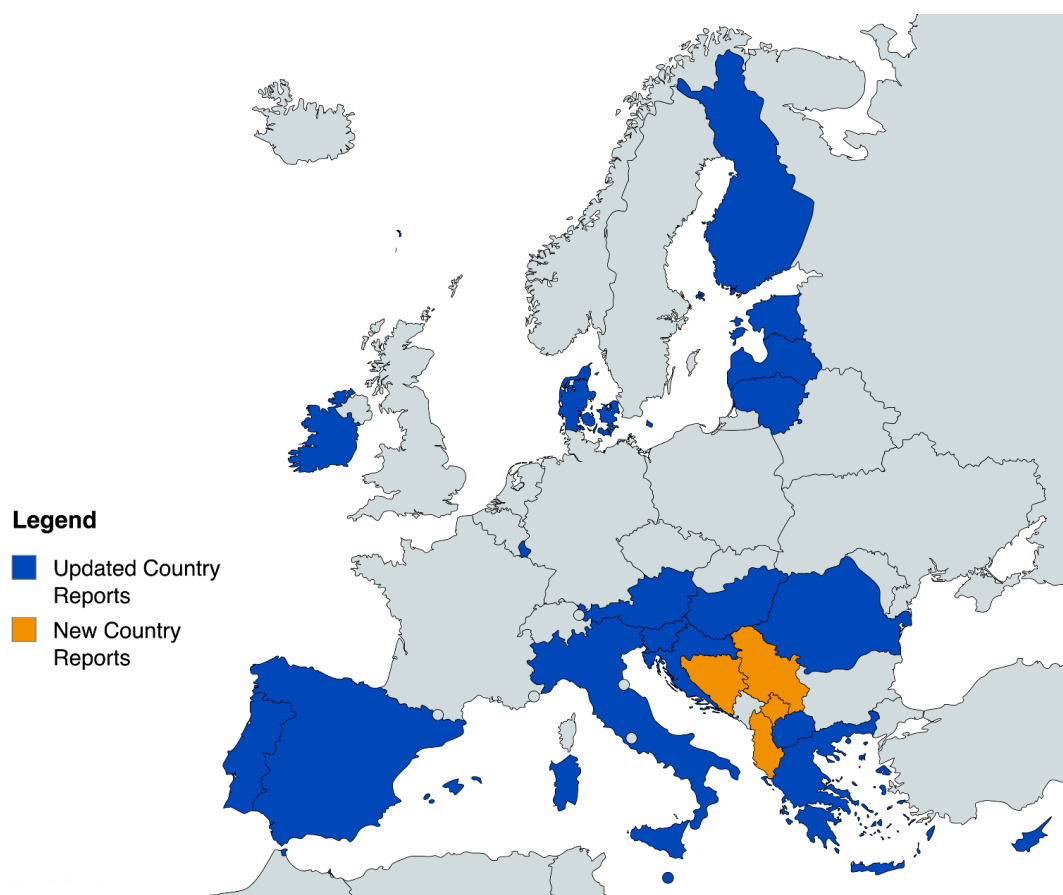
OSOR promotes open source software and showcases successful examples of adoption within European public administrations, while examining the challenges they face. OSOR raises awareness on the benefits of adopting open source software in terms of transparency, cost-effectiveness, and inter-governmental collaboration.

In 2019, OSOR started publishing country intelligence reports, which provide readers with a deeper analysis of the policies, initiatives, and stakeholders in different EU member states and beyond. Since then, OSOR has published reports on 56 countries, expanding the coverage from Europe to South and North America, Asia, and Africa. In 2025, the country report collection expanded to include four new Western Balkan countries: Kosovo, Serbia, Albania, and Bosnia and Herzegovina, giving insights into open source software adoption in EU candidate countries.

In 2024, OSOR published the first iteration of this paper, finding that digital sovereignty, transparency, and accelerated digitalisation had emerged as key motivations for open source adoption. The report also highlighted the growing importance of cities and municipalities, alongside the evolution of national policies towards collaborative approaches, including Open Source Programme Offices (OSPOs) and innovative funding mechanisms influenced by global initiatives.

This 2025 paper builds on the 2024 analysis by examining the continued evolution of open source software adoption across the European public sector, with particular attention to governance models, cross-border collaboration, and regional integration. The analysis draws on 23 recent country reports published since the previous paper, including four new reports from the Western Balkan region.

Figure 1 – Map of OSOR Country Intelligence Reports



Countries included in the 2025 analysis: updated country reports (blue, n=19) and new additions to the OSOR collection (orange, n=4). Source: own elaboration.

Structure of this paper

This paper begins by examining the evolution of the legal environment surrounding open source, assessing its ability to stimulate the development and implementation of open source projects. The number and quality of policies addressing open source is examined, as well as the degree to which open source is included in the most recently adopted digital strategies.

The second section investigates the governance models, structures, and processes that drive the development of open source solutions, shedding light on the relationships between public administrations and civil society organisations.

The third section focuses on international projects. It examines occurrences of cross-border collaboration between European countries, and the extent to which this facilitates the adoption and development of open source software. It also includes initiatives and projects that facilitate the reuse of software and information, to identify efforts made by countries to avoid duplication of efforts and increase sustainability.

Finally, the paper delves deeper into the Western Balkan region as a case study to illustrate the impact of EU integration processes on the adoption of open source software in candidate countries.

Note on methodology

The analysis has mapped common policy trajectories across the 23 countries. All these country reports were updated or newly created from 2024 forward and thus include recent data. This paper's analysis provided an overview of shared developments and national differences. It focused on four themes:

- governance mechanisms;
- legal frameworks;
- initiatives that facilitate reuse;
- cross-border collaborations.

These dimensions were examined through both quantitative and qualitative measurements. Quantitative metrics include the number of policies and strategies addressing open source, interoperability, and reusability; the number and types of actors involved in open source development; the number of open source catalogues and shared code pages; and the number of cross-border collaboration projects. To ensure consistency across sampled countries, each metric was scored using a three-point scale: 1 (clearly present), 0.5 (partially present or ambiguous), and 0 (absent). This approach gives the flexibility to capture nuanced situations where a simple yes/no classification would be insufficient. Scores were then aggregated to produce overall country scores for each thematic dimension.

The qualitative analysis focused on governance models and legal frameworks. For governance models, the analysis examined the types of relationships between stakeholders and the governance structures employed, based on the initiatives reported in the country reports. Regarding legal frameworks, the analysis examined the wording of legislation reported in the country reports, assessing the extent to which open source software was explicitly integrated and for what purposes. This qualitative examination informed the quantitative scoring by clarifying instances where legislation explicitly addressed open source software rather than related issues, such as interoperability or sustainability. Digital strategies were also analysed qualitatively to identify the most frequently cited drivers and priorities, as well as the role of open source within these broader strategic frameworks.

Progress and Trends

Legal Frameworks: Open Source at the Centre of Digital Policy

Key points

Emerging trends and new patterns:

- **Open source is becoming increasingly mainstream**, with most countries having a policy relating to open source.
- **Open Source is increasingly viewed as a strategic objective**, instead of only a means to achieve other goals.
- **Strategic integration is accelerating**, with 52% of recent digital strategies explicitly mentioning open source, and another 22% addressing aligned principles, such as interoperability, sustainability, and transparency.
- **Interoperability is an important aspect of policies relating to open source**, but the connection between these aspects is declining.
- **Digital sovereignty is not yet cited in many concrete open source relating policies**, in contrast with its dominating role in the discourse and day-to-day product adoption considerations
- Overall, **most countries are making progress in including open source software in their digital policy frameworks**, with 43% showing substantial advancements.

Challenges:

- **The analysis reveals uneven progress**, with 26% of countries experiencing setbacks in open source legal development.
- **Some countries with high progress in digital transformation advance without embracing open source**, suggesting gaps in the establishment of integrated approaches.

Opportunities:

- **Strong legal foundations are being established**, with 87% of countries having at least one open source policy, creating favourable conditions for adoption.
- **There is a strategic integration momentum**, with countries moving from implicit support to explicit legal recognition.
- **Growing recognition of open source's role in digital strategies creates political space for deeper commitments**; countries can leverage strategic integration to embed open source in long-term digital planning.

In recent years, the role of open source software in legislation has increased significantly across Europe. This trend creates favourable conditions for the

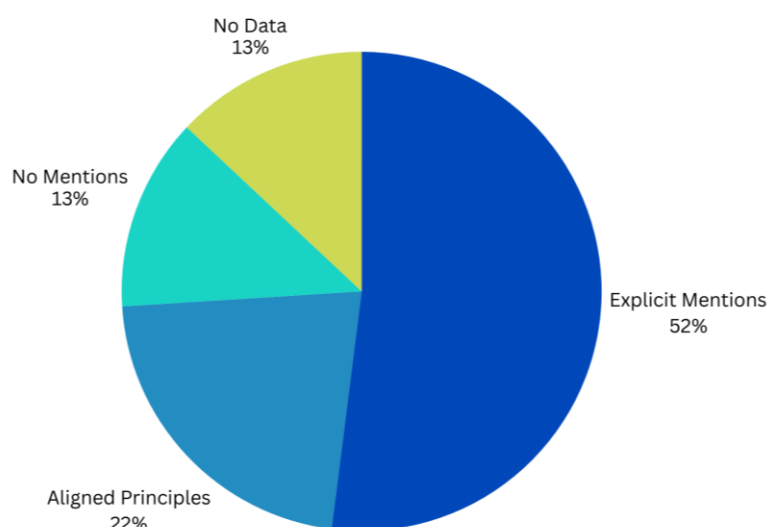
adoption and development of open source software within public administrations. Progress in this area is particularly evident when examining two key dimensions: policy development and strategic integration.

In fact, 20 of the 23 countries examined in this paper have at least one policy pertaining to open source - meaning legislation that explicitly recognises open source software as a vital component of digital policy, with the intention of regulating or encouraging its use. Furthermore, half of these countries even have more than one such policy, with some, such as Austria and Finland, having up to six.

The share of countries which have adopted a policy relating to open source software, such as legislation, a digital strategy or guidelines, has risen specifically in recent years. The five years from 2019 to 2023 especially show a burst in adopted policies, with nine countries adopting a policy relating to open source software for the first time in that period. The country report data indicates that the 11 countries adopting their first policy did this in the longer period of 15 years from 2003 to 2018.

An important takeaway from the country reports is that open source is becoming an integral part of national digital strategies. Investigating the type of policies which have open source relevance shows that there is a transition from tactical adoption to strategic integration and long-term commitment. This signals an increasing number of countries are changing their broader vision for digital transformation towards greater integration of open source software principles, with eight countries centring open software in their digital strategies: Estonia's Digital Agenda 2030, Croatia's Digital Strategy 2032, Austria's National Strategic Roadmap for the Austrian Digital Decade, Luxembourg's AI and Data strategies, Ireland's Connecting Government 2030, Greece's Bible of Digital Transformation, Kosovo's Digital Agenda 2030 and North Macedonia's ICT Development Strategy SMART/MK 2030.

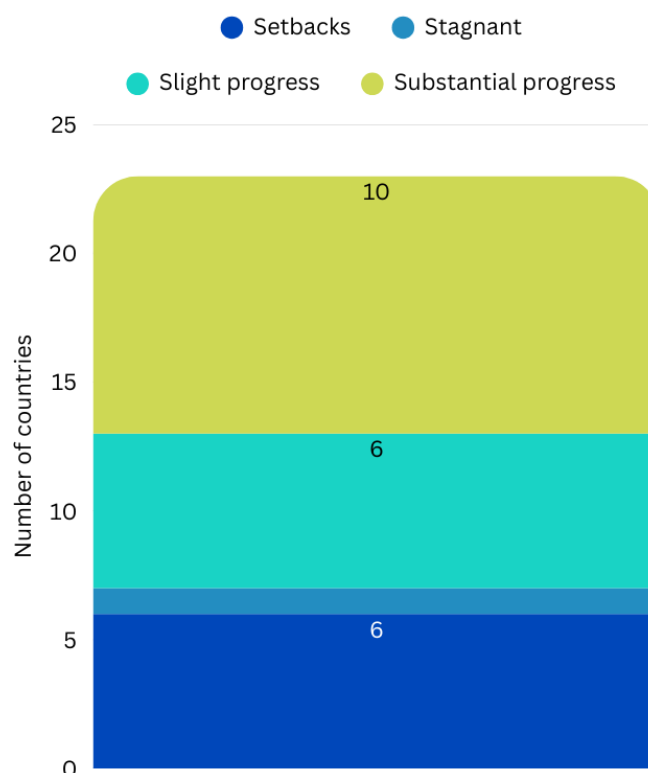
The analysed digital strategies show the goal of accelerating the digitalisation of public services, particularly with a view to improving accessibility and modernising state functions in line with digital-age expectations. Open source software is increasingly transitioning from one tool among many to the preferred means of achieving these strategic goals. This trend is even more prevalent when examining recent digital strategies, as of the time of data collection 52% of digital strategies, which mention open source software, do so explicitly and as a central pillar, while excluding strategies of recent years shows open source software plays a less strategic role.

Figure 2 – Open Source Integration in National Digital Strategies

Integration of open source in national digital strategies: explicit mention of open source software, mention of aligned principles (interoperability, sustainability, transparency, user-centricity), or no mention (n=23 countries). Source: authors' own elaboration.

This combination of dedicated policies and strategic integration has led to overall increased adoption, with 70% of countries showing an increase in their adoption of open source related policies. Examples are the Law 40/2015 in Spain focusing on the role of open source in reuse and several regional initiatives, such as in the Basque region, during that period. In Luxembourg, the AI as well as the Data strategies incorporate open source in their toolkits. Italy continues its proven track record through the adoption of the Three-Year Plan for Information Technology in Public Administration, which defines specific goals for the number of public administration bodies code as open source and adopting released code.

Setbacks in open source adoption were observed in Albania, Bosnia and Herzegovina, Hungary, Malta, Serbia, and Slovenia with adoption of new policies halting and existing policies being phased out without replacement, as indicated through desk research and interviews conducted. In Hungary, open source inclusion peaked around 2015-16 and has since declined. Serbia saw early interest grow in the 2000s thanks to an active Linux user group (LUGoNS) and government support, but this interest has decreased significantly since. Albania's National Agency for Information Society (AKSHI) and public sector have adopted proprietary-oriented policies; Libre Labs remains the sole open source organisation. Bosnia and Herzegovina shows fragmented digital governance with no single actor responsible; the Federal Administration for Geodetic and Real Property Affairs is an exception with open source standards policies.

Figure 3 – Overall Progress of Open Source Policy Framework

Progression of open source inclusion in national digital policy frameworks: substantial progress, slight progress, stagnation, and setbacks (n=23 countries). Source: authors' own elaboration.

Investigating the framing and themes which are connected to open source software within this legislation results in the conclusion that open source software has evolved from simply a means to an end and is increasingly seen by legislators as valuable in itself. Still, topics such as interoperability, sustainability, digital sovereignty play a role in the adoption of open source software.

Interoperability specifically stands in a close relationship with open source software, as 80% countries which have a policy covering open source software connect this policy to interoperability. Yet, most of those policies were adopted before 2020, often citing the European Interoperability Framework (EIF) as a driver for the adoption as it is the case in Albania, Luxembourg, and Serbia. Policies adopted from 2020 onwards diverge as new open source policies with interoperability as a goal become less common, pointing towards that the Interoperable Europe Act (IEA) has either not yet been translated into national policy frameworks or these policies do not cover open source software and thus would not be in the scope of the country reports - though the latter seems unlikely as the IEA specifically takes open source software into account as enabler of interoperability solutions in Europe.

At the same time, the topic of digital sovereignty that has been playing an ever-increasing role in the discourse for public sector IT infrastructure, is not being connected to adopted open source policies frequently at the point of data collection. Of the countries which have adopted a policy covering open source, only 25% cite digital sovereignty as a goal or at least connect it in some way to

the adopted open source policy. Austria's National Strategic Roadmap for the Austrian Digital Decade, adopted in 2023, is the most relevant example making a specific connection between open source software and digital sovereignty. This finding contrasts to some degree with the countries examined in the 2024 report. While the discourse and increasing pressure on public administrations and policymakers remain and even intensify, the countries surveyed in the report, all having been updated from 2024 onward, have fewer concrete implementation steps which take open source into account.

In conclusion, progress remains uneven across Europe and coordination would be able to improve this. A quarter of the countries have experienced setbacks in open source software legal developments over the past five years. These reversals stem from various causes, such as political transitions that shift priorities, budget constraints, a working environment that leans towards proprietary software, and a technical knowledge deficit, which can result in lock-in situations. Moreover, legal frameworks alone with increased open source prevalence is not enough if it is not followed by thorough implementation. While policy is necessary to encourage adoption, open source software also requires adequate institutional structures to guide enforcement, capacity building, and cultural change.

Governance Mechanisms: From Institutional Gaps to Collaborative Models

Key points

Emerging trends and new patterns:

- **Top-down institutional leadership remains dominant across Europe**, with central public administrations remaining the primary drivers of open source adoption.
- **Governance models and policy maturity are linked**, where countries with stronger institutional leadership tend to have more explicit and numerous open source policies.
- **NGOs act as substitute drivers in countries with limited institutional engagement**, though impact remains lower than with top-down institutional leadership.
- **Multi-stakeholder governance models are emerging** in countries like Latvia, Portugal, and Finland, building on the collaborative trend identified in 2024.

Challenges:

- **Stakeholder ecosystems remain insufficient**, with strong NGO presence but weak or absent central institutional structures limiting progress of open source adoption.

- **Limited adoption of collaborative governance models**, which are between NGOs and central public administrations, remain confined to a minority of countries.

Opportunities:

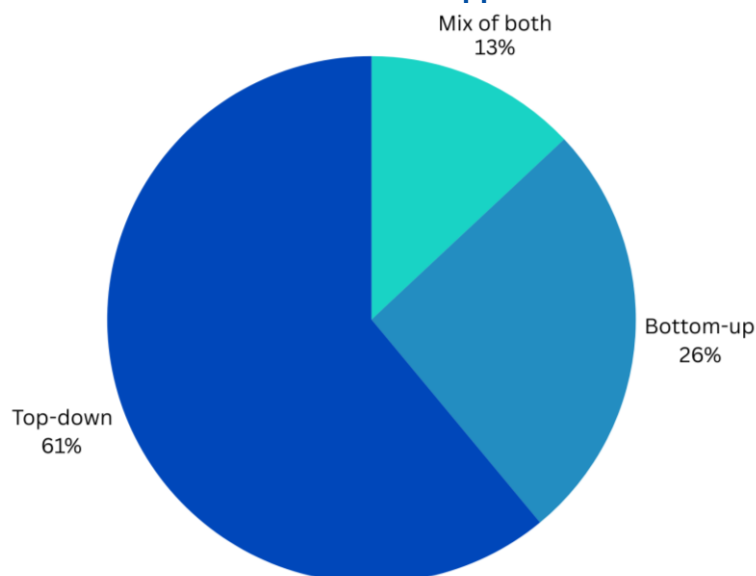
- **Strengthening collaborative governance models** that combine institutional capacity with civil society innovation and community engagement and show biggest impact.
- **Establishing or expanding dedicated public sector structures** such as OSPOs to coordinate open source efforts.

Current open source governance models in European public administrations reveal both strengths and limitations. In most countries, open source software adoption and initiatives are primarily driven through top-down approaches. Yet, institutional support through central public administrations remains inconsistent, resulting in gaps in implementation and practice. This situation creates a fundamental issue, as the actors required for the success of public sector open source in the country, are frequently underrepresented.

A majority of 61% of examined countries display a top-down approach to governance, meaning that the development of open source projects is primarily led by central government institutions. In contrast, community-led initiatives are less common. Just over 25% of countries rely primarily on bottom-up approaches, where civil society, developer communities, or local actors drive open source adoption with limited central coordination.

An emerging group of countries has adopted a different approach, moving beyond purely top-down or bottom-up models, moving towards a more collaborative policy environment. Latvia, Portugal, and Finland showcase stronger partnerships between the public and civil society sectors, both contributing to digitalisation efforts and positively impacting open source developments. This trend towards multi-stakeholder governance was already identified in the 2024 report.

These examples underscore the value of mixed governance models that combine institutional leadership with civil society engagement, leveraging the strengths of both approaches, an important factor in the sustainability of efforts. Collaborative governance models represent a positive shift away from purely institutional models towards a more balanced governance model that maintains institutional leadership while fostering broader stakeholder participation.

Figure 4 – Distribution of Governance Approaches Across Countries

Distribution of governance approaches: top-down, bottom-up, and mixed models (n=23 countries). Source: authors' own elaboration.

Despite most countries having adopted a top-down approach to governance, a large majority lack proper institutional support prioritising open source software at the top levels. In fact, the country reports reveal a significant imbalance between the public sector and civil society. Engagement by public administrations in open source remains surprisingly limited across Europe. Less than half of the countries have ministries or agencies explicitly prioritising open source software. This holds true for countries with a proven high level of public sector digital transformation, such as Estonia and Denmark.

Open Source Programme Offices (OSPOs) are largely absent, with only three of the examined countries having one on the central government level. The three countries with central government OSPOs are Italy (with its de facto OSPO, the Digital Team), Ireland (Lero-OSPO and Trinity College's OSPO), and Luxembourg (Luxembourg House of Cybersecurity OSPO and the CLAUSEN project establishing a national Open Source Promotion Office). This limited expansion contrasts with the momentum documented in the 2024 report, which identified OSPOs as an emerging organisational structure and noted their presence in various forms across at least 13 EU Member States. This is likely less a reversal of a trend but the result of the selection of countries analysed. However, institutional leadership appears to be crucial to develop strong and encouraging legal frameworks, capable of fostering the adoption of open source software more systematically.

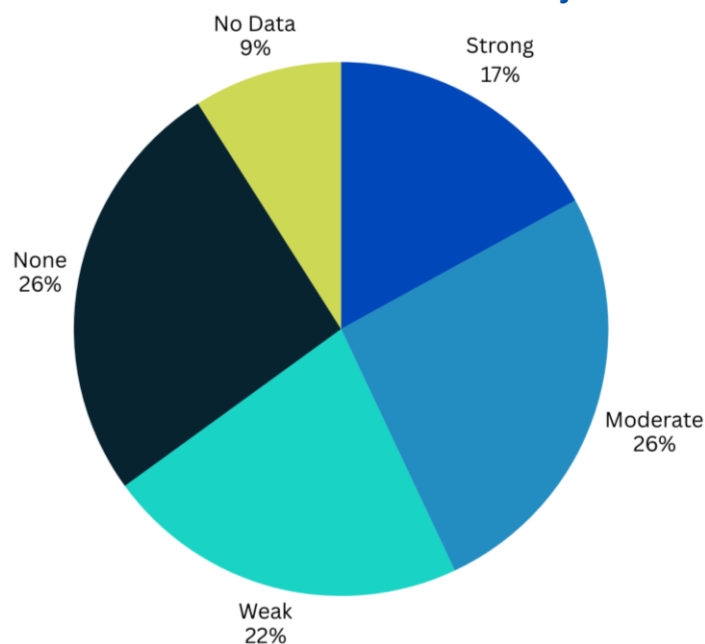
Italy demonstrates the strongest institutional ecosystem with its Digital Team functioning as a de facto OSPO, the state-owned IT supplier PagoPA S.p.A. developing open source solutions, the Department for Digital Transformation, and the Competence Centre for Reuse and Open Source (CCROS) created by Agency for Digital Italy (AgID). This institutional depth correlates with Italy's consistent progress in open source adoption. Austria's Department of Digitalisation within the Federal Chancellery has also set up several initiatives

that prioritise open source software. These countries demonstrate strong institutional leadership, resulting in significant progress, considered here as increased open source adoption, centring open source in digital policies and institutional leadership.

In contrast, countries such as Cyprus, Romania, and Slovenia, which currently lack sufficient institutional support, have made slow progress, and in some cases experienced setbacks, in developing open source software in the public sector.

In countries lacking top-down leadership, NGOs have emerged as key players. Open source NGOs are significantly more prevalent and active across Europe than institutional actors. Nearly 90% of the countries show an active civil society presence. Slovenia leads with four active NGOs (including LUGOS and Duh-Casa), followed by Greece and Italy with 3 each. Only Hungary and Lithuania show no active NGO presence. In the absence of institutional leadership, NGOs tend to step in to fill the void. The presence of NGOs is crucial for steering the development and adoption of open source software.

The analysis reveals that, even though many countries' public administrations lack an explicit open source mandate, 65% still showcased collaboration between public sector and civil society. This appears to be a prevailing trend. Examples are countries such as Latvia and Portugal, where the strong relationship results in tangible progress. Latvia's collaborative model centres on VARAM (Ministry of Smart Administration), which implements e-Governance policy with an open source by default principle through Cabinet Regulation No. 367 (2023). LATA, the Latvian Open Technology Association, actively participates in policy discussions, organises dedicated hackathons and awards, and provides education and training. The State Digital Development Agency (SDDA) was recognised by LATA in 2025 for advancing open solutions. Portugal combines strong ministerial leadership with active NGO engagement. The Minister in the Cabinet of the Prime Minister has competences listed in Decree-Law 87-A/2025 steering OSS procurement. ESOP (Associação de Empresas de Software Open Source Portuguesas) works directly with policymakers. The Decree-Law 107/2012 and Law 36/2011 establish preference for open source software and open standards in ICT procurement.

Figure 5 – Distribution of Public Sector-Civil Society Collaboration Types

Distribution of collaboration types between public sector and civil society organizations: strong, moderate, weak, and none (n=23 countries). Source: authors' own elaboration.

NGO-led approaches show limitations. In fact, countries with bottom-up approaches have fewer and less comprehensive open source policies, which impedes the growth of open source software adoption in the public sector. While community initiatives stimulate innovation and raise awareness, they tend to struggle with scale and coordination, a task for which state actors are better suited.

In fact, the comparison between governance models and legal frameworks' maturity regarding open source software reveals a pattern: institutional leadership and comprehensive regulation tend to go hand in hand. Among countries with limited legislation relating to open source, community-driven approaches are more common, while countries with active central government engagement develop more comprehensive open source regulations. Bottom-up approaches drive innovation and community engagement, yet they often struggle to achieve the same level of coordination that institutional leadership enables. Top-down approaches, by contrast, drive faster and more systematic adoption through dedicated policies and resources. Government institutions are therefore crucial in leading the development and implementation of open source software. Although NGOs are valuable in advocacy and community building, they cannot replace institutional capacity; systematic adoption requires government backing.

This demonstrates the importance of institutions as the main actors capable of steering evolution. By establishing favourable environments and legal frameworks, institutions can effectively promote the development and adoption of open source solutions. This highlights an opportunity for public institutions to play a more important role. Currently, public institutions are not adequately represented to effectively support these initiatives, and institutional support is uneven across European countries, which limits the effectiveness of existing open source initiatives in many countries.

In order to be able to implement an open source favourable policy framework, countries would benefit greatly from developing collaborative governance models. These models provide countries with a way to address deficiencies in central public administration by partnering with civil society actors capable of balancing institutional shortcomings. In addition, the establishment of dedicated public sector bodies, in particular OSPOs, to coordinate open source software developments and regulations, combined with formal partnership mechanisms with NGOs and developer communities, can effectively address current institutional gaps and leverage innovation.

Investing in Cross-Border Collaboration to Break Stagnation

Key points

Emerging trends and new patterns:

- **Stagnation in cross-border collaboration**, marking a departure from the positive momentum observed in the 2024 report.
- **Fragmentation visible at both international and domestic levels**, with limited cross-border projects and limited national code sharing.
- **This situation is the result of strategic choices**, rather than technical capacity.

Challenges:

- **Substantial underutilisation of existing EU interoperability frameworks and international initiatives.**
- **Duplication of development efforts across countries**, leading to inefficiencies and higher costs.
- **Disconnect between data-sharing practices and code-sharing practices.**

Opportunities:

- **Strengthening EU-level infrastructure**, through the development of shared repositories and development platforms.
- **Creating incentives for multi-country open source projects**, accelerating innovation, reducing duplication, and increasing cost-efficiency.
- **Developing repositories and development platforms** to support reuse and transparency.
- **Integrating cross-border collaboration as a core priority in national digital strategies**, by leveraging open source as a strategic tool for digital sovereignty, transparency, and interoperability.
- **Extend domestic collaborative governance models to international level.**

In addition to establishing collaborative governance models at the national level, fostering cross-border cooperation represents a critical yet overlooked opportunity for advancing open source software across Europe. Transnational open source cooperation appears less active in the examined countries in comparison with the progress reported in 2024. Projects spanning multiple countries have remained rare. Less than half of the analysed countries participated in international open source projects and even fewer engaged in interoperability initiatives during the past year.

These takeaways show the need for the advancement and implementation of initiatives such as the European Interoperability Framework, with a new revision set out in the equally relevant IEA, and collaborative platforms, such as the EU OSPO Network, the Interoperable Europe Community, the Interoperable Europe Board and the Interoperable Europe Academy, designed to address precisely these challenges. Even EU member states that are advanced in terms of public sector digital transformation, such as Denmark, have few initiatives and solutions shared across borders.

This stagnation has resulted in fragmented development at both international and national levels. Countries often develop similar solutions independently, leading to duplicated efforts, reduced cost-efficiency, and missed opportunities for innovation and knowledge sharing.

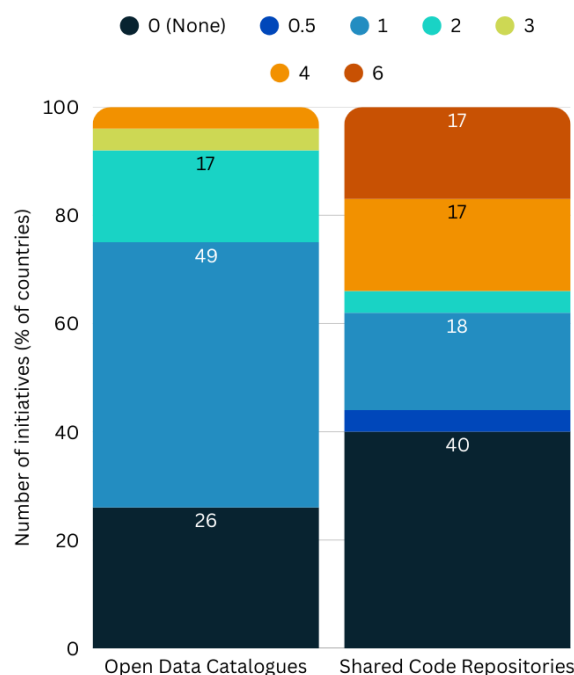
This fragmentation is visible not only in the lack of cross-border projects but also in how countries approach data and code-sharing domestically. On the one hand, open data catalogues have gained traction, demonstrating an increasing commitment to transparency. More than 75% of the analysed countries have at least one open data catalogue for public administrations. Estonia leads with four open data initiatives: the Veera Design System, the Kratid repository of open source AI components, the Estonian code repository Koodivaramu, and the Estonian Open Data Portal using CKAN. Croatia follows with three: the National Croatian Research Information System on GitHub, the Open Data Portal also using CKAN, and the Open Data Portal of Zagreb. The majority of these catalogues use the open source CKAN platform. These portals facilitate the exchange of data between public administrations within a country, but also with the public, enhancing the visibility and transparency of public sector work. Furthermore, they facilitate the reuse of information by compiling it in one public online registry. The prevalent adoption of open source software in this context further contributes to the reusability of information and software.

On the other hand, domestic shared repository pages seem to be stalling. Despite the recognised value of sharing code, a significant proportion of countries remain reluctant to share the underlying code powering their digital services. In fact, the analysis has revealed fragmentation among the countries. While roughly half of the countries manage at least one shared code repository, eight countries host between two and six, whereas nine countries do not have any shared code repositories at all. Those leading with 4-6 shared code repositories: Croatia (6, including HRVOJKA on GitHub, City of Zagreb's HACKL hackathon projects, and Croatian Scientific Bibliography API), Italy (6, including Developers Italia),

Luxembourg, Romania, Portugal, and Latvia (4 each). Finland maintains 4 repositories including the Helsinki Region Infoshare open data service. In contrast, 9 countries (39%) have no shared code repositories, including Austria, Cyprus, Bosnia and Herzegovina, and North Macedonia. Though the European Commission has adopted certain principles from national code repositories and created a federated code repository¹, with the aim to promote and connect such national repositories, this impact cannot be seen in the country reports yet.

This points to the emergence of a critical divide in how countries approach digitalisation. Some countries, such as Finland and Spain, seem to perform well in developing and disseminating open source projects, thereby promoting transparency and community participation in public digital services. In contrast, other countries exhibit high levels of service digitalisation without systematically embracing open source principles. This suggests that these countries may be reluctant to develop code internally, use open source projects, or publish the code of projects developed for public administration's digitalisation. This concerns countries with a high degree of digital transformation, such as Austria, indicating that the gap is not about technical capacity but reflects strategic choices and priorities. As a result, countries appear to be splitting into two groups with contrasting approaches. While the first group of countries view transparency and code reusability as integral to digital transformation, the second group seems to treat digitalisation primarily as a service delivery challenge rather than an opportunity for open collaboration and knowledge sharing.

¹ <https://interoperable-europe.ec.europa.eu/eu-oss-catalogue>.

Figure 6 – Distribution of Countries by Number of Open Data Catalogues and Shared Code Repositories

Distribution of reuse initiatives by country. Each stacked bar shows the percentage of countries with 0-4 open (data) catalogues (left) or 0-6 shared code repositories (right) (n=23 countries). Source: authors' own elaboration.

Open source software thrives on collaboration, code reuse, and international contributions. A lack of initiatives that facilitate reuse at both the national level and in the context of cross-border collaborations represents a missed opportunity to leverage open source software's core strengths and steer digital development. When countries embrace these principles through cross-border initiatives, the benefits are substantial. Finland and Estonia's collaboration through the Nordic Institute for Interoperability Solutions (NIIS) demonstrates successful cross-border open source development. X-Road, their flagship project, provides secure data exchange between public and private organisations and has been adopted internationally. Finland also participates in the OpenEuroLLM initiative (EU project) and the Open Kvarken project between Umeå (Sweden) and Vaasa (Finland). Estonia has released its ID card software architecture on GitHub for international usage and Bürokratt (AI chatbot) is being deployed in other countries. This kind of investment in cross-border collaboration facilitates resource pooling, knowledge transfer through shared code repositories, and the development of solutions serving multiple administrations simultaneously.

To realise this potential, the country report data indicates a benefit from greater use of international and EU level initiatives. At the EU level, the main obstacle does not seem to be the availability of offerings such as the European Interoperability Framework and the initiatives resulting from the IEA but their visibility and participation as well as adoption on the national level. The data indicates that concrete incentives for multi-country collaborations, and the reduction of administrative barriers that discourage participation are necessary. An important principle that the federated EU Open Source Solutions Catalogue

adopts is the aim to complement rather than compete with national repositories, serving as a hub for transnational initiatives.

At the national level, countries should integrate cross-border collaboration as a core priority within their digital strategies. Building on the collaborative governance models emerging domestically, countries could extend this collaborative mindset to the international level. This approach would result in a more connected European open source ecosystem. By strengthening cross-border collaboration, countries could accelerate innovation through shared development, and build more interoperable public digital infrastructure, while reducing overall costs and development timelines. The European Digital Infrastructure Consortium is an example of such an opportunity.

EU Integration: The Western Balkans as a Case Study

Key points

Emerging trends and new patterns:

- **EU accession aspirations are the primary driver of digitalisation in candidate countries**, demonstrating the EU's influence on digital priorities.
- EU member state Croatia demonstrates significantly stronger open source infrastructure, suggesting the **EU integration process can facilitate open source adoption**.

Challenges:

- **Institutional gaps in the Western Balkans**, with limited structures to support systematic open source adoption.
- **Declining or slowing open source adoption in parts of the Western Balkan region**, despite strong digitalisation incentives tied to EU accession.
- **This trajectory conflicts with the EU's growing emphasis on open source for digital sovereignty**.
- **Potential interoperability barriers with EU systems upon accession**.

Opportunities:

- **Candidate countries make foundational digital infrastructure decisions now**, during the accession phase, indicating that it can be channelled towards open source adoption.
- **Embedding open source principles into EU accession and enlargement processes**, using knowledge sharing and support mechanisms.
- **Deeper inclusion of Western Balkan candidate countries in EU open source and interoperability initiatives**, accelerating convergence and integration.

- **Open source software can facilitate the smooth integration of new members** with interoperable systems from day one.

For the first time, OSOR included four countries from the candidate and potential candidate countries in the Western Balkans in its collection of country reports: Albania, Bosnia and Herzegovina, Kosovo, and Serbia, alongside an updated report on North Macedonia. The remaining country within the Western Balkans, Montenegro, was not examined during this report period and the term Western Balkans refers thus to the five examined countries. These reports offer initial insights into open source software development and adoption in the region. More significantly, they provide a unique lens through which to examine how EU integration and enlargement strategies can shape open source adoption. The Western Balkans case study reveals that while EU accession aspirations drive candidate countries' digitalisation policies, demonstrating the EU's influence on their digital priorities, this influence has not yet extended meaningfully to open source software adoption.

Open source software uptake appears to be declining in the region. Research into and interviews conducted in the course of the country report creation on the history of open source adoption in the region show that three of the Western Balkans countries show a slowdown or a stagnation in open source adoption within the public sector. This is despite active digitalisation efforts inspired by EU standards. Additionally, while a large majority approach digital issues in a top-down manner, institutional gaps remain, hindering the Western Balkan countries' ability to develop and implement open source initiatives within the public administrations. Dedicated institutional open source actors, such as ministries or agencies prioritising open source software and OSPOs, are largely absent. This absence of institutional infrastructure contrasts sharply with EU member state Croatia, and represents a critical missed opportunity during the accession phase when digital foundations are being established.

Due to their accession aspirations, Western Balkan countries are at a pivotal moment in their digital transformation. Their ambition to join the EU is a key driver of their digital policies, ensuring that they will be able to integrate smoothly with European systems in the future. The accession phase provides a valuable opportunity to embed open source technologies and principles into digital infrastructure from the ground up, ensuring future interoperability with EU systems and avoiding costly vendor lock-in.

Open source software and open source policy adoption across the region is uneven, revealing different strategic approaches. Kosovo, and North Macedonia demonstrate positive momentum in open source adoption. Their recent digital strategies explicitly mention open source software as a key element of their digital transformation, and they have developed supportive legal frameworks. These countries appear to recognise open source as a tool for alignment with their European integration goals. In contrast, Albania, Bosnia and Herzegovina, and Serbia have taken a more limited approach. While their digital strategies mention related principles such as interoperability and sustainability, they stop short of

explicitly addressing open source software. In these countries, open source adoption had peaked in the 2000s, but declined from 2010 onward as priorities within the government changed. Now, their public administration increasingly face vendor lock-in, creating dependencies on proprietary systems that may prove difficult and costly to escape. This divergence is particularly concerning given the EU's growing emphasis on open source software as essential for digital sovereignty and autonomy. As European leaders increasingly frame open source as crucial, these three countries risk aligning their digital infrastructure with approaches that may soon be at odds with EU requirements and expectations.

Croatia offers compelling evidence of how EU integration facilitates open source adoption. In fact, the country has a significantly stronger open source infrastructure than its neighbours. Its public sector maintains multiple open data and code catalogues and GitHub pages, whereas non-EU Balkan countries typically have only one open data catalogue and no public code repositories. The example of Croatia indicates that EU integration processes can facilitate open source adoption, by opening the door to EU frameworks and projects.

By leveraging their ambition to join, the EU can influence the Western Balkan country's digital priorities, ensuring that their systems follow the norms of the Union and that their digital infrastructure can be integrated with those of other member states upon accession. The accession process therefore provides a unique opportunity to incorporate open source software into these countries' digital transformation efforts from the outset, through the interoperability of open source, avoiding challenging transitions further down the line. This would foster the development of open source software in the region and facilitate the future integration of candidate countries into EU digital infrastructure. Deeper involvement of Western Balkan countries in EU open source initiatives could accelerate adoption, while promoting interoperability with European systems, reusability, and cost efficiency. This could involve encouraging these countries to participate in European interoperability projects and providing access to collaborative platforms, as well as assistance to help them establish institutional capacity. It could additionally include sharing best practices from member states and encouraging Western Balkan countries to collaborate with each other to build a regional open source community.

Conclusion

Since the 2024 iteration of this report, public sector adoption of open source software has continued to gain momentum in Europe, yet this report draws attention to specific challenges with regard to governance and cross-border collaboration.

As digital sovereignty and transparency concerns increase across Europe, open source software presents a strategic opportunity. As a result, legal recognition has increased across Europe over the past five years. Digital sovereignty drives the discussion and adoption, but has not yet had a broad impact on legislation of the examined countries. In addition, policy implementation remains uneven and institutional support appears to lag behind political commitment. European countries increasingly recognise the value of open source software but seem at the same time to struggle to transition their digital infrastructures towards it.

This has resulted in contrasting situations among countries and gaps in open source software adoption. Three critical areas have emerged requiring particular strategic attention to stimulate open source software adoption in the public sector. First, in order to effectively address the issue of insufficient yet essential institutional support, transitioning towards collaborative governance models for digital issues emerges as essential. This involves boosting partnerships between public administrations and open source communities, to combine government capacity with civil society innovation. Dedicated public sector bodies, in particular OSPOs, could coordinate open source software regulations and partnerships with NGOs and developer communities.

Second, gaps in cross-border cooperation and shared code repositories represent a missed opportunity to implement open source policies. This results from strategic choices that overlook the benefits of open source principles in driving digital transformation. The establishment of stronger EU sharing and development platforms, and the integration of cross-border collaboration as a core priority within member states' digital strategies could overcome this challenge. Cross-border collaboration can significantly accelerate innovation and interoperability, while reducing costs and development timelines.

Finally, the Western Balkans shows how EU integration ambitions drive candidate countries' digital transformation priorities. This represents a window of opportunity to include open source software as a key pillar of candidate countries' digital infrastructure upon accession. While adoption in some countries is regressing, integrating open source software during accession ensures greater interoperability with existing European systems and reduces the need for costly transitions in the future.

This report comes at a pivotal moment for Europe's digital future. Growing geopolitical tensions and concerns over digital sovereignty have brought open source software to the centre of strategic discussions. As Europe navigates an increasingly contested digital landscape, open source emerges as both a practical tool and a strategic choice.



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