NEXT GENERATION INTERNET

D1.3 THE IMPACT OF NGI FUNDING ON DC/IC - INTERMEDIATE REPORT

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Abstract	This intermediate report aims to summarise the insights and challenges gained through undertaking the task of measuring the funding impact and multiplier effect of the NGI funding programme. It serves as a reflection of what has been learnt so far and presents findings from five case studies through desk research, interviews and quantitative analysis. This topic will be further explored and finalised for the final report in 2026.
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* *R: Document, report (excluding the periodic and final reports)*
DEM: Demonstrator, pilot, prototype, plan designs
DEC: Websites, patents filing, press & media actions, videos, etc.
DATA: Data sets, microdata, etc.
DMP: Data management plan
ETHICS: Deliverables related to ethics issues.
SECURITY: Deliverables related to security issues
OTHER: Software, technical diagram, algorithms, models, etc.

EXECUTIVE SUMMARY

The Next Generation Internet (NGI) initiative represents one of the European Union's most ambitious efforts to reshape Europe's digital scene around values of openness, trust, and human-centric design. Since its inception, NGI has invested in hundreds of open source software (OSS) projects across Europe by seeding innovation in areas ranging from decentralised and privacy-preserving technologies to digital identity, sovereignty, and resilient infrastructure. As these projects mature, understanding how public funding translates into long-term impact, as well as the sustainability of individual projects and the broader ecosystem, has become increasingly important for funders, policymakers, and practitioners alike.

This document presents the latest findings from our ongoing assessment of funding impact for NGI-funded projects. It aims to explore both the potential and current limitations of the monitoring and evaluation approaches that aim to capture the full spectrum of outcomes. The outcomes studied include multiple types of impact including social, technical, economic and strategic outcomes.

One unexpected obstacle of this study has been the lack of comprehensive data on the funding received for the projects. Since funding coordinators are responsible for distributing the funding, it has been a challenge to pool data from these different sources. Though there have been attempts, there is currently no comprehensive database which includes the correct funding amount, start and end dates, OKRs and project information of NGI funded projects. This has made assessing the funding impact of NGI especially difficult.

The intermediate report focuses on five case studies that merge quantitative data analysis of project metrics with qualitative insights. The qualitative approach is drawn from interviews with project leaders, desk research, and literature review. This combined approach aims to provide a more holistic view of how public investment supports multiplier effects, and contributes to Europe's digital sovereignty goals.

The findings in this intermediate report reveal encouraging trends in continued project activity, reuse, and community growth, alongside methodological challenges of assessing the true impact of funding. Many impacts are distributed, indirect, and long-term, which make them difficult to capture with quantifiable metrics. Methodological refinements are recommended where possible, e.g. long-term tracking of funding flows, ecosystem mapping, and the integration of qualitative and quantitative evidence. These approaches would allow for a better understanding of these complex effects.

Our in-depth analysis of five OSS projects funded by NGI – **Mastodon, Decidim, AboutCode, F-Droid, and Mobile NixOS** – brings out some recurring patterns in how public funding shapes OSS impact and sustainability. Stable and predictable funding are crucial for long-term planning. It allows projects to maintain infrastructure, development, and operations without the strain of financial uncertainty.

The NGI funding coordinators' technical expertise and understanding of community-driven development further improved outcomes for these projects by guiding them through the application proposals and providing support throughout the funding period. NGI's lightweight and flexible application processes allowed small, agile teams to focus on delivery. And open licensing and reusable outputs amplified the public value of this funded work. The recognition gained through successful grants increased credibility and confidence of the projects. It also attracted further support and collaborative opportunities.

Projects aligned with European priorities such as digital sovereignty, transparency, and democratic participation, benefit from greater legitimacy and access to funding. However, challenges persist. Even with financial support, essential maintenance, infrastructure, security,

and community stewardship are often underfunded, and long-term sustainability continues to rely heavily on volunteer contributions.

The impact of funding is difficult to quantify, as outcomes unfold over time, overlap with multiple support streams, and include societal and ethical dimensions that are difficult to measure by conventional metrics. Values-driven contributions can be central to a project's success, as exemplified by Mastodon and Decidim, where social and ethical outcomes are as important as technical achievements.

Based on the intermediate report's findings, public funding does help innovation, governance, and can amplify societal impact. Achieving lasting sustainability and adoption of these projects, however, requires flexible, multi-source funding, recognition of maintenance work, and evaluation approaches that capture all types of contributions, including those not appearing in the codebase.

This interim analysis provides lessons learned and practical guidance to policymakers and funders seeking to improve the sustainability and systemic impact of open source investments. In the recommendations section insights can be found that have been identified so far and which could be incorporated into future funding programs focusing on open source projects or Digital Commons more widely. The recommendations include embedding lightweight, meaningful monitoring from the outset of the funding process. The report concludes that funding frameworks should assess both technical outputs and non-technical contributions, such as governance and community-building activities. It is recommended that focus is on ecosystem-level outcomes instead of project-level analysis to assess the impact of an inherently decentralised innovation network. Though project-level outcomes are important and are explored in this study, due to the dispersed nature of open source projects they only show a small segment of the ecosystem supporting the digital infrastructure.

In order to secure continuity of these projects, staged or tiered funding mechanisms can help promising projects transition from microgrants to multi-year support. So that the innovative works can become long-term elements of Europe's Digital Commons. Given the success seen in the social impact of the five case studies examined, it is encouraged policymakers to continue prioritising the human-centric and rights-based approach, alongside the current sovereignty-based focus. NGI is a flagship example of Europe's approach to build a trustworthy, privacy-preserving Internet.

TABLE OF CONTENTS

EXECUTIVE SUMMARY **3**
TABLE OF CONTENTS **5**
LIST OF FIGURES **6**
LIST OF TABLES **7**
ABBREVIATIONS **8**
1 NGI FUNDING **9**
1.1 NGI OVERVIEW AND CONTEXT 9
1.2 NGI'S PURPOSE AND GOALS 9
1.3 NGI FUNDING MECHANISM 10
1.4 NGI MONITORING AND EVALUATION 11
2 FROM CHALLENGES TO INSIGHTS WHEN MEASURING THE IMPACT OF PUBLIC FUNDING **13**
2.1 KEY CHALLENGES 14
2.1.1 Structural challenges 14
2.1.2 Design challenges 16
2.1.3 Operational challenges 16
2.2 EXISTING WORK AND TOOLS 17
2.2.1 Review of valuation models 17
2.2.2 Community Health Analytics Open Source Software (CHAOSS) 20
2.2.3 Toolkit for Measuring the Impacts of Public Funding on Open Source Software Development 20
2.3 FURTHER LITERATURE ON THE IMPACT OF OPEN SOURCE FUNDING 21
2.4 OUR ONGOING WORK - METHODOLOGY 22
3 CASE STUDIES **24**
3.1 GENERAL INSIGHTS FROM CASE STUDIES 24
3.2 METHODOLOGICAL INSIGHTS FROM CASE STUDIES 26
3.3 INDIVIDUAL CASE STUDIES 27
3.3.1 Mastodon 29
3.3.2 Decidim 32
3.3.3 AboutCode 36
3.3.4 F-Droid 40
3.3.5 Mobile NixOS 43
4 NEXT STEPS FOR 2026 RESEARCH **47**
5 RECOMMENDATIONS FOR POLICYMAKERS **48**

LIST OF FIGURES

FIGURE 1: NGI CASCADE FUNDING 10
FIGURE 2: MASTODON RADAR CHART 30
FIGURE 3: MASTODON PROJECT METRICS OVER TIME 30
FIGURE 4: MASTODON ENGAGEMENT OVER TIME 31
FIGURE 5: DECIDIM RADAR CHART 33
FIGURE 6: DECIDIM PROJECT METRICS OVER TIME 34
FIGURE 7: DECIDIM PR/ISSUE METRICS OVER TIME 35
FIGURE 8: SCANCODE RADAR CHART 37
FIGURE 9: VULNERABLECODE RADAR CHART 38
FIGURE 10: DEJACODE RADAR CHART 38
FIGURE 11: ABOUTCODE PROJECT METRICS OVER TIME 39
FIGURE 12: ABOUTCODE PR/ISSUE METRICS OVER TIME 39
FIGURE 13: F-DROID RADAR CHART 41
FIGURE 14: MOBILE NIXOS RADAR CHART 44
FIGURE 15: MOBILE NIXOS PROJECT METRICS OVER TIME 45
FIGURE 16: MOBILE NIXOS PR/ISSUE METRICS OVER TIME 45

LIST OF TABLES

TABLE 1: EXAMPLES OF SOCIAL, ECONOMIC, TECHNOLOGICAL IMPACT AREAS OF OSS FUNDING TAKEN FROM OSBORNE ET AL'S TOOLKIT 13
TABLE 2: VALUATION MODELS AND THEIR APPLICATION TO OSS DEVELOPMENT TAKEN FROM OSBORNE ET AL.'S TOOLKIT 18
TABLE 3: DESCRIPTION AND EXPLANATION OF METRICS 27

ABBREVIATIONS

AI	Artificial Intelligence
CHAOSS	Community Health Analytics Open Source Software
CRA	Cyber Resilience Act
CSA	Coordination and Support Action
DEP	Digital Europe Programme
DMA	Digital Markets Act
DSA	Digital Services Act
EC	European Commission
EU	European Union
FOSDEM	Free and Open source Software Developers' European Meeting
FOSS	Free and Open Source Software
FOSSY	Free and Open Source Software Yearly
GDPR	General Data Protection Regulation
GPU	Graphics Processing Unit
MAU	Monthly Active Users
NGI	Next Generation Internet
NGI0	Next Generation Internet Zero
NGO	Non-Governmental Organization
OKR	Objectives and Key Results
OSS	Open Source Software
OTF	Open Technology Fund
PR	Pull Request
R&D	Research and Development
RIA	Research and Innovation Action
SCA	Software Composition Analysis

1 NGI FUNDING

1.1 NGI OVERVIEW AND CONTEXT

The NGI initiative was conceived in the late 2010s as the European Commission's (EC) response to growing concerns over the centralisation of digital infrastructure, the erosion of privacy, and the dominance of a few global technology companies. NGI emerged from a recognition that Europe required a new, human-centered vision for the Internet, one grounded in openness, trust, and respect for fundamental rights.[1]

In 2017, the EC commissioned a foundational study led by the NLnet Foundation in collaboration with Gartner, setting out a roadmap and vision for a more decentralised and values-based Internet. Published in October 2018, this study provided the conceptual framing for NGI's early research directions and funding mechanisms.[2]

At its launch, NGI emphasised a human-centric Internet, placing individuals and communities at the center of the digital ecosystem. It sought to advance core European values (e.g., privacy, transparency, inclusivity, participation, and digital rights) and support bottom-up innovation in Internet technologies that could shift power away from centralised, opaque platforms.

Over time, geopolitical and strategic considerations, including growing dependency on non-European technologies and infrastructures, have pushed NGI toward a stronger focus on digital sovereignty. Today, NGI's mission explicitly includes Europe's capacity to build, own, and operate critical open digital technologies. By doing that, it aims to reduce external dependencies across the continent.[3]

1.2 NGI'S PURPOSE AND GOALS

For any assessment of funding impact, it is crucial to understand the goals of the specific funding programme. The NGI initiative aims to combine aspirational values with concrete operational objectives[4]. Since its inception, its focus has shifted from ethical and human-centric Internet innovation to a focus on Europe's digital sovereignty through open, trustworthy, and resilient digital infrastructures. Our understanding and explanation of its core objectives are outlined below.

- **Support open, decentralised, and trustworthy Internet building blocks.**

NGI's aims to fund research and development of protocols, systems, tools, hardware, middleware, and applications that embody openness, transparency, interoperability, and privacy. NGI aims to seed viable alternatives to closed, centralised platforms, ensuring that Europe retains agency in shaping the next phase of the Internet.

- **Empower users through a human-centric approach.**

Empower individuals to control their data, identity, and digital interactions and reduce algorithmic opacity. NGI projects promote inclusivity across languages, regions, and abilities. This is to make sure that Europe's digital transformation leaves no one behind.

[1] https://ngi.eu/
[2] Next Generation Internet 2025
[3] The Future of Internet: From Digital Sovereignty to Strategic Autonomy
[4] https://ngi.eu/

- **Promote digital rights, values, and regulatory alignment.**

Ensure that funded projects align with key EU policy frameworks such as the General Data Protection Regulation (GDPR), the Digital Services Act (DSA), the Digital Markets Act (DMA), and the Cyber Resilience Act (CRA). Some of these regulations came into force years after the launch of NGI. This again shows how strategic priorities of the EU become objectives of past, current and future funding programmes.

- **Create alternatives and diversify Europe's technological base.**

Develop open technology solutions that diversify Europe's digital ecosystem, challenge global incumbents, and broaden competition. This goal supports Europe's ambition to cultivate a robust, independent, and innovation-driven technology ecosystem.

- **Encourage sustainability and ecosystem growth.**

Provide targeted support to innovators, including individual researchers, developers, startups, and small and medium-sized businesses, to cultivate resilient, self-sustaining communities; and encourage the development and adoption of open solutions that address ongoing societal and environmental challenges, among others.

- **Align innovation with strategic European priorities.**

Position NGI as an important pillar of Europe's digital sovereignty strategy, contributing to trusted infrastructure and open technology stacks. The emerging Open Internet Stack[5] vision reflects this trajectory by making an attempt at consolidating NGI results into interoperable, large-scale public digital infrastructure. This was not a primary focus at the outset but has grown in importance over time, and is now a primary objective of funding for open source and the Digital Commons at large.

1.3 NGI FUNDING MECHANISM

To simplify access to EU funding within the Horizon Europe framework, NGI relies on the cascade funding model. In this structure, the European Commission provides funding to intermediary organisations (e.g., Research and Innovation Actions (RIAs)), which in turn re-grant smaller, agile funding to third parties such as small and medium-sized businesses, startups, individual developers, and community-led projects.

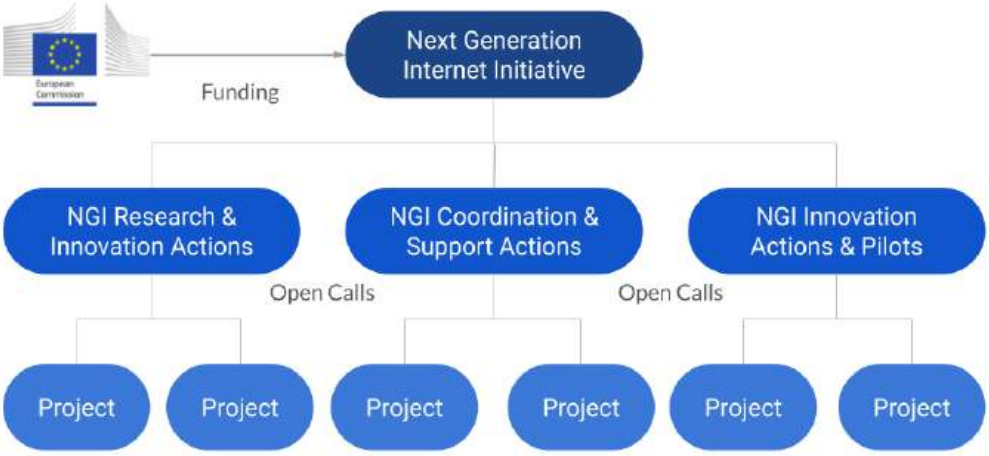

FIGURE 1: NGI CASCADE FUNDING

[5] From NGI to the Open Internet Stack: Charting the Next Chapter in Europe's Digital Future

This approach allows NGI to reach a wide spectrum of innovators and support early-stage experimentation that might otherwise struggle to access EU funding. It facilitates quicker iteration and localised decision-making and at the same time maintaining alignment with broader, strategic EU priorities. Cascade funding is particularly well-suited to the open-source ecosystem, which is inherently decentralized and dispersed.

A key example is the NGI Zero (NGI0)[6] family of programmes, coordinated by the NLnet Foundation. NGI0 focuses on open source software and hardware development through sub-programmes such as NGI Zero Entrust and NGI Zero Core, which provide microgrants, typically ranging from €5,000 to €50,000, for targeted research and development in areas such as decentralised social media, cryptography, digital identity, open hardware, and secure collaboration tools.

It is important to note that one consequence of the way cascade funding has been implemented in the NGI programme is that the funded projects might credit funding to the funding coordinators instead of the source of funding, which is through the European Commission.

So far, the NGI programme mobilised approximately €140 million to fund over 1,400 open source projects across decentralized platforms, trust technologies, and privacy-preserving tools.[7] The NGI0 Commons Fund is distributing €21.6 million in grants from 2024 to 2027 to open digital technologies and commons.[8] **No public figure was found that states the total planned funding for NGI to 2027 across all streams.**

1.4 NGI MONITORING AND EVALUATION

To measure the effectiveness and long-term impact of its investments, NGI attempted to develop an effective approach to monitoring, benchmarking, and evaluation.

In 2024, a commissioned benchmarking study from Gartner combined quantitative survey data with qualitative analysis to assess the sustainability, adoption, and regulatory alignment of NGI-funded projects.[9] The findings were encouraging, with 76% of projects maintaining active developer or user communities, and their outputs remain publicly accessible via repositories and distribution platforms. Around 50% engage with standardisation efforts and 74% continue development beyond their initial funding period. **These indicators suggest that NGI funding can support short-term innovation as well as the continuity of some of the funded projects.**

However, the study also pointed out important limitations and methodological blind spots. Only 291 of the 1,014 projects (28.7%) responded to the survey.[10] And due to self-selection bias the sample size is likely not representative of the thousand projects. It's worth mentioning that projects abandoned by key contributors after the funding period are less likely to reply to surveys. Also, the heavy reliance on self-reported data further complicates the attribution of specific impacts to NGI, and it is difficult to isolate it from broader community momentum, market dynamics, or other external funding sources. Similarly, the visibility and persistence of code do not necessarily translate into large-scale adoption or institutional uptake, particularly in public-sector and enterprise contexts, where integration, procurement, and regulatory compliance remain significant barriers.

Moreover, the cascade funding model which is a defining feature of NGI that channels hundreds of microgrants through intermediary organisations, further amplifies monitoring

[6] https://ngi.eu/ngi-projects/ngi-zero/
[7] https://www.europarl.europa.eu/doceo/document/E-10-2025-001618-ASW_EN.html
[8] https://nlnet.nl/news/2024/20240109-CommonsFund-starts.html
[9] Benchmarking the Impact of the Next Generation Internet Initiative
[10] Expert Report on NGI Evaluation

complexity. Traditional Horizon Europe evaluation methods are not well-suited to capture the distributed, cumulative, and ecosystem-level impact across hundreds or thousands of small actors. The fact that these small actors can receive funding as individuals, non-profit organisations, small businesses or other legal entities further complicates evaluation. **Monitoring must therefore improve to track not only project-level outputs, but also network effects, such as inter-project collaboration, code reuse or standardisation uptake.**

To address these challenges, future monitoring efforts should adopt a mixed-methods approach that combines both quantitative and qualitative evidence. Quantitative metrics such as repository activity and downstream adoption, should be complemented by qualitative analysis, including interviews, desk research and other available analysis methods. Drawing on diverse data sources, this approach will give us a more comprehensive understanding of how NGI-funded projects advance Europe's digital sovereignty, technological autonomy, and the long-term sustainability of Digital Commons.

2 FROM CHALLENGES TO INSIGHTS WHEN MEASURING THE IMPACT OF PUBLIC FUNDING

Measuring the impact of public funding for OSS presents inherent challenges, as the effects are multi-dimensional, heterogeneous, and unfold over the long-term. Unlike traditional research or commercial projects, OSS projects operate within complex ecosystems of contributors, users, and downstream adopters. This complexity means that the consequences of funding are rarely linear or immediate, and the same input can generate diverse outcomes depending on context, timing, and community dynamics.

As part of the NGI Commons project, a research paper was published that aims to gather the different challenges identified when assessing funding impact and the methodological considerations needed to provide a fuller picture. Osborne et al.'s toolkit, developed through a collaboration between Linux Foundation Europe, the CHAOSS Project, and the Sovereign Tech Agency, identifies four key dimensions of impact that structure the analysis throughout this report.[11] These dimensions are outlined below:

TABLE 1: EXAMPLES OF SOCIAL, ECONOMIC, TECHNOLOGICAL IMPACT AREAS OF OSS FUNDING TAKEN FROM OSBORNE ET AL'S TOOLKIT

	Internal Impacts (Project-level)	External Impacts (Ecosystem-level)
Direct Impacts	• **Social:** Contributor retention, community engagement, community events, contributor diversity, work-life balance, reduced burnout, mentorship • **Economic:** Paid developer time / support roles, infrastructure coverage, conference sponsorship, project-related revenue via various channels • **Technological:** Maintainer responsiveness, commit velocity, code security, dependency management, documentation quality, consistent releases	• **Social:** User trust, ecosystem community, ecosystem events • **Economic:** Cost savings for adopters, integration/support costs, shared maintenance burden • **Technological:** Stability of APIs, ecosystem-wide security updates, interoperability
Indirect Impacts	• **Social:** Leadership development, governance and decision-making processes, knowledge preservation, conflict resolution/prevention mechanisms • **Economic:** Job market value for developers, partnership opportunities, academic collaborations, consulting opportunities, funding diversity • **Technological:** Standardisation, interoperability	• **Social:** Cross-project collaboration, training & education resources, ecosystem engagement • **Economic:** Market growth, job creation, industry cost reduction, start-up creation • **Technological:** Standardisation, research papers, patents, ecosystem-wide security improvements

[11] A Toolkit for Measuring the Impacts of Public Funding on Open Source Software Development

Social impacts include the cultivation of vibrant communities, collaboration, the growth of skills and capacity among contributors. By helping inclusive participation, funding can help create sustainable networks that extend beyond the immediate scope of a project.

Technical impacts often take the form of improved software quality, better security, greater robustness, and the development of new features or functionalities. These contributions can improve the reliability and usability of software, increasing trust among users and increasing downstream adopters.

Economic impacts are another critical dimension. Public investment in OSS can stimulate job creation, support open source business models, and generate downstream value as software is reused and integrated into broader systems. By lowering barriers to entry and providing shared digital infrastructure, OSS funding can catalyze entrepreneurial activity and reduce costs for organizations that rely on these tools.

The effects of funding can be both **direct and indirect.** Direct impacts may include the delivery of specific new features, improvements in code quality, or the establishment of new development workflows. Indirect impacts, however, often emerge through ecosystem reuse, forks, community spin-offs, or network effects that amplify the original investment in unexpected ways. These indirect benefits would be a great opportunity to quantify the multiplier effect, however they are particularly difficult to measure, as they may take months or even years to materialize and may interact with broader social, technical, or economic trends.

Given these complexities, credible evaluation of OSS funding requires careful methodological design. Mixed-method approaches that combine quantitative metrics with qualitative insights are essential to maximise the possibility of capturing the full spectrum of impacts. By adopting a holistic, context-sensitive approach, policymakers and funders can more accurately assess the value of their investments and make informed decisions about future support and funding for OSS initiatives.

2.1 KEY CHALLENGES

The key challenges fare outlined below. These were faced during undertaking the task of measuring the impact of funding. These challenges extend from fundamental issues of attribution and temporality to questions of evaluation design, ethics, and resource constraints. This section groups them into three broad categories: structural, design-related, and operational challenges. Together, they stress the need for mixed-method, context-sensitive approaches that balance quantitative and qualitative insights.

Some of these challenges are almost impossible to overcome and rather reflect the nature of open source ecosystems, where value is externalised and the focus is one ecosystem-level impact. However, they are worthwhile to outline and explain since they have a strong effect on whether the impact of funding can be measured at all and if yes, to what extent and in what ways.

2.1.1 Structural challenges

Structural challenges concern the underlying dynamics that shape how OSS impact can be observed and interpreted, including attribution, data visibility, and temporal effects.

Attribution vs. contribution

One of the most fundamental challenges in assessing OSS impact is distinguishing attribution from contribution. Attribution seeks to determine the extent to which public funding directly

caused an observed outcome (e.g., increased adoption, better security, or faster feature development). Contribution, in contrast, acknowledges the broader ecosystem of influences, including volunteer effort, community engagement, prior project momentum, market trends, and existing infrastructure, that collectively shape outcomes.

For example, a public grant might fund a developer to implement a new feature in a widely used library. If adoption subsequently increases, it is tempting to credit the funding entirely. However, adoption may also reflect pre-existing demand, the reputation of the maintainers, or complementary contributions from volunteers. To confidently rely on funding impact metrics, evaluators must aim to design methodologies that separate the marginal effect of funding from the baseline trajectory, using approaches such as counterfactual analysis, longitudinal studies, or mixed-methods evaluation to avoid overstating the financial support's causal role.

Data gaps

First, **locating a comprehensive database of NGI funded projects proved challenging.** While the NGI Innovator Database[12] compiles funded projects, interviews with project leaders revealed that some grants were not yet reflected in the database. In addition, the current database is missing funding amounts in many cases and the start and end dates of funding do not reflect the updates or changes that occurred during the funding process. Such a database would be crucial to assess NGI's funding impact, so that at least the funding amounts, start-, end-dates and funding OKRs are present. This data was unavailable for us so we had to decide on another approach and fill gaps for the five studies projects through interviews.

Second, even data mined from repositories or gathered through other sources can be incomprehensive or misleading. Not all relevant OSS activity is publicly visible, especially if downstream adopters decide to develop technologies in a closed approach. Development and experimentation may occur in private repositories, internal forks, proprietary extensions, or fragmented package registries. Similarly, usage may be invisible if software is embedded in internal systems, offline environments, or custom deployments. These data gaps create blind spots that compromise the reliability of analyses based solely on observable signals. Evaluators should seek combined approaches from multiple data sources, including surveys, interviews, and private collaborations. And clearly acknowledge limitations where data are unavailable.

Time-lags and delayed effects

The impacts of funding are often long-term and may not be immediately visible. OSS adoption cycles in the public sector, large enterprises, or regulated industries are slow due to procurement, compliance, or integration requirements. Similarly, improvements in maintainability, security, or community capacity may only manifest over years.

Conducting evaluations too soon can lead to underestimating value, overlooking strategic effects, and missing systemic benefits such as ecosystem growth or skill development. Evaluators should plan for longitudinal studies and incorporate follow-up assessments to capture delayed outcomes. If monitoring is set out at the beginning, the follow-up assessments can be less resource-incentive, and simply further track the funded projects. In doing so, they can get a more accurate understanding of funding effectiveness.

[12] https://ngi.eu/discover-ngi-innovations/?

2.1.2 Design challenges

Design challenges relate to the frameworks, indicators, and conceptual lenses used to assess impact, including metric design and the recognition of non-code work.

Diverse goals & outcomes

Open source projects vary enormously in scale, purpose, and intended impact. Some projects focus on narrow, technical tools serving a specialised audience. Others aim to establish broad ecosystems or support critical public infrastructure. The goals of projects can include innovation, social value, accessibility, security, economic development, knowledge sharing and others.

Applying standardised metrics (e.g., lines of code, download counts, or contributor numbers) across such heterogeneous projects risks misrepresenting their success. For example, a small security-focused library may have a few highly active contributors but a profound impact on public infrastructure. A popular web framework may show high usage but limited systemic influence. Evaluations must therefore incorporate context-sensitive indicators aligned with each project's mission.

Deceptive simplicity of metrics

Metrics such as GitHub stars, forks, or download counts may be easy to collect and compare, but, on their own, they are weak proxies for meaningful impact. These indicators primarily capture short-term popularity or visibility rather than long-term health, sustainability, security, or community engagement.

For instance, a library may be widely downloaded but rarely updated, poorly maintained, or lacking in documentation and community support, which are critical factors for long-term usability. Overreliance on simplistic metrics risks incentivising superficial success rather than durable contributions. Evaluations should combine multiple metrics, qualitative assessments, and context-specific feedback to better reflect real project health.

Undervalued non-code work

Critical activities such as documentation, community management, governance, outreach, mentoring, and user support often leave few quantifiable traces but are essential for OSS sustainability. These tasks could be about onboarding of new contributors, improving accessibility, moderating, labeling, improving security practices, or managing open source communities.

Failing to recognise such 'invisible labour' undervalues contributions that are crucial to project health. Effective evaluations could incorporate contribution logs, community forums, blog posts, social network analyses to make sure non-code work is properly accounted for and rewarded.

2.1.3 Operational challenges

Operational challenges concern the practical and ethical dimensions of implementing evaluation frameworks, including ethical safeguards, resource limits, and broader ecosystem effects.

Ethics & privacy

Evaluating OSS impact often involves collecting data on contributors or users. This raises ethical and privacy concerns, particularly if personal information is tracked without consent. Improper handling of contributor data can erode trust, discourage participation, and compromise community relations. Responsible evaluation practices must prioritise transparency, informed consent, data minimisation, anonymisation, and compliance with legal frameworks such as GDPR.

Resource constraints

Comprehensive impact evaluation requires sustained funding, methodological expertise, and community engagement. Limited resources can incentivise the use of simplistic indicators or short-term studies. Institutions commissioning evaluations should plan for iterative, multi-year processes that reflect the long-term timeline of OSS ecosystems.

Multiplier effects

OSS funding frequently generates spillover effects that extend beyond the directly funded project. Contributions may seed new initiatives, forks, and downstream innovations. These multiplier effects amplify the original investment but are inherently diffuse and indirect and so they are challenging to trace.

For instance, a publicly funded security library might be reused across multiple software products, indirectly improving reliability in a wide range of systems. Capturing such effects requires network analyses, ecosystem mapping, and scenario modeling to quantify broader societal and economic benefits.

Measuring the impact of public funding on open source ecosystems is as much an interpretive exercise as a technical one. The first primary difficulty lies in the absence of data and the second difficulty lies in integrating multiple perspectives into a coherent analytical framework. Effective evaluation should aim to include multiple methodologies and consider technical, economic, and social dimensions to reflect the full complexity of OSS ecosystems.

2.2 EXISTING WORK AND TOOLS

When assessing the impact of public funding on open source, evaluators can build on a growing body of research, frameworks, and practical toolkits. Three major strands of work stand out:

- The economic valuation models synthesized by Sophia Vargas
- The metric frameworks developed by the CHAOSS community
- The operational guidance of the *Toolkit for Measuring the Impacts of Public Funding on Open Source Software Development*.

2.2.1 Review of valuation models

The funding impact of open source is embedded within a larger school of thought around measuring the value of open source. The question of valuation, which is essentially putting numbers on the economic worth of open source, has been tackled most recently by Sophia

Vargas, who presented a synthesis of models at FOSSY 2024.[13] Her review makes clear that no single model captures the multiple ways in which the value of open source. Instead of trying to conflate all values into a single figure, her recommendation is to present multiple valuation models side by side. The summary of the valuation models is presented below:

TABLE 2: VALUATION MODELS AND THEIR APPLICATION TO OSS DEVELOPMENT TAKEN FROM OSBORNE ET AL.'S TOOLKIT

Model	Application to OSS	Key Variables	Challenges
Constructive Cost Model (COCOMO) • COCOMO estimates the effort, cost, and schedule of software projects • COCOMO II includes reused/adapted code & code incorporation effort	• LOC as proxy variable for value creation • Complexity multipliers for context adjustment	• LOC • Task complexity	• No maintenance tracking • Does not account for code history or maintenance
DevOps Research and Assess-ment (DORA) • Evaluates maturity of DevOps performance and processes • Focus on operational metrics for DevOps evaluation	• Quality versus quantity measurement • Compares upstream versus company-specific quality	• Deployment frequency • Lead time for changes • Change failure rate • Time to restore service	Assumes team structure • Heterogeneity of OSS communities (e.g. varied incentives and time commitments)
OSS as Socio-technical Model • Complex software development processes by loosely coordinated developers • Social, economic, political network relationships • Social model: classify project by creator intent	• Recognises OSS projects as complex systems • Captures diversity of contributors and incentives • Recognises multiple value types for individuals (skill development, learning, etc.	• People (e.g. incentives) • Infrastructure (e.g. tools) • Content (e.g. documents) • Governance (e.g. participation in roadmap decisions)	• The more complexity one recognises, the more difficult it becomes to quantify value • What kind of value, by whom, and for whom?

[13] A review of valuation models and their application to open source models

Business Models (TCO/ROI) • Total cost of ownership (TCO): a financial estimate of direct and indirect costs • Return on investment (ROI): ratio between net income (over time) and investment	• Business benefits of OSS, some more quantifiable than others (e.g. cost savings vs. open standards creation) • TCO includes infrastructure, maintenance, and integration • ROI based on percentage of codebase that is OSS	• Infrastructure costs • Maintenance expenses Community funding • Integration effort	• Organisationally subjective • Assumption of "OSS is free" • Difficult to measure % of income associated with a OSS package or project
Economic Models (e.g. GDP) • GDP measures market value of goods and services in a time period in a country	• Tracks economic impact • Estimated: C1B invested in OSS in 2018 generated C65-95B for EU GDP	• OSS contributions • Investments in OSS • Economic indicators	• Limited data availability • Attribution difficulties
Supply and Demand Models • Market equilibrium analysis	• OSS creation versus replacement cost estimation • Estimated: Supply-side value = $4.15 billion, demand-side value = $8.8 trillion	• Value: Cost of software development labour (LOC)	• Difficult to measure due to non-pecuniary nature and lack of usage tracking • LOC focus ignores maintenance, non-technical labour, and different types of value
Underproduction Risk Model • Adapted supply and demand model for OSS context	• Maintenance-focused • Recognition of collaboration dynamics in OSS projects	• Maintenance supply • Usage demand	• Correlational limitations • Quality measurement issues • Lack of usage data

2.2.2 Community Health Analytics Open Source Software (CHAOSS)

The CHAOSS[14] project has become an important hub for open source metrics. Born out of the open source community itself, CHAOSS provides standardised metrics, formal definitions, and tooling for measuring the health of open source projects.[15]

Its focus on contributors, responsiveness, activity, and diversity has given funders and maintainers a shared vocabulary to understand community vitality. The metrics are not just abstract since they are accompanied by open dashboards, APIs, and tools that can be deployed directly to monitor repositories. For example, a funder might request grantees to track monthly active contributors and pull request response times. One way is to rely on CHAOSS definitions for better comparability across metrics and projects.

CHAOSS provides automated data pipelines that extract and process information from diverse sources (e.g., version control system logs, issue trackers, mailing lists, and package registries). These raw signals are transformed into structured time series that can be analysed longitudinally. Rather than presenting metrics in isolation, CHAOSS organises them into interpretive categories such as project health, sustainability, and growth, each reflecting different dimensions of community and technical vitality. The framework explicitly cautions against relying on single proxies, and instead recommends combining multiple indicators to develop a more robust and context-sensitive understanding of project trajectories.

The strength of CHAOSS lies in this combination of community legitimacy and ready-to-use tooling, which makes its adoption fairly straightforward. However, its indicators must be interpreted with care as with any quantitative approach. For example, an uptick in commit activity might reflect trivial refactoring rather than meaningful new features, and many forms of value such as private deployments or non-code contributions can remain invisible. The Augur CHAOSS tool was used to mine data of the five projects in this interim report.

2.2.3 Toolkit for Measuring the Impacts of Public Funding on Open Source Software Development

Where CHAOSS provides the metrics and data mining tools, the *Toolkit for Measuring the Impacts of Public Funding on Open Source Software Development* (Osborne et al.), published by the Linux Foundation in 2024, in collaboration with the CHAOSS project and the Sovereign Tech Agency, provides the process.[16] This toolkit was developed as part of NGI Commons work and published as a research paper on Arxiv.

The toolkit represents one of the first concerted efforts to consolidate practical guidance for evaluating publicly funded open source initiatives. Rather than offering a static set of indicators, it delivers a methodological framework that helps funders design evaluations suited to their objectives, scales, and resource constraints.

The toolkit translates academic and theoretical insights from open source studies, innovation economics, and public value research into step-by-step guidance for practitioners. It acknowledges that funders of open source work, from large European programmes such as NGI and Horizon Europe to national digital agencies and non-profit organisations, face similar dilemmas: how to measure outcomes that are distributed, emergent, and often intangible. By treating OSS not as a conventional product but as a living sociotechnical ecosystem, the toolkit reorients evaluation around change over time, interdependencies, and community dynamics.

The emphasis on mixed methods and longitudinal design marks one of the toolkit's key insights. It argues that short-term monitoring, such as at grant close-out, rarely captures the enduring or systemic benefits of OSS funding. Instead, the toolkit encourages multi-phase

[14] https://chaoss.community/
[15] https://chaoss.community/kb-metrics-and-metrics-models/
[16] A Toolkit for Measuring the Impacts of Public Funding on Open Source Software Development

tracking, combining time-series data from repositories, surveys, and usage metrics with qualitative inputs from interviews, community self-assessments, and document reviews. This approach makes it possible to identify trajectories rather than snapshots: whether a project's community grows, codebases are reused, or outputs influence policy and procurement over time.

The toolkit also aims to provide a solution for one of the most persistent methodological problems: attribution versus contribution. It acknowledges that strict causal inference is rarely achievable in open, collaborative ecosystems, and instead promotes pragmatic strategies for triangulation. Suggested methods include timeline analysis (comparing key development events with funding periods), matched comparisons (contrasting funded projects with similar unfunded ones), and counterfactual reasoning (asking what might have occurred in the absence of funding). These techniques are difficult to implement but could help evaluators understand the funding's role.

This toolkit represents a significant step forward in operationalising open source impact assessment. It provides funders and evaluators with a shared vocabulary and flexible tools for evidence-based decision-making. It supports a shift from one-off project metrics analysis toward understanding the broader ecosystems of open digital technologies.

2.3 FURTHER LITERATURE ON THE IMPACT OF OPEN SOURCE FUNDING

Multiple other bodies of work inspired the analysis and writing of this interim report. Their short summaries are compiled below.

Findings of the *2024 Open Source Software Funding Survey*[17], a collaboration between GitHub, the Linux Foundation, and researchers from Harvard University, estimates that organisations contribute over $7.7 billion annually to open source, primarily through employee labor rather than direct funding. Yet, many organisations still lack visibility into their actual contributions, revealing systemic blind spots in how OSS work is tracked, valued, and governed. The report calls for better measurement practices and a commitment to open contribution of funding data in order to improve transparency and accountability across the ecosystem.

In her influential talk *Where Money Meets Open Source talk*,[18] Nadia Eghbal stresses the persistent lack of coordination between sectors and funding mechanisms. She argues that open source should be treated as shared digital infrastructure, requiring systemic, cross-sector investment rather than sporadic corporate sponsorship or ad-hoc philanthropy. This framing echoes broader calls for a shift from short-term project grants toward institutional models of public digital infrastructure support.

Academic research continues to explore the complex interaction between financial incentives and intrinsic motivations that have long driven open source participation. Studies such as *How Are Paid and Volunteer Open Source Developers Different?*,[19] *The Shifting Sands of Motivation: Revisiting What Drives Contributors in Open Source*,[20] and *Working in Public: The Making and Maintenance of Open Source Software*[21] converge on the insight that funding should complement community dynamics rather than replace them. Sustainable collaboration depends on social infrastructure as much as on financial inputs.

[17] https://opensourcefundingsurvey2024.com/#detailed-findings
[18] https://www.youtube.com/watch?v=bjAinwgvQqc
[19] https://dl.acm.org/doi/10.1145/3597503.3639197
[20] https://arxiv.org/abs/2101.10291
[21] https://press.stripe.com/working-in-public

Empirical studies of OSS funding impacts are still limited but are getting more sophisticated. *The Benchmarking the Impact of the Next Generation Internet Initiative*[22] report demonstrates that microgrants can catalyze lasting ecosystem effects, with more than 70% of surveyed funded projects continuing beyond initial funding. Research such as *How to Not Get Rich: An Empirical Study of Donations in Open Source*[23] discusses that donation-based models rarely provide sustainable income but deliver significant psychological, reputational, and community benefits. The Atlantic Council's *O$$ Security: Does More Money for Open Source Software Mean Better Security?*[24] report and related work on bug-bounty programmes show measurable improvements in security and maintenance outcomes of funding, though long-term effects depend on governance and community integration. Across these studies, multiplier effects (e.g., reuse, standardization, and interoperability) are repeatedly observed but remain difficult to quantify.

A wave of recent maintainer-centered research has re-focused attention on the human dimension of OSS sustainability. Works such as *Sustaining Maintenance Labor for Healthy Open Source Software Projects through Human Infrastructure: A Maintainer Perspective*[25] and the *FOSDEM 2025 Maintainers Survey*[26] emphasize the need for predictable, low-burden funding and formal recognition for non-code contributions such as governance, documentation, and community support. Similarly, *Open Source Software Developers' Views on Public and Private Funding: A Case Study on scikit-learn*[27] finds that institutional grants improve stability, however, administrative complexity can undermine agility and innovation. These perspectives conclude that sustainability requires trusted, long-term funding relationships and support mechanisms, adapted to the realities of distributed and volunteer-driven communities.

2.4 OUR ONGOING WORK - METHODOLOGY

Our ongoing research weaves together quantitative data, qualitative interviews, and desk research. The aim is to move beyond surface-level indicators and build a richer, evidence-based picture of how NGI funding influences project sustainability, adoption, and broader ecosystem outcomes.

In this interim report, five open source projects are analyzed which received funding from NGI and represent different layers of the technology stack: Mastodon, Decidim, AboutCode, F-Droid, and Mobile NixOS. Another four projects have been reached out to but we received no reply.

The description and funding information of these projects are outlined in their relevant sections under the "Case studies" heading. This analysis allowed us to gain a deep contextual understanding into these individual projects and the challenges they face and opportunities that emerged from NGI funding. This work will advise next year's analysis on the multiplier effect which will look at the broader open source ecosystem and map networks and dependencies of the NGI funded projects.

First, we undertook desk research to obtain information of the projects and the NGI funding they received. The desk research spanned project websites, information available on GitHub and GitLab accounts as well as information on NGI and cascade funder websites including grant links. We experienced that some information is inaccurate or unavailable through the

[22] https://op.europa.eu/en/publication-detail/-/publication/257ae66f-23c7-11ef-a195-01aa75ed71a1/language-en
[23] https://www.cs.cmu.edu/~ckaestne/pdf/icse20-donations.pdf
[24] https://www.atlanticcouncil.org/content-series/cybersecurity-policy-and-strategy/o-security-does-more-money-for-open source-software-mean-better-security-a-proof-of-concept/
[25] https://dl.acm.org/doi/abs/10.1145/3674805.3686667
[26] https://fosdem.org/2025/schedule/event/fosdem-2025-5680-what-do-maintainers-need-from-funders-and-others-we-asked-maintainers-to-find-out-/
[27] https://dl.acm.org/doi/abs/10.1145/3678884.3681844

grant links. **For example, the funding amount and full funding period were missing for some of the grants the projects received.**

Second, we conducted semi-structured interviews with the individuals from the open source projects who received funding. These conversations revealed the lived realities behind the metrics, particularly, how specific grants were deployed, what kinds of new features/capabilities they supported, which barriers persisted despite funding, and whether meaningful adoption or scaling followed. We agreed with the project leaders that the interviews would not be recorded to allow a pressure-free environment for the discussion of the NGI funding experiment. Project leaders were given the opportunity to flag any misrepresented information to validate the contents of this interim report.

Third, we gathered repository data through the Augur open source data mining tool. We heavily drew on CHAOSS-defined indicators to capture project activity and health. These are supplemented by funding and support information as well as project visibility and distribution. We decided to include data 6 months before and after NGI funding. This is a short period, but as we get further from the funding period the less confident we can be that the changes we see are due to funding. This is one of the challenges outlined by Osborne et al.[28] The research in 2026 will look at a wider time window to compare and contrast the outcome observed in the different time periods.

To contextualise these quantitative signals, we again researched project websites, documentation, and funding records, mapping all identified sources of support, whether from NGI or other funders. We also integrate insights from project-level annual reports, where available.

In the next phase of the research, we will experiment with network and dependency mapping, tracing overlaps in contributor communities, and package/project dependencies. This approach makes it possible to identify ecosystem-level multipliers, where one funded project helps the growth or sustainability of several others.

Taken together, this mixed-methods approach provides a stronger and more credible account of impact than any single method could offer on its own. That said, this approach is resource-intensive and reveals a fundamental challenge in impact assessment. The difficult task is to find a balance in the trade-off of rigor with feasibility. Our ongoing work is an attempt at this, by developing a framework that can inform both the interim 2025 reporting and the more comprehensive synthesis planned for 2026.

[28] https://arxiv.org/abs/2411.06027

3 CASE STUDIES

3.1 GENERAL INSIGHTS FROM CASE STUDIES

Analysis of Mastodon, Decidim, AboutCode, F-Droid, and Mobile NixOS reveals recurring patterns in how public funding influences the sustainability of open source software. These patterns bring into focus not only the opportunities public investment creates but also the structural challenges some OSS projects face in using funding to achieve long-term sustainability.

Most of the insights gained from the interviews present a positive picture of the NGI funding programme. All interviewed projects report a great experience with the funding. However, from a research perspective this could be due to a number of biases present in the study design. For instance, projects whose experience have been less ideal could try and avoid giving interviews. Projects might also fear repercussions if negative sentiments are shared. This is why interviews were not recorded and projects were given the opportunity to review the intermediate report. A summary of the general insights gained can be found below:

1. Stable funding is crucial for sustainability

Predictable and sustained financial support forms the foundation of long-term planning and operational stability in OSS projects. Public funding and multi-year grants give the means to teams to maintain core functions (e.g., development, infrastructure, and maintenance, without the constant uncertainty around the financials).

Projects such as Mastodon and Decidim demonstrate how strategic partnerships with public bodies can help against volatility, and reduce reliance on ad hoc donations. At the same time, they need to develop complementary revenue models such as microdonations or commercial support in order to secure financial resilience beyond the lifecycle of public grants.

2. Intermediary funding coordinators' expertise is valued

Several interviewees identified the deep technical expertise and domain knowledge of funding coordinators as a major strength of the NGI funding process. Beyond their familiarity with open source technologies, their understanding of the specifics of community-driven software development, as well as other domain-specific knowledge are highly appreciated.

This level of expertise helps grant applicants refine their project proposals, align goals with funding priorities, anticipate potential implementation issues and help in reshifting priorities when operational or technical issues do arise. Coordinators acting as informal mentors by offering constructive feedback, connecting teams to relevant networks, providing technically informed guidance, and suggesting complementary funding opportunities, significantly improve both the quality and feasibility of funded projects.

3. Low administrative burden and flexibility are appreciated

Projects generally praise the lightweight and flexible nature of the NGI funding application process. The application format is considered proportionate to the scale of funding and particularly well-suited to smaller, agile open source teams that may lack dedicated administrative staff.

Applicants value that the process emphasises collaboration and trust, allowing them to focus on project delivery rather than resource-insensitive, time-consuming reporting. However, some interviewees noted that rejected applicants typically receive little to no feedback, limiting their ability to learn from the experience or improve future submissions. Providing brief, structured

feedback could improve transparency and further support the growth of the open source community.

4. Open licensing and reuse amplify public value

Interviewees agreed that public investment achieves outsized returns when outputs are openly licensed and reusable. Open licensing not only helps transparency but allows downstream adaptation across sectors, multiplying the impact of public spending.

Decidim and AboutCode, in particular, exemplify this dynamic as both projects provide tools that governments, NGOs, security and software companies and other organizations can adopt and customize. This creates a ripple effect of innovation that extends beyond the original funding context.

5. Visibility and legitimacy attract further support

Formal recognition and public visibility of EU funding can provide an important role in helping a project's credibility and ability to attract sustained support. In their interview, the F-Droid team shared that receiving an NGI grant provided a sense of recognition and validation for the importance of their work and gives them confidence to continue.

Such recognition and visibility can create a virtuous cycle that attracts new contributors, grants, and partnerships, and in turn, improves governance and quality, and further increases public confidence. For policymakers, visible success stories provide tangible evidence of the value of open source investment and reduce perceived risk.

6. Policy alignment shapes funding access

Projects that align with current public priorities (e.g., digital sovereignty, supply-chain security, transparency, and democratic participation) are more likely to attract support from European, national, and local funding programmes. For instance, Mastodon and Decidim have benefited from being framed as enablers of democratic participation and autonomy from dominant platforms. Similarly, AboutCode and F-Droid, which contribute to transparency and software supply chain integrity, align with the EU's cybersecurity and open technology priorities.

This way, funded projects can contribute to broader societal missions rather than isolated technical achievements. At the same time, this dynamic also introduces some risks. Projects whose goals fall outside immediate policy priorities (as recognized by current funding bodies) may struggle to access public funding, even if their long-term social value is substantial and meaningful.

7. Sustainability challenges persist despite funding

Even with financial support, open source projects frequently struggle to sustain critical operational and community functions. Grants often prioritise feature development or innovation milestones and essential yet less visible tasks such as maintaining infrastructure, addressing security vulnerabilities, managing documentation, and nurturing contributor communities, remain underfunded.

Projects such as AboutCode maintain vital infrastructure for open and secure software ecosystems, yet their sustainability depends heavily on intermittent funding and volunteer labor. Sustaining open digital infrastructure therefore requires a more balanced funding model that recognizes the value of maintenance as much as innovation. This could mean separate but integrated funding programmes for maintenance, such as the proposed EU-wide Sovereign Tech Fund[29] and a separate funding programme for innovation, such as NGI.

[29] https://eu-stf.openforumeurope.org/

3.2 METHODOLOGICAL INSIGHTS FROM CASE STUDIES

We have also gained insights from interviewees on what they believe would be the best approach to measure the funding impact for their specific projects. Many of the insights already align with the challenges we identified in Section 2.1 and when researching for the funding toolkit. During the interviews, most of these risks were confirmed and are outlined below.

1. Mixed methodologies are needed for accurate insight

The relationship between funding flows and project outcomes cannot be fully understood through quantitative data alone. Metrics (e.g., commits, downloads, or contributor) counts reveal activity patterns but conceal the complex narratives behind them. Qualitative engagement, including interviews, scans of blog posts and forums, and ecosystem mapping, can expose forms of indirect or underreported support that would remain invisible in purely numerical analyses.

Our interviews across the five case studies uncovered a rich environment of non-code contributions and informal collaborations. For example, F-Droid demonstrated how the intensive work of labeling and moderation do not show up in the codebase as well as the numerous bug files they reported to major app creators. Decidim's partnerships with municipalities show how adoption often grows through institutional relationships rather than code metrics. Combining the diverse perspectives provides a fuller understanding of impact that evaluators need to take into account.

2. Attribution is complex

Attributing outcomes directly to specific funding sources is exceptionally difficult in OSS ecosystems, where most projects blend resources from diverse origins, including public grants, non-profit foundations, commercial support and individual contributors. This diversity in funding itself is not a weakness but a defense mechanism for OSS projects to secure their long-term future. However, it does complicate efforts to isolate causal effects or quantify the precise impact of any single intervention.

Projects such as Mastodon and AboutCode have received support from several overlapping initiatives, including NGI funds, national digital programmes, and independent sponsors. Their success is therefore best understood through ecosystem-level analysis that examines how public funding interacts with volunteer labor, community governance, and market adoption. For example, a notable uptick in Mastodon’s user adoption can be directly linked to a specific market event (Elon Musk’s acquisition of Twitter, now X).

3. Evaluation faces time-lag and engagement hurdles

Assessing the long-term effects of funding is inherently constrained by time-lags between investment and measurable outcomes. Open source adoption, particularly in public administration or regulated sectors, can take years to materialise due to integration, compliance, and procurement processes. Moreover, re-engaging project leads after funding ends is often difficult as contributors move on to new roles or initiatives.

For instance, tracking the downstream use of F-Droid or the institutional uptake of Decidim requires sustained observation and ongoing communication beyond the initial reporting period. However, this need for continuity and follow-up may create some tension with the low-overhead, trust-based granting model. Programmes that minimise administrative burdens encourage participation and flexibility, but lighter reporting requirements also limit the availability of consistent and comparable data for evaluation.

Balancing this trade-off is likely one of the most important challenges and opportunities in assessing funding impact. While low-friction funding supports innovation and community

responsiveness, it can make long-term impact assessment more difficult. Embedding minimal but meaningful reporting practices, promoting shared and consistent data standards can help preserve the benefits of low-overhead grants and allow more effective evaluation. Without such mechanisms, important impacts risk being overlooked simply because they emerge after the formal grant closure.

4. Values-driven outcomes remain difficult to measure

Many of the most meaningful contributions of open source projects are not easily captured by conventional performance metrics. Values such as privacy protection, inclusivity, transparency, and democratic empowerment cannot be reduced to numerical indicators but remain central to the ethos and societal relevance of publicly funded OSS.

Projects show how social and ethical outcomes define success as much as technical performance. In their interview, the Mastodon team noted that R&D funds often prioritise granular technical features, meaning that such funding is rarely used to support broader ambitions. However, Mastodon's mission addresses pressing societal challenges, particularly the destabilisation of democratic foundations by dominant social media platforms. By promoting open source and decentralised technologies, Mastodon seeks to reclaim control, defend freedom of expression, and uphold democratic values. As one team member put it, *"Open source is key to Mastodon's DNA and supports these political goals. It goes beyond open source; it is more than a technical project."* This example demonstrates that the societal and ethical dimensions of the open source and Digital Commons work, though difficult to quantify, are intrinsic to the definition of some of the projects' successes.

3.3 INDIVIDUAL CASE STUDIES

After reviewing the general and methodological insights gained from the case study interviews, the findings have been summarised for each project including insights from the interviews, desk research and quantitative analysis. The goal was to gather context of these very different projects across the layers of the stack and showcase how they were affected by NGI funding. The quantitative analysis gave us some proxies for adoption and development activity, however they should be interpreted as complementary approaches to qualitative research. As described earlier, much of funding's impact is difficult to observe in the codebase. Another goal was to identify areas where the multiplier effect could be measured. This gives a foundation to work from in 2026 where, through network and dependency analysis, projects can be looked at from another dimension and capture the essence of open source ecosystems where it is hypothesised that the multiplier effect can be measured. The methodology behind the findings outlined below can be found in Section 2.4

A summary and description of the metrics used can be seen below:

TABLE 3: DESCRIPTION AND EXPLANATION OF METRICS

Metric	Description	What it's designed for
Active issues	The number of currently open problems, questions, or tasks in the project's issue tracker.	Designed to show the project's current workload and outstanding needs.
Closed issues	The number of issues that have been resolved or completed.	Designed to highlight progress and how effectively issues are being addressed.

Commits	Saved changes to the codebase, each commit representing an individual update.	Designed to measure development activity and the pace of changes over time.
First-timer issues	Issues labeled as beginner-friendly to help new contributors get started.	Designed to make onboarding easier and encourage fresh participation.
Forks	Copies of the repository created by users to modify or experiment independently.	Designed to indicate community interest in exploring or building on the project.
Issue resolution duration	The average time it takes for an issue to be closed after being opened.	Designed to reflect responsiveness and efficiency in handling project tasks.
Issues	Tasks, questions, bug reports, or feature requests tracked within the project.	Designed to organize work, track feedback, and centralize project discussions.
Merged pull requests	Pull requests that have been approved and added to the main codebase.	Designed to measure successful collaboration and integration of contributions.
Monthly active users	The number of people who interact with the project during a given month.	Designed to gauge ongoing usage and the size of the active community.
New contributors	People making their first contribution within a given time period.	Designed to assess how well the project grows and welcomes new participants.
New issues	Issues opened within a specific time period.	Designed to show how much new work, feedback, or challenges are emerging.
New pull requests	Pull requests created within a specific time period.	Designed to track new contributions and development activity.
New releases	Official new versions of the project published for users.	Designed to indicate how frequently the project delivers updates or improvements.
Open issues	All issues currently waiting for review, discussion, or resolution.	Designed to reveal the scope of outstanding work and potential bottlenecks.
Pull request review duration	The average time between a pull request being opened and receiving a review or being fully reviewed.	Designed to monitor review efficiency and overall contributor experience.
Pull requests	Proposed changes to the codebase submitted for review.	Designed to manage contributions and ensure changes are reviewed before merging.

Stars	A GitHub/GitLab 'like' that shows appreciation or helps users bookmark the project.	Designed to reflect community interest, visibility, and overall popularity.

3.3.1 Mastodon

Project	Mastodon
Website	https://joinmastodon.org/
Description	Launched in October 2016, Mastodon is an open source microblogging and social networking platform built on the ActivityPub protocol. It offers a decentralized, ad-free alternative to centralized platforms such as X. The project was officially incorporated as a German non-profit organization in 2021.
Funding	• **NGI Zero Discovery**: Supported the development of groups, advanced filtering, and moderation tools (€35k / 2021-2022) • **NGI Zero Entrust**: Currently funding the development of ActivityPub quote posts (2024-2025) • **NGI Search (Fediscovery Project)**: Improving search and discovery across the Fediverse (€150k / 2024-2025) • **Other support**: Includes formal service contracts with public institutions, user donations, and contributions from high-net-worth individuals
Repo	https://github.com/mastodon/mastodon

3.3.1.1 Funding & support

Funding has been critical for **Mastodon**'s evolution, providing necessary resources to sustain core infrastructure, including server hosting, moderation tools, and scalability for a growing user base. Grants and donations have also supported the development of key user-facing features, e.g., the quote posts, improving usability, accessibility, safety, and inclusivity, which are core priorities for a federated platform that is built on trust and community governance.

Funding has also supported the human side of open source sustainability. Modest donations and microgrants can make a significant difference for projects such as Mastodon, where a small core team is responsible for complex tasks that go far beyond coding. These include community management, administrative duties, and long-term maintenance, all of which require stable personnel funding.

Our analysis of **GitHub** metrics before, during, and after the first funding period suggests that public funding helped Mastodon consolidate its technical base and contributor community, positioning the project to effectively manage and capitalize on a sudden wave of global adoption (triggered by Elon Musk's acquisition of Twitter, now X).

Funding has also facilitated institutional partnerships, e.g., contracts with the European Commission. This can offer predictable revenue and align public-sector adoption with the values of open source.

3.3.1.2 Metrics & assessment

Mastodon's metrics reflect a highly impactful, sustainable, and community-driven open source project with both strong developer adoption and cultural relevance.

3.3.1.3 GitHub activity

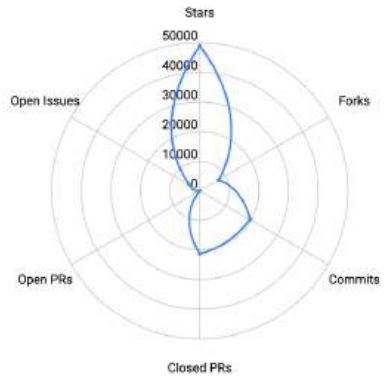

FIGURE 2: MASTODON RADAR CHART

Mastodon's metrics:

- 49k stars
- 7.3k forks
- 19.5k commits
- 21k+ PRs closed vs. 312 open
- 4.1k open issues

During its first funding period (Dec 2021 – Oct 2022), Mastodon demonstrated steady and broad-based growth across nearly all development and engagement indicators (Figure 3). NGI funding coincided with improvements in the project's foundations, including more contributors, faster issue resolution, and higher code output. The change in core activity metrics such as new contributors (+99%) and lines of code added (+117%), and issues resolved, show that funding effectively improved development capacity and community engagement and modestly improving efficiency in pull request merging (+38%) and issue resolution (+73%).

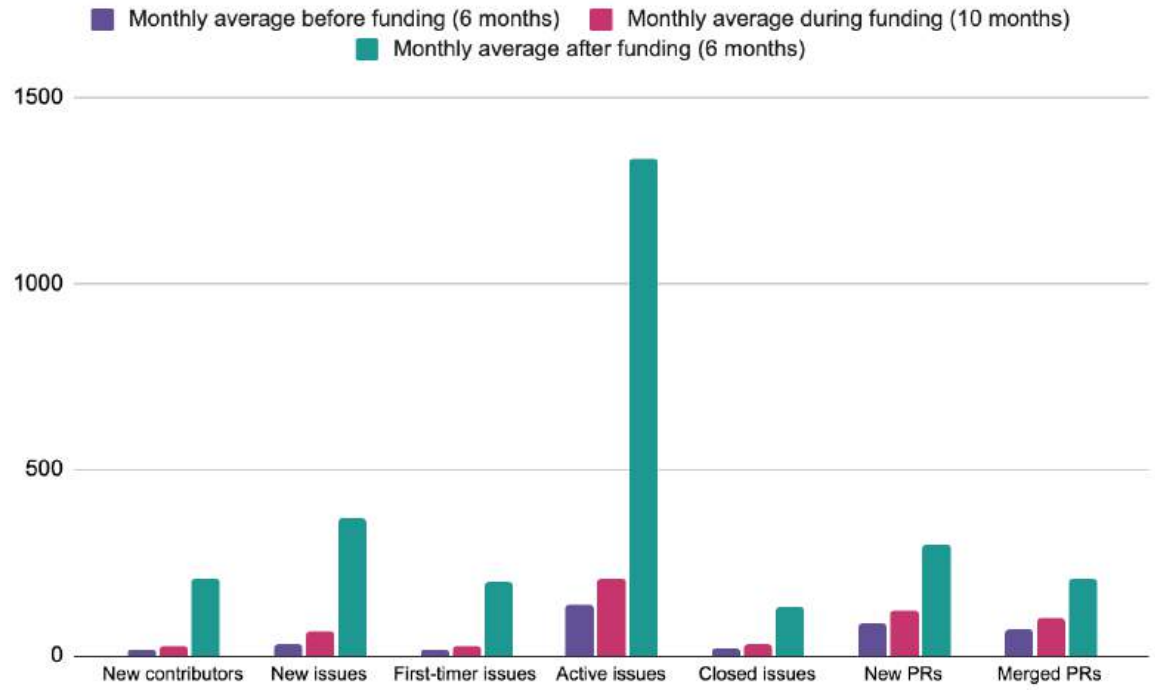

FIGURE 3: MASTODON PROJECT METRICS OVER TIME

Following the initial funding phase, Mastodon was technically and organisationally prepared to absorb a surge in public attention triggered by Twitter's acquisition by Elon Musk (October 2022). The project experienced an explosive ecosystem growth, with most metrics multiplying between 4x and 8x. New contributors and first-time issue engagement grew nearly eightfold, and active issues and community discussions expanded more than sixfold (Figure 3). Despite

the rapid scaling, issue resolution times continued to improve, indicating a resilient project governance and workflow maturity.

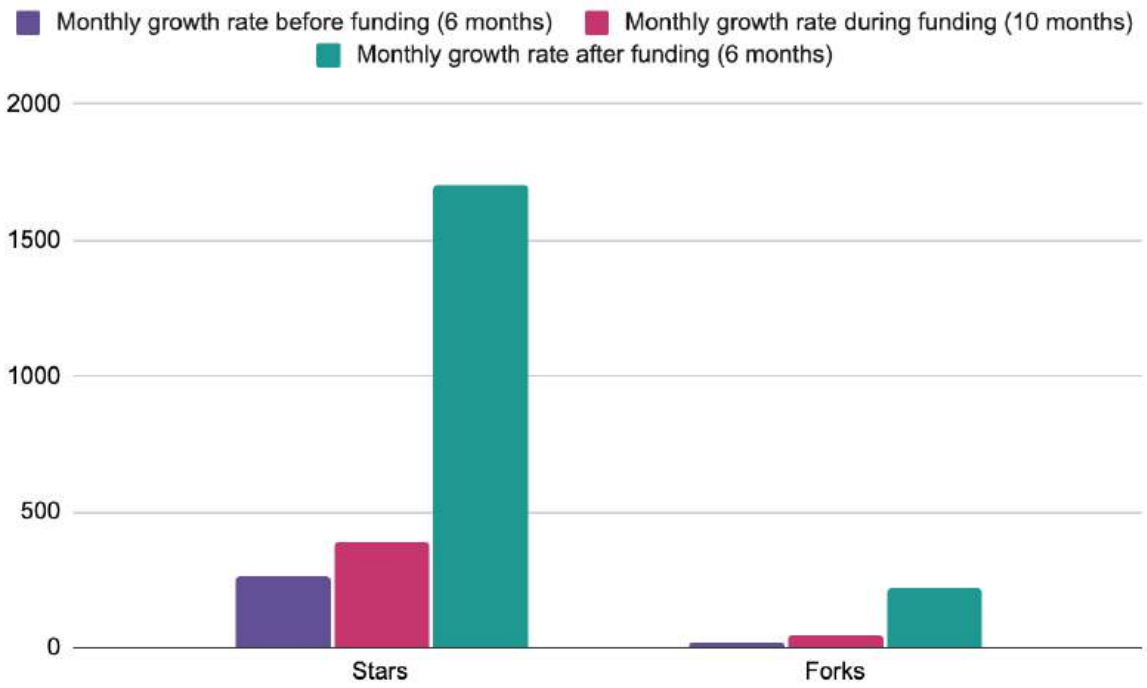

FIGURE 4: MASTODON ENGAGEMENT OVER TIME

3.3.1.4 User adoption

Mastodon's user base has fluctuated significantly over time, reflecting both the platform's decentralized architecture and broader shifts in social media. Mastodon currently has between c. 1 million monthly active users (MAU) according to the source of the project.[30] MAU estimates vary widely. Lower estimates generally apply stricter definitions of activity such as requiring recent logins or posting behavior and higher numbers often include more casual and infrequent participants. Measuring activity across Mastodon's federated network of independently operated servers further complicates the picture, as data aggregation depends on voluntary reporting by administrators and may omit private or inactive nodes.

A key inflection point occurred in the final quarter of 2022, when Mastodon experienced a significant surge in registrations and engagement.[31] This growth closely coincided with Elon Musk's acquisition of Twitter (now X), which prompted many users to explore alternatives to centralized social media platforms.

Despite fluctuations, Mastodon's user base has stabilized at levels substantially higher than pre-2022 figures, suggesting a durable increase in visibility and legitimacy within the broader social media ecosystem. The post-2022 period also saw growth in institutional participation, with public broadcasters, universities, and government agencies experimenting with official presences on the network.[32]

[30] https://joinmastodon.org/about
[31] Mastodon Annual Report 2022
[32] Mastodon Annual Report 2023

3.3.1.5 Ecosystem impact

Mastodon's features like moderation tooling and quote posts influence other Fediverse platforms, such as Pixelfed and Ghost. Mastodon functions not only as an open source project but also as an important example of decentralized social networking, shaping EU digital policy debates and wider adoption of the Fediverse.

Funded developments within Mastodon have broader ecosystem benefits. Beyond the platform itself, funded features are often adopted by other ActivityPub implementations. This amplifies Mastodon's impact across the Fediverse, a network of independent but interconnected social platforms. This is where the multiplier effect in Mastodon's case could be best observed and will be explored further in 2026.

3.3.1.6 Broader impact

Mastodon has empowered social media users. NGI-funded features and improvements laid the groundwork for a stable, high-quality user experience that supports millions of users.

Mastodon is highly policy relevant for the EU's goals, especially DSA, DMA, and GDPR. Mastodon remains a flagship example of digital sovereignty, privacy, and democratic participation, which are values that are increasingly recognized by public institutions. As Mastodon offers a resilient, open alternative to dominant platforms, it contributes to a more pluralistic and decentralised digital ecosystem. Its post-funding stability demonstrates how public investment can help long-term sustainability and governance capacity in open source social media platforms.

3.3.2 Decidim

3.3.2.1 Project overview

Project	Decidim
Website	https://decidim.org/
Description	Decidim is an open source platform for digital democracy and citizen participation. It enables processes e.g., proposals, deliberation, voting, and collaborative decision-making. Originally developed by the City of Barcelona in 2016, Decidim has since grown into a global project adopted by municipalities, institutions, and organizations worldwide. The platform is community-governed, designed to remain transparent, inclusive, and open to continuous improvement.
Funding	• **Barcelona City Council**: initial funding (€1.5M / 2016-2018) • **Barcelona City Council & Government of Catalonia**: Decidim Association agreement (€100k /year 2021-2025) • **MultiPoD**: Horizon Europe project (Decidim's share €103k / 2022-2025) • **NGI Zero Commons**: Decidim Revamp (€18k / 2020-2021) • **Other support**: Metagov-funded interoperability project (2022), Barcelona Supercomputing Center (€50k / 2022), the Open Collective platform (€636k / 2017–2023), various service contracts
Repo	https://github.com/decidim/decidim

3.3.2.2 Funding & support

Decidim began with direct public funding from the City of Barcelona, which not only supported development but also established institutional legitimacy and a clear path for public-sector deployment. A contagious effect helped reach other administrations and the fact that the City of Barcelona was the leading project. A formal agreement was key to recognize the Decidim Association as the central actor of the project. This meant that Decidim became the maintainers of the source code. [33]

To reduce reliance on a single funding source, Decidim implemented a diversification strategy. Competitive grants such as those from NGI0 have been particularly valuable for maintenance and incremental platform improvements. These are areas that are often underfunded in public procurement.

EU-funded research and deployment projects, such as MultiPoD, leverage Decidim's technology for cross-border R&D and civic participation pilots. In addition, community donations via Open Collective and partnership policies with IT firms[34] contribute to the platform's long-term sustainability and operational resilience.

3.3.2.3 Metrics & assessment

Since its inception, Decidim has progressed from a locally funded initiative into a globally recognized platform for participatory democracy. Though challenges persist, the project's commitment to openness, inclusivity, and civic engagement remains central to its growth and influence.

3.3.2.4 GitHub activity

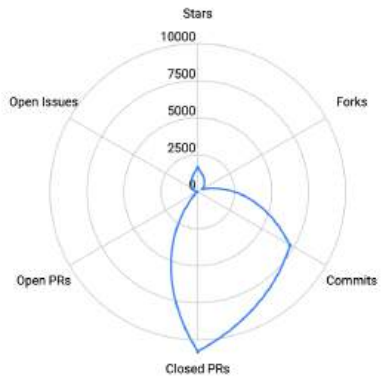

FIGURE 5: DECIDIM RADAR CHART

Decidim's metrics:

- 1.6k stars
- 443 forks
- 7.2k commits
- 10k+ PRs closed vs. 67 open
- 403 open issues

Decidim's GitHub activity reflects a mature and well-maintained project with an engaged development community. The relatively high number of forks and pull requests, compared to stars, suggests extensive adaptation and customization by municipalities, governments, and consultancies. The continuous management of open issues and PRs demonstrates a sustained maintenance cadence and collaborative development culture.

During its latest NGI funding period (from June 2024 to July 2025), Decidim experienced an acceleration in overall development and maintenance activity (Figure 6). Compared to the previous 6-month period, the number of new and active issues rose substantially, with issue closures up by more than a quarter, pointing to greater responsiveness and throughput in

[33] https://decidim.org/blog/2023-05-19-la-asociacion-de-software-libre-decidim-renueva-un-acuerdo-clave-para-su-sostenibilidad-y-su-fortalecimiento-como-un-comun-digital/
[34] https://decidim.org/partnership-policy/

project maintenance. Similarly, the increase of both new and merged pull requests show steady growth, indicating a higher development pace and stronger pipeline management. The volume of code committed also expanded, with lines of code added increasing by 70%, which is a sign of intensified feature development and technical investment. However, the project does report that this is multicasual, and the NGI funding represents the smallest amount of their funding during 2025, and the number of PRs related to NGi is small too.

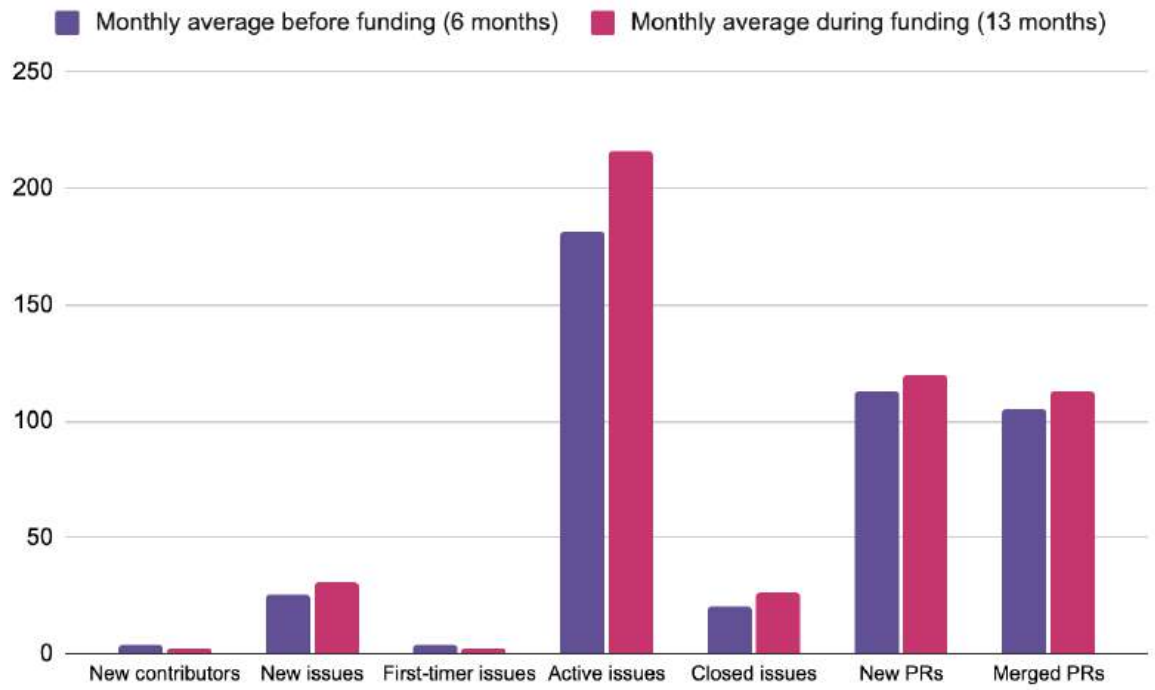

FIGURE 6: DECIDIM PROJECT METRICS OVER TIME

Efficiency indicators reveal that the project has become faster and more effective at resolving work (Figure 7). The average time to close issues dropped from three months to about seven weeks, reflecting quicker feedback loops and improved coordination. Pull request review durations increased slightly, which could correspond to more complex or larger code changes following the funding boost.

FIGURE 7: DECIDIM PR/ISSUE METRICS OVER TIME

3.3.2.5 User adoption

Decidim is now deployed across 30+ countries, supported by broad language translations.[35] Exact monthly active user figures are not centrally tracked but this widespread municipal usage suggests significant active engagement at the citizen level and sustained institutional trust in the platform's transparency and governance model.

3.3.2.6 Ecosystem impact

A growing ecosystem of over 20 service providers has built business models around Decidim, offering deployment, configuration, training, consultancy, and maintenance services.[36] This ecosystem improves Decidim's sustainability by distributing expertise and local innovation, and extending the platform's reach.

Real-life examples from municipal deployments show that Decidim increases citizen participation and diversity in democratic processes. In Barcelona's participatory budgeting cycle (2020–2023), for instance, citizens directly allocated €75 million of the municipal budget through Decidim. This shows the platform's ability to engage a broad and diverse public, including traditionally underrepresented groups.[37]

Several municipalities have also reported time and cost savings in platform maintenance, including fewer incident tickets and reduced maintenance hours. Decidim's transparency and accountability features have increased trust in public institutions and improved participatory workflows.[38]

[35] https://decidim.org/usedby/
[36] https://docs.decidim.org/en/develop/whitepaper/decidim-a-brief-overview.html?utm_source=chatgpt.com
[37] https://participedia.net/case/decidim-participatory-budgeting-in-barcelona
[38] https://capitalofdemocracy.eu/wp-content/uploads/2023/01/ECoD23-24_Application_Barcelona.pdf

3.3.2.7 Broader impact

Public-sector funding and active participation by local and regional governments continue to reinforce Decidim's credibility and adoption across Europe. The platform remains a leading example of how digital tools can embed transparency, participation, and deliberation within institutional governance processes, embodying the democratic principles at the core of the NGI mission. Investments in accessibility and compliance with public-sector digital standards can expand participation among underrepresented and underserved groups. Decidim's commitment to multilingualism and usability further show its role as a truly European digital public good.

At the ecosystem level, Decidim has become an example for capacity building and civic tech innovation. The project's open architecture and modular components have achieved a growing network of service providers and integrators. These actors collectively contribute to lowering onboarding costs, promoting interoperability, and multiplying impact through code reuse and shared best practices. Decidim's public deployments and active participation in EU-funded initiatives have informed policy debates on digital public infrastructure, open governance, and digital sovereignty. As governments increasingly explore open source solutions for citizen participation and administrative transparency, Decidim provides a working model of how public investment in open technologies can deliver enduring public value.

3.3.3 AboutCode

3.3.3.1 Project overview

Project	AboutCode
Website	https://aboutcode.org/
Description	AboutCode is a collection of open source tools and data designed to support Software Composition Analysis (SCA) to allow organizations of all sizes to ensure open compliance and improve software supply chain security and integrity. AboutCode is operated by a Belgian nonprofit association, and its core toolkit, ScanCode, was first released in November 2014. Projects include ScanCode, VulnerableCode, and DejaCode.
Funding	• **NGI Assure:** FOSS Code Supply Chain Assurance (2022-2023) • **NGI0 Entrust:** supported development of purl2all and purl2sym, tools to create, query, and expose a database of pURLs (~€50k / 2023-2024) • **NGI0 Core:** funded FastScan, a project improving the performance and scalability of the ScanCode toolkit (~€50k / 2024-2025) • **NGI0 Commons:** supported the creation of purlvalidator, a tool to validate pURLs across the ecosystem (~€50k / 2024-2025) • **NGI Search:** funds the AI-Generated Code Search project (~€150k / 2022-2025) • **Other support:** nexB, Open Collective, and Google Summer of Code (~$12k / 2021-2025)
Repo	https://github.com/aboutcode-org

3.3.3.2 Funding & support

Public funding and community support have been crucial in sustaining and expanding AboutCode's suite of tools. The AboutCode team shared that NGI grants gave the means for the development of targeted subprojects such as FastScan, purl2all, purl2sym, and purlvalidator, each addressing specific challenges in software supply chain analysis. AboutCode is also collaborating in AI-generated code search, funded through the NGI Search grant.

Additional support has come from organisations e.g., nexB, Google Summer of Code, and Open Collective, which have provided funding for student contributions, ongoing development, maintenance, and community-driven initiatives. These sources have helped AboutCode's tools remain up-to-date, sustainable, and accessible to a broad range of users.

NGI funding, in particular, has been very impactful, enabling AboutCode to implement new capabilities that would have been difficult to achieve through volunteer effort alone. Maybe most importantly, the creation and adoption of the pURL standard, now widely used across both open source and proprietary software ecosystems, demonstrates the broader impact of this support. By providing resources for complex, resource-intensive development tasks, NGI and other funders have allowed AboutCode to work on its technical foundation and deliver tools that benefit the wider software community.

During the interview, the project team described their experience with NGI as highly positive, emphasising the absence of unnecessary bureaucracy and the efficiency of the grant process. They added that the NLnet team demonstrated deep expertise across multiple technical and thematic areas, which further improved the experience of the grant process.

3.3.3.3 Metrics & assessment

The AboutCode ecosystem demonstrates a robust and sustained development effort across its core projects.

3.3.3.4 GitHub activity

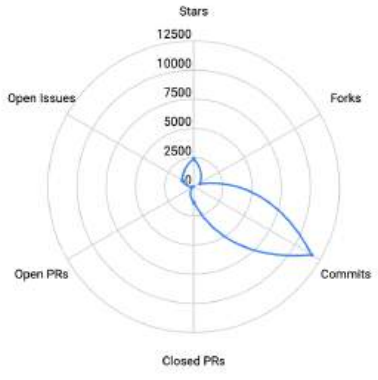

FIGURE 8: SCANCODE RADAR CHART

ScanCode's metrics:

- 2.4k stars
- 604 forks
- 11.7k+ commits
- 1.4k PRs closed vs. 52 open
- 1.1k open issues

The amassed stars and forks of AboutCode's flagship repository reflect strong recognition and interest within its niche. The number of commits and pull requests illustrates an active and well-maintained codebase. The fork-to-star ratio and high commit volume indicate not only adoption but also meaningful customization and re-use by the community.

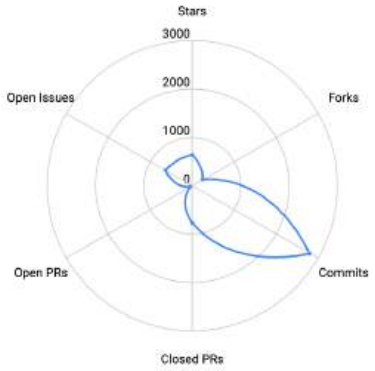

FIGURE 9: VULNERABLECODE RADAR CHART

VulnerableCode's metrics:

- 633 stars
- 237 forks
- 2.8k+ commits
- 768 closed PRs vs. 59 open
- 646 open issues

VulnerableCode is much smaller than ScanCode but it shows a similarly active pattern. It is a vital component for vulnerability tracking and demonstrates sustained contributions from its core maintainers.

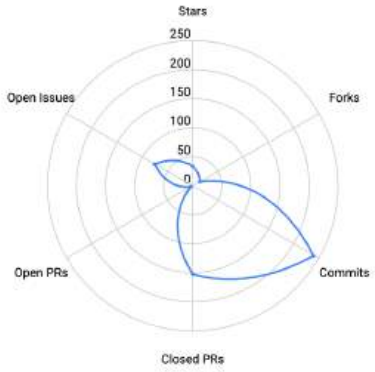

FIGURE 10: DEJACODE RADAR CHART

DejaCode's metrics:

- 34 stars
- 14 forks
- 240+ commits
- 156 closed PRs vs. 4 open
- 76 open issues

DejaCode, though more modest in scale, still shows targeted development and active engagement with its user base. These metrics indicate a robust and active development process, with ScanCode Toolkit being the most active repository, reflecting its central role in the AboutCode ecosystem.

The metrics across these repositories suggest a healthy lifecycle of contribution. Consistent commits show sustained engineering effort, active issue reporting signals engaged users, and pull request activity reflects an effective collaboration and maintenance workflow. In particular, ScanCode's visibility is on par with other specialized projects such as F-Droid. This reinforces its recognition and trustworthiness in the software compliance domain.

Overall, during its five continuous funding cycles from February 2022 to present time, the AboutCode project has experienced moderate growth in participation and engagement, with increases in new contributors (+188%) and merged pull requests (+106%). The appearance of new issues indicates improved community interaction and onboarding. However, overall development intensity has declined, as reflected by a sharp drop in lines of code added and fewer new pull requests per month. These suggest a shift toward refinement and maintenance rather than major feature expansion.

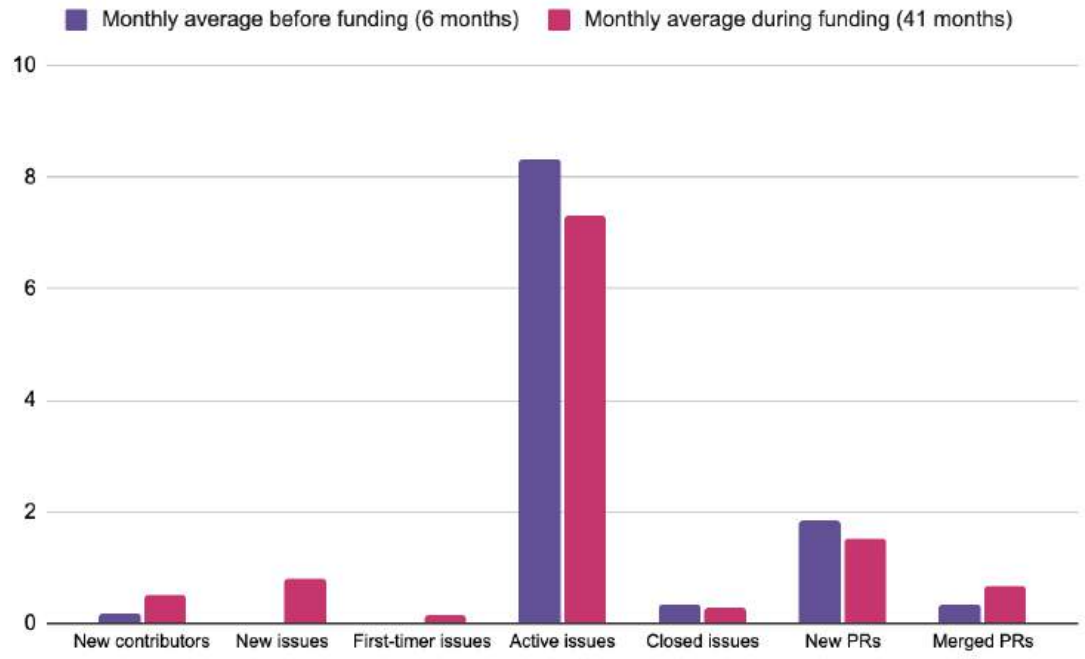

FIGURE 11: ABOUTCODE PROJECT METRICS OVER TIME

At the same time, process efficiency has improved significantly. Pull request review times dramatically shortened from 112 to 5 days, and issue resolution times have also improved significantly, which suggest a more focused and effective project management. The reduction in issue participants and active issues indicates a tighter scope control and more selective contribution practices (Figure 12).

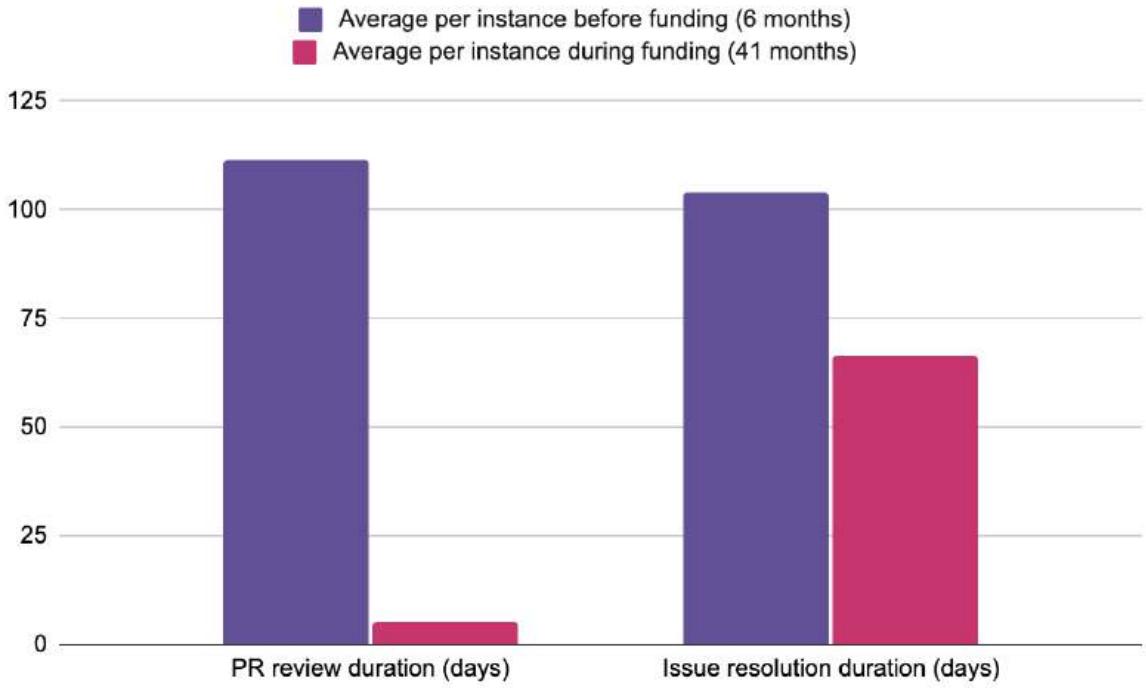

FIGURE 12: ABOUTCODE PR/ISSUE METRICS OVER TIME

3.3.3.5 User adoption

AboutCode's user adoption remains strongest in the software supply chain and open source governance sectors. ScanCode, in particular, is widely recognized for license compliance and vulnerability detection. Although, the project may not have the broad end-user visibility of platforms like Mastodon, its fork-to-star ratios and high commit counts demonstrate meaningful real-world use and steady contribution from developers and organizations interacting with open source ecosystems.

3.3.3.6 Ecosystem impact

AboutCode's ecosystem impact is significant. The introduction of pURL has standardized package identification industry-wide, facilitating software composition analysis and improving vulnerability tracking. Tools like ScanCode are now integral to Software Bill of Materials (SBOM) generation, helping organizations comply with emerging regulatory requirements. Additionally, AboutCode's ongoing collaboration in AI-generated code search, funded through the NGI Search grant, tackles the challenge of detecting AI-generated code. This has broader implications for software supply chain integrity since its important that automatically produced code adheres to licensing and security standards.

3.3.3.7 Broader impact

AboutCode provides open, transparent tools that support software license compliance and vulnerability assessment, which directly benefits public institutions that are seeking accountability and trust in software supply chains.

By providing open alternatives in the software supply chain and security domain, AboutCode contributes to the broader digital sovereignty agenda, and reduces reliance on proprietary solutions. Through its focus on transparency, SBOMs, and open standards, AboutCode has influenced procurement practices and policy discussions around secure software development in the public sector.

3.3.4 F-Droid

3.3.4.1 Project overview

Project	F-Droid
Website	https://f-droid.org/
Description	Founded in 2010, F-Droid is an installable catalog of free and open source Android apps. Its client app makes it simple to browse, install, and manage updates, giving users an easy way to discover and maintain software that respects privacy and digital freedom.
Funding	• **NGI0 PET**: automated scanning for spyware in mobile applications (€50k / 2020-2021) • **NGI0 Discovery**: give users more choice on where they download F-Droid FOSS apps (€50k / 2022) • **NGI0 Entrust**: reproducible builds (€50k+ €10k / 2023-2025) • **NGI Mobifree**: modernization of the F-Droid client app (~€5k-€50k / 2024-2025) • **Open Technology Fund**: long-term sustainability ($396k / 2025)

	• **Other support**: Donations from the community through various channels, incl. Open Collective, Liberapay, and GitHub Sponsors (~$93k in total)
Repo	https://gitlab.com/fdroid/

3.3.4.2 Funding & support

Since its founding, F-Droid has relied on a mix of community donations, public grants, and volunteer labor to sustain its mission. Steady contributions through platforms like Open Collective, Liberapay, and GitHub Sponsors cover cumulative infrastructure costs e.g., server hosting, repository building, and app moderation, which is individually modest but add up to a significant long-term expense. Volunteer contributions from an international team across five continents also provide critical support.

According to the F-Droid team, public funding has been crucial at key moments. Grants from the NGI0 programme supported work on privacy, malware detection, and reproducible builds. More recently, NGI Mobifree is backing a major overhaul of the F-Droid client app and the Open Technology Fund awarded funds to improve long-term sustainability. These grants have supported paid development time, organizational maturity, and greater legitimacy, giving F-Droid the credibility of being EU-funded, not just a grassroots project.

3.3.4.3 GitLab activity

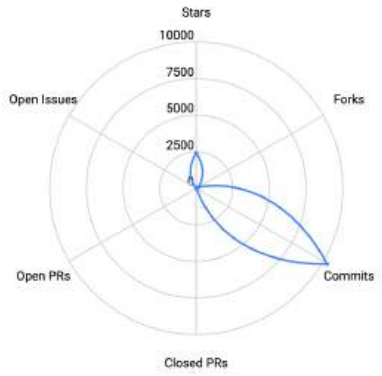

FIGURE 13: F-DROID RADAR CHART

F-Droid's metrics:

- 2.4k stars
- 190 forks
- 10.3k commits
- 10 closed PRs vs 0 open
- 0 open issues

The number of forks is relatively low for its age, which suggests fewer external modifications or derivative projects but that can be explained by the project's main focus as an application store. The 10k+ commits indicate long-term, consistent development. The low PR activity suggests a tightly controlled core team, and that contributions may be handled differently, e.g., via separate repos or merge policies.

For F-Droid, it was not possible to apply the same before–during–after funding analysis used for the other projects. Since their code repositories are present on GitLab and not GitHub, the Augur data-mining tool is not able to extract data from GitLab. As a result, quantitative trends could not be reliably extracted across the funding timeline. The analysis here focuses on available GitLab activity indicators and qualitative insights.

The F-Droid team notes that raw repository statistics understate impact. Much of the labor involves curating and reviewing thousands of apps, writing throwaway scripts, and filing upstream issues with other apps or even Google itself. One telling metric is how many external

bugs filed by F-Droid contributors get fixed, which is a slow but steady form of ecosystem influence. Blog posts and developer testimonials also serve as valuable qualitative indicators.[39]

Advocacy efforts, such as the 'Public Money? Public Code!'[40] campaign, also raise awareness of F-Droid's role in digital sovereignty and help shift public policy toward more institutional support.

3.3.4.4 Metrics & assessment

F-Droid is a niche but influential project in the Android ecosystem, with its value measured less in stars than in the trust and freedom it provides users.

3.3.4.5 User adoption

F-Droid's adoption is specialized and mission-driven rather than mass-scale. It holds particular value in regions with censorship, where users turn to the platform to discover VPNs, secure communication tools, and other apps that support digital freedom.

3.3.4.6 Ecosystem impact

F-Droid functions as both an app store and a standards-setter. Its policies on inclusion, reproducible builds, and tracker detection influence how app developers design and distribute software. Privacy researchers, advocacy groups, and academic teams frequently build on F-Droid's methodologies for auditing and distributing apps. Moreover, features and practices pioneered in F-Droid, like the reproducible builds, have been taken up more broadly in the Android ecosystem and beyond and shapes discussions around software supply-chain security.

3.3.4.7 Broader impact

F-Droid offers a censorship-resistant way for people worldwide to access apps, somewhat becoming a gateway to digital freedom. Receiving EU and OTF funding signals that F-Droid is not just a volunteer project but recognized digital public infrastructure. Work on reproducible builds and malware/trackers analysis feeds into broader efforts by groups like Exodus Privacy, academics, and other FOSS projects.

Usage statistics are difficult to measure due to F-Droid's privacy-preserving design. There are 2028 apps listed on F-Droid, on Google play there is 7051 showing that F-Droid has a substantial amount of apps listed.[41] F-Droid maintains a strong presence within the privacy-focused, open source Android ecosystem, by serving users, developers, and institutions that prioritize transparency and open licensing. Its adoption is deep within these communities but limited in overall scale compared to mainstream app stores currently.

F-Droid's reviews and app indexing indirectly improve the wider Android ecosystem by identifying privacy and security gaps. Its methodologies and open source tooling ripple outward and standardize free software development practices.

[39] https://f-droid.org/en/news/
[40] https://f-droid.org/2019/06/11/public-money-public-code.html
[41] https://android.izzysoft.de/stats.php

3.3.5 Mobile NixOS

3.3.5.1 Project overview

Project	Mobile NixOS
Website	https://mobile.nixos.org/getting-started.html
Description	Mobile NixOS brings the flexibility of the Nix operating system (NixOS) to mobile devices, letting users configure their phones like desktops. Active since 2018, the project – built on NixOS and Nixpkgs – has grown steadily with community updates and public releases from 2020 onward.
Funding	• **NGI0 PET**: support privacy-preserving technologies (€50k / 2019-2021) • **Other support**: community contributions, volunteer efforts, and infrastructure support via broader Nix/NixOS sponsors
Repo	https://github.com/NixOS/mobile-nixos

3.3.5.2 Funding & support

Mobile NixOS received targeted support through the NGI0 Privacy Enhancing Technologies (PET) initiative. The overall programme distributed nearly €6 million in funding across 148 projects spanning 28 countries, supporting a wide range of open source efforts focused on digital rights and privacy. Within this framework, Mobile NixOS was awarded €50,000 to further develop its work on secure and privacy-preserving mobile systems.

In addition to this funding, Mobile NixOS benefits from significant community contributions and volunteer efforts, which are vital for its ongoing development and maintenance. The project also receives infrastructure support through broader Nix/NixOS sponsors, which helps with ensuring the sustainability and growth of the platform.

According to the data we collected, public funding has activated development and community engagement. Post-funding activity slowed slightly but persisted. Efficiency improved, shown by faster issue resolution and stable participation.

Mobile NixOS is in early adoption stages, so further public funding could significantly accelerate support for many devices, maintenance, usability, documentation, security features, etc.

3.3.5.3 Metrics & assessment

Mobile NixOS remains a niche project but it exemplifies how targeted funding for experimental initiatives can launch broader ecosystem contributions, knowledge transfer, and sustainable development in open source.

3.3.5.4 GitHub activity

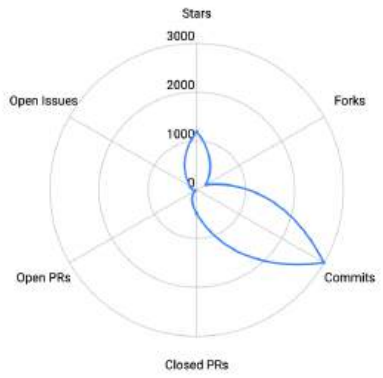

FIGURE 14: MOBILE NIXOS RADAR CHART

Mobile NixOS's metrics:

- 1.2k stars
- 215 forks
- 3k+ commits
- 489 closed PRs vs. 46 open
- 139 open issues

The repository demonstrates sustained development and consistent commitment, though the contributor base remains relatively small, with most activity concentrated among core maintainers.

Stars indicate growing visibility within a specialized community. Forks reflect experimentation and interest relative to the project's niche. Commits show significant development effort for a mobile operating system of this scale. Push requests point to active development and issues suggest a limited but engaged user base.

During its first funding period (April 2019 – October 2022), Mobile NixOS progressed from a nascent prototype into an active development project (Figure 15). Public funding helped with the establishment of a regular contributor base and the formation of core project workflows. Average monthly activity rose from zero to more than six merged pull requests per month and over five thousand lines of code added on a monthly basis, indicating a clear acceleration in technical output and collaboration.

Engagement metrics e.g., new contributors (from 0 to 1.55 per month) and issue participation (from 1 to 2.03 per issue) suggest that funding seeded an active community. Post-funding data show moderate declines in throughput but sustained contributor activity and code additions, implying that the project has retained momentum and community capacity after the funding period ended.

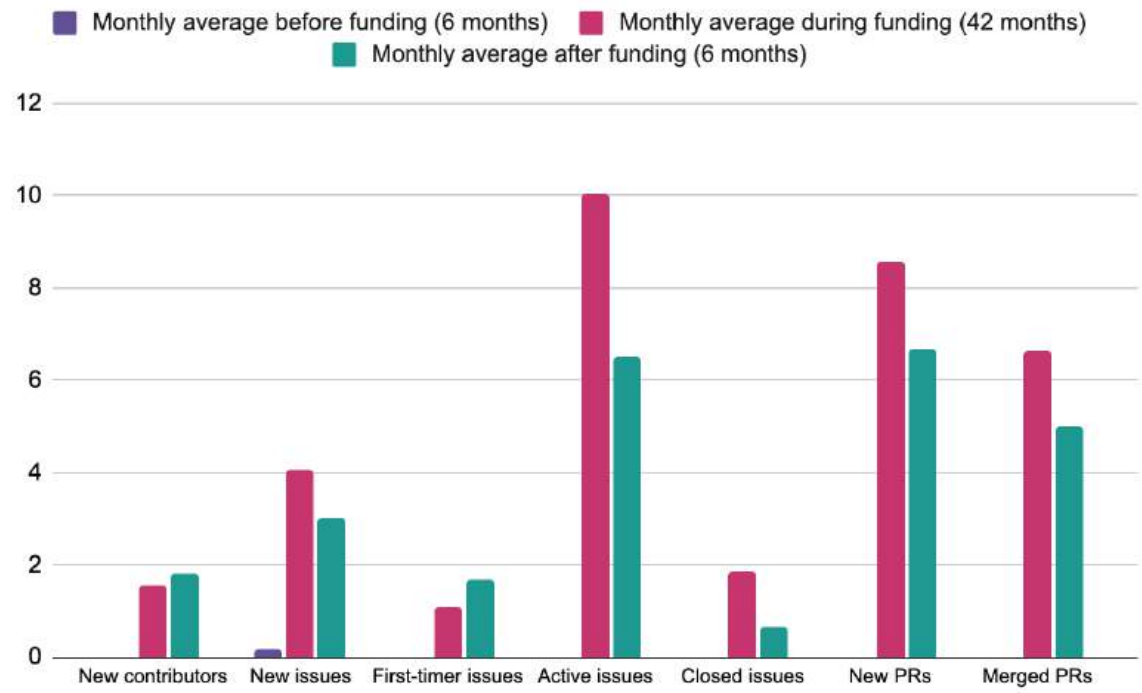

FIGURE 15: MOBILE NIXOS PROJECT METRICS OVER TIME

Efficiency has also improved, with average issue resolution time dropping from 305 to 166 days, demonstrating growing project maturity and better responsiveness (Figure 16). Public funding has helped Mobile NixOS transition from an experimental effort into a structured, self-sustaining open source initiative with measurable community and technical resilience.

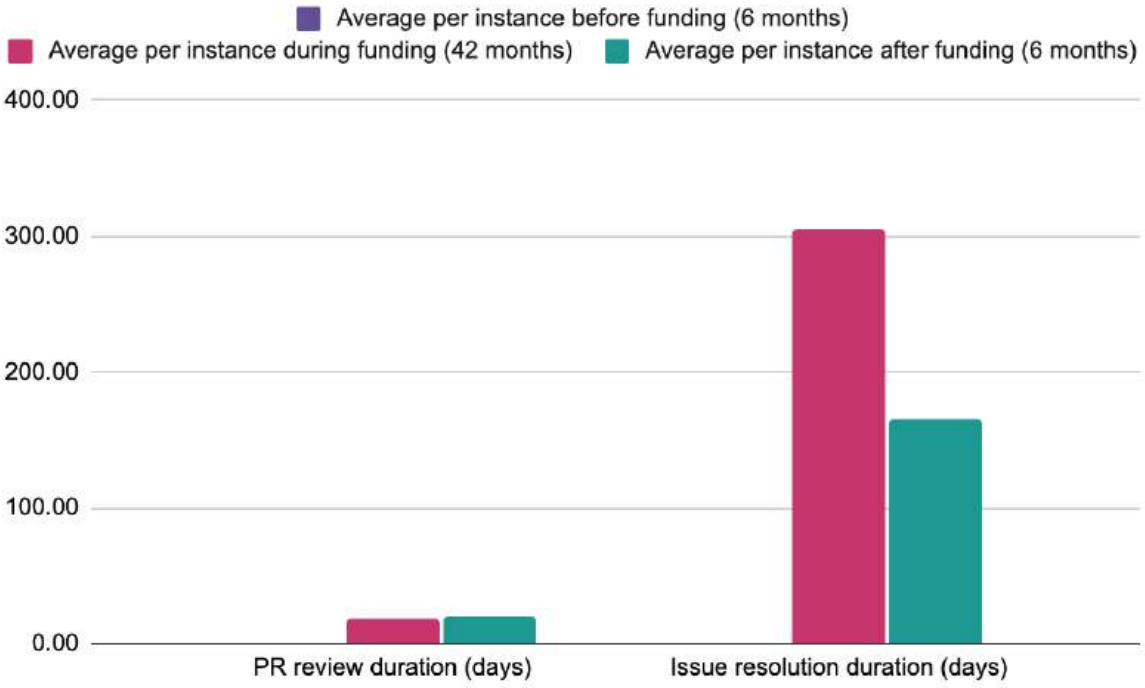

FIGURE 16: MOBILE NIXOS PR/ISSUE METRICS OVER TIME

3.3.5.5 User adoption

Mobile NixOS primarily attracts enthusiasts interested in running NixOS on mobile devices. Early adopters test devices like the PinePhone and other Linux-capable phones. Adoption is community-driven rather than commercially oriented, with feedback and feature requests emerging through testing and discussions on NixOS forums.

3.3.5.6 Ecosystem impact

Mobile NixOS contributes to the broader Nix/NixOS ecosystem in several ways. Reusable components, such as improvements in boot and bootchain handling, have been adopted in NixOS and other projects.

The project shows how NixOS concepts can be applied to mobile devices, encouraging experimentation and knowledge sharing within the community. Mobile NixOS is not a mainstream platform but it introduces new users to NixOS, potentially expanding the overall user base.

NGI funding gave the means for maintainers to invest in tooling, documentation, and reproducibility features that benefit other NixOS subprojects.

3.3.5.7 Broader impact

Public funding permitted the project to transform from an early-stage experiment into a functioning prototype and significantly advanced the adaptation of NixOS for mobile devices and improving bootchain reliability. Funding allowed the main maintainer to work full-time on the project and establish consistent development practices and project governance that persisted, though at lower intensity, after funding ended. By sharing tooling, documentation, and insights, the project has also influenced the broader Nix/NixOS ecosystem and inspired other contributors to experiment with mobile deployments.

4 NEXT STEPS FOR 2026 RESEARCH

The interim findings presented in this report discuss both the potential and the limitations of current approaches to monitoring the sustainability and impact of NGI-funded open source projects. This is augmented by our ongoing work around mixed methods and a fresh set of data and case study interviews.

To deliver a comprehensive and conclusive evaluation in 2026, the next phase of research will focus on the multiplier effect of funding through network and dependency analysis. The final report in 2026 will synthesise these elements into an evidence-based assessment of NGI's long-term impact. By combining quantitative metrics with qualitative insights from case studies as well as existing literature, the evaluation will aim to offer a holistic view of how NGI funding shapes sustainable, resilient, and values-driven open digital ecosystems across Europe.

Integrating more granular metrics

Building on the metrics introduced in this interim phase, the next stage will aim at incorporating additional indicators derived from both primary and secondary data sources. This will include additional metrics, a longer observed time-window, adoption statistics and dependency analysis. These refinements will allow for more precise measurement of sustainability, adoption, and social impact.

Exploring attribution and causality analysis

Future work will continue to employ mixed-method approaches and aim to include causal methods based on available data to better distinguish NGI's specific contributions from broader community, market, and policy dynamics. This will help clarify not just what impacts occurred, but why and how they can be linked to NGI support.

Conducting network analysis of the NGI ecosystem

A network mapping will aim to reveal interconnections among project-to-project, contributor-to-contributor and project-to-contributor. Identifying clusters of collaboration, reuse, and multiplier effects will illustrate how NGI-funded projects interact within the broader Digital Commons and open source ecosystem. This exercise will hopefully reveal measurable multiplier effects.

Performing dependency analysis

By examining package, code, and infrastructure dependencies, future research will assess the systemic importance of NGI-funded projects within the wider open source and Digital Commons ecosystems. This analysis will help identify critical nodes of innovation, resilience, and risks within the ecosystem.

The success of next year's research will depend on various factors. Anticipated challenges include the complexity of attribution, distinguishing the specific influence of NGI-funded projects within dense, interdependent software networks. The EU digital policy context could change too, which may shift priorities as seen previously with the increasing focus on digital sovereignty. In addition, data availability and computing resource constraints may limit the scope and reproducibility of large-scale dependency and network analyses.

5 RECOMMENDATIONS FOR POLICYMAKERS

This interim analysis provides some preliminary recommendations for policymakers aiming to improve the sustainability of open source ecosystems and advance European digital sovereignty through public investment. To maximise long-term impact, the following recommendations are proposed. These recommendations will be revised and expanded in the light of new research for the final report in 2026.

Embed lightweight monitoring from the outset

Integrate simple but meaningful monitoring mechanisms into the funding process from the very beginning. The simple monitoring should follow projects throughout the funding period and ideally after the funding too. Ask for core indicators such as community engagement, code reuse, dependencies, governance maturity, and emerging business models. At the same time, evaluators need to make sure that reporting remains proportionate to the size and capacity of each project, i.e., being mindful of the burden this could cause to the projects. The feasibility of providing such indicators needs to be further evaluated and will be explored in the final report.

Support continuity beyond microgrants

Many promising initiatives may lose momentum after their initial funding round. Introduce mechanisms for staged or tiered funding that allow successful projects to transition from one-time microgrants to larger or multi-year support specifically for open source. This funding mechanism will be explored in other deliverables of the NGI Commons project as well as the final report in 2026. This approach would reward demonstrated impact and maturity and help projects go from prototypes to long-term solutions to Europe's digital goals, similar to the Digital Europe Programme (DEP).

Invest and evaluate according to ecosystem-level outcomes

When evaluating the success of a funding programme aimed at open source and Digital Commons, focus on ecosystem-level outcomes instead of individual project outputs. Ecosystem-level investment can make sure that public funds contribute not only to discrete innovations but also to the foundations that allow for ongoing collaboration and reuse across the open source space.

Recognise and amplify multiplier effects

Identify projects that demonstrate strong downstream impact, such as adoption by other OSS communities, integration into public procurement, and contribution to emerging standards. Public spending can yield compounded social and technological value over time, especially if multiplier effects are taken into account during evaluations. These projects should receive special attention as they are key nodes in open source ecosystems.

Reduce barriers to public-sector adoption

The public sector plays a key role in helping open source projects get recognized and widely adopted. This is why the public sector could incentivize adoption through, for instance, procurement policies. Align NGI funding with initiatives to modernize procurement and build technical capacity within municipalities and public administrations. Some of the approaches include: encouraging pilot deployments, open source-friendly procurement frameworks, and training for public-sector IT staff. This could increase the odds that Digital Commons are adopted, maintained, and scaled effectively across Europe.

Preserve and promote Europe's values-driven leadership

Continue prioritizing human-centric, rights-based, and sovereignty-focused approaches to digital innovation while keeping in mind that the specific goals outlined are difficult to quantify and measure. Although for the sustainability and transparency of funding it would be ideal to measure funding impact, this challenge should not prevent Europe from delivering that dream. NGI's model that is founded on value-driven outcomes, (e.g., openness, inclusivity, transparency, privacy and freedom of choice) should remain a flagship example of Europe's distinctive pathway in building a trustworthy, democratic, and sustainable digital infrastructure.