



**MINISTÈRE
DE L'ENSEIGNEMENT
SUPÉRIEUR
ET DE LA RECHERCHE**

*Liberté
Égalité
Fraternité*

French policy and initiatives for research software

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(presented by Roberto Di Cosmo, Chair, Software College, National committee for Open Science)

ECSS - Workshop on Open Science





Define and promote an Open Source Software policy

Network of Chief Data and Software Officers (ADAC)

Establish strategic **connections between data and software initiatives across universities and research performing organizations**. These officers will serve as catalysts for institutional transformation, ensuring alignment between data management practices and software development policies.

Funding Body Recommendations

Develop comprehensive guidelines for funding agencies to optimize their **support for software development projects**. These recommendations will address evaluation criteria, funding mechanisms, and long-term sustainability models that recognize the unique challenges of research software.

Enhanced Valorisation Services

Strengthen the capabilities of technology transfer offices and valorisation services to **better understand and support the economic models associated with open source software** production. This includes training on licensing strategies, community building, and sustainable business models.

Software Heritage Support

Champion Software Heritage as **the platform for archiving and referencing source code**. Promote its adoption across institutions while ensuring long-term preservation of valuable research software assets.



Recognize software as a research contribution

Excellence Recognition

Create a prestigious **Open Source Research Software Award** that celebrates exemplary teams and projects making significant contributions to the research software ecosystem. This award will highlight best practices in software development, community engagement, and research impact.

Career Integration

Provide substantial **recognition for software production in researcher career advancement**, support staff evaluations, and institutional research assessments. This systemic change will ensure that software contributions receive equal weight alongside traditional publications.

Impact Monitoring

Implement comprehensive tracking through the **Open Science Monitor** to track research software mentions in publications.

Unified Catalogue

Develop a **comprehensive catalogue of research software using standardized metadata** models shared across higher education, research, and innovation stakeholders. This centralized resource will improve discoverability and facilitate collaboration.

Coordinate communities using source code and Open Source Software



College of Experts

Create a dedicated **College of Experts for Source Code and Software** within the Committee for Open Science.

This college will provide strategic guidance, establish best practices, and ensure that software considerations are integrated into all open science initiatives. The college will comprise leading researchers, software engineers, and policy experts.

Infrastructure network

Create **infrastructure for version control, issue tracking**, and community engagement

Software as **essential research infrastructure**

Highlight the software to promote collaboration

International connections

Establish robust connections with key international organizations including the EOSC Software Working Group, RDA's FAIR for Research Software Working Group, FORCE11, and the Research Software Alliance (ReSA).

Build an ecosystem connecting code, data, and publications



Integrated Publishing Policy

Within the framework of public funding for journals and conferences, advocate for mandatory **open source software policies associated with published articles**. This initiative will promote the development of software-focused publications and pilot innovative approaches that link articles, datasets, and source code, creating a comprehensive research output ecosystem.

Infrastructure Coordination

Develop strategic **coordination mechanisms between software forges, open publication archives, data repositories, and the scientific publishing sector**. This interconnected infrastructure will enable seamless **discovery, access, and reuse of research outputs** while maintaining proper **attribution and version control across all components**.

SWHID Standardization

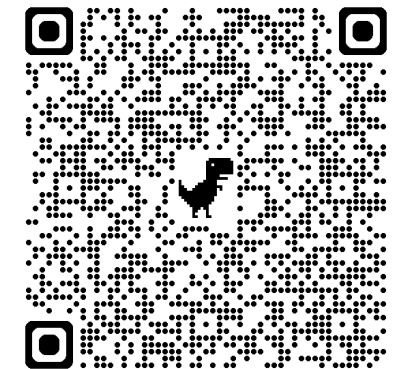
Standardization of the Software Hash Identifier (SWHID) for software citation and referencing. This standardization will ensure persistent identification of software versions, enabling proper attribution, reproducibility, and long-term preservation of research software assets.

Now ISO/IEC 18670 see <https://swhid.org>

This **integrated approach** will create a robust, interconnected research environment where software, data, and publications work together to advance scientific discovery and ensure the reproducibility of research outcomes.

Production and Valorisation of Software from French Public Research

Understanding the landscape of research software development, distribution,
and economic impact across French academic institutions
and their global contributions to open-source innovation.



Key Findings

65%

Standalone Applications

Independent software tools that operate without requiring external dependencies or frameworks

77%

Community-Driven

Produced by collaborative communities of 2–20 people, fostering knowledge sharing

33%

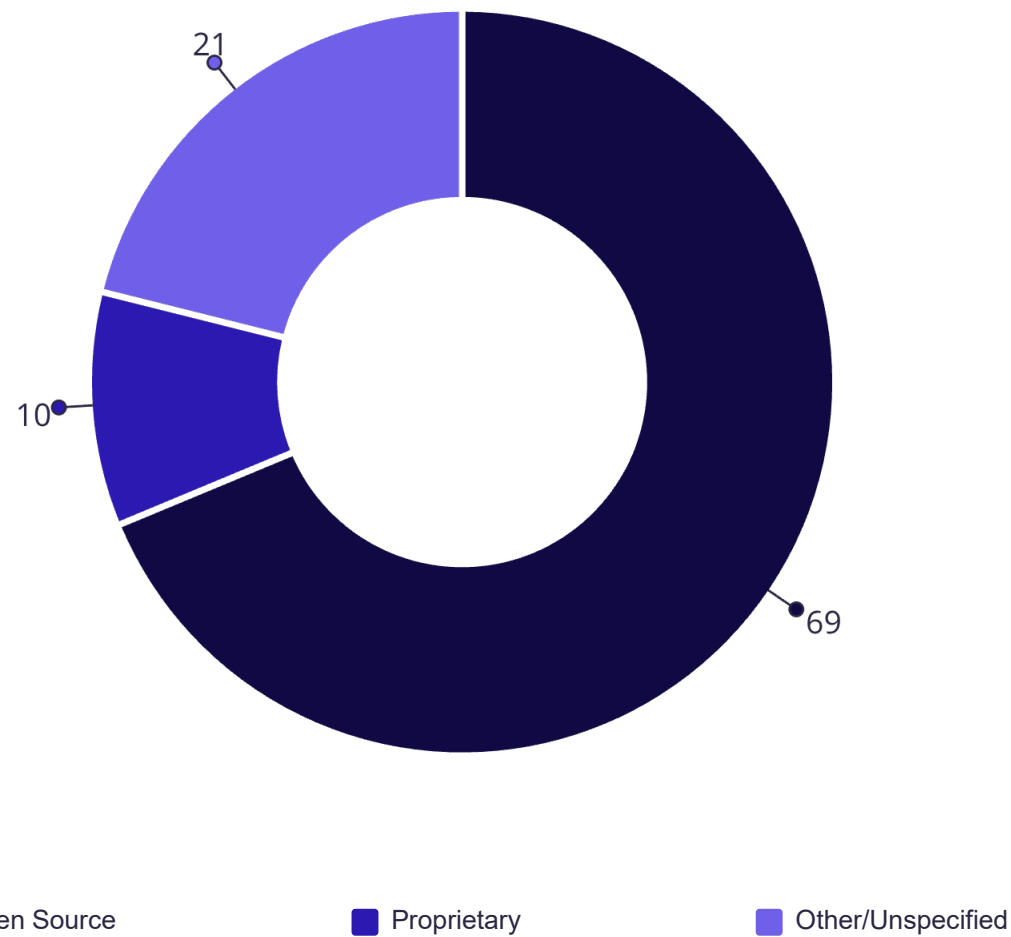
Have Governance

Established governance structures ensuring sustainable development and maintenance

Universal Research Impact

All research fields produce software, demonstrating the fundamental role of computational tools across scientific disciplines from humanities to hard sciences, every domain contributes to the research software ecosystem.

Licensing Landscape



Open-Source Dominance

Nearly 70% of research software adopts open-source licensing, reflecting the scientific community's commitment to transparency, reproducibility, and collaborative innovation.

Strategic Implications

Open-source licensing serves as the primary diffusion mode, facilitating knowledge transfer, reducing barriers to entry, and enabling researchers and industry worldwide to build upon existing work. Only 10% remains under restrictive proprietary licenses.

Software Usage and Impact



Long-term Production

Research software demonstrates remarkable longevity, being produced and actively used for many years.



Beyond Laboratory Walls

Usage extends far beyond the originating laboratory, creating networks of adoption across institutions.



Industry Adoption

Research software transcends academic boundaries, finding applications in commercial and industrial contexts.

36% Have Large Communities

Over 100 users each, indicating substantial impact and adoption rates that extend research influence globally

Strong International Visibility

French research software gains recognition worldwide, contributing to France's scientific reputation

Impact Beyond Research

Applications in education, industry, and public sector demonstrate broad societal value creation

Software archival and development platforms

Code preservation

Only **20% of research software is currently author-archived in Software Heritage**, the premier long-term preservation platform for source code(*). This represents a significant opportunity for improving the sustainability and accessibility of research outputs.

Development platforms

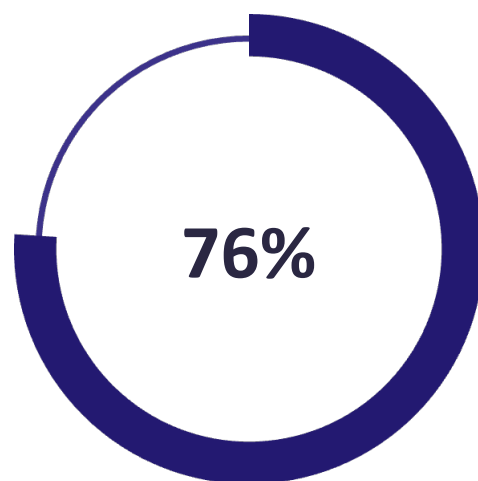
An overwhelming **73% of projects utilize software forges** for development and collaboration. GitHub dominates this landscape, followed by GitLab.com, providing essential infrastructure for version control, issue tracking, and community engagement.



(*) a much larger percentage is **automatically harvested** by Software Heritage, hence preserved **without the authors even knowing**

Academic and economic value

Academic Publications



Scientific Publications

Research software demonstrates significant academic value through one or more scientific publications.

Most **research software contributes directly to scholarly knowledge**, serving as both a research tool and a **research outcome that advances scientific understanding**.

Economic Valorisation Pathways

Direct exploitation contracts

10% of research software operates under formal exploitation agreements, establishing clear commercial frameworks for technology transfer and revenue generation

Service-based value creation

23% generate economic value through complementary services built around the software—including consulting, training, customization, and technical support

Job creation impact

14% contribute to French economic growth by creating employment opportunities, demonstrating tangible socioeconomic benefits beyond research applications

Conclusion



Universal practice

Active software production is a common practice across all scientific communities, demonstrating computational tools as essential research infrastructure



Open-Source leadership

Open-source licensing dominates as the preferred distribution method, fostering collaboration and knowledge sharing while maintaining commercial viability



Economic compatibility

Open licensing creates no barriers to economic valorization, enabling diverse business models and commercial applications

Open-source research software > Dynamic and innovative but needs support

Require structured support to ensure :

- Sustainable maintenance and adoption,
- Foster user communities
- Maximize the comprehensive impact across scientific, technological, and economic domains

Challenges & Perspectives



Strategic Development

Help scientists and organizations develop comprehensive strategies for dissemination and valorization, ensuring research software reaches its maximum potential impact and sustainability



Enhanced Governance

Strengthen software governance at both project and organizational levels, establishing clear decision-making processes, quality standards, and long-term maintenance protocols



Comprehensive Legal Protection

Legal protection extends beyond simple license selection. Securing software authorship, facilitating scientific knowledge sharing, and creating transfer opportunities requires diverse protective methods and strategic legal frameworks



These challenges represent opportunities to create more robust, sustainable, and impactful research software ecosystems that benefit both academic and commercial stakeholders.

National Support Programs

CNRS OPEN Program

- Supports **valorization of open-source software** from academic research
- Provides **funding and tailored support** to researchers
- Ensures **sustainable adoption** and builds **user communities**
- Maximizes **scientific, technological & economic impact**
- Facilitates **industrialization, proprietary modules, industry partnerships, start-up creation**
- Explores innovative models: **user consortia, service-based strategies**



Strategic Investment

Both programs represent strategic national investments in research software valorization, recognizing computational tools as critical national assets

Inria's P16 Program

- Strategic initiative supporting **maturation and transfer** of research software
- Provides **funding, mentoring, and technical expertise** to research teams
- Accelerates movement toward **industrialization, technology transfer, start-up creation**
- Aims to **accelerate adoption** and strengthen **software sustainability**
- Boosts **scientific & economic impact** through structured support



Comprehensive Support

From initial development through commercialization, these programs provide end-to-end support for research software lifecycles

Promoting Academic OSPO Network Development in France

Connected to OSPOs Worldwide



Structured researcher support

Comprehensive guidance on releasing, maintaining, and scaling research software through institutional frameworks : tools and infrastructures to support OSS



Developing and sharing best practices

Comprehensive guidance on releasing, maintaining, and scaling research software through established best practices



Sustainable maintenance and adoption

Foster long-term software use through strategic licensing, comprehensive documentation, and engaged community building



Community & Network Building

Connect French academic OSPOs domestically and link with global OSPO networks for knowledge sharing and collaboration



Maximizing Impact

Acculturate to Different Software Dissemination Methods
Define sustainable valorization strategies that balance open science principles with commercial viability



Legal & Strategic Guidance

Ensure proper open-source licensing, intellectual property management, and contribution policies align with institutional goals

Connecting codes, communities, and global impact

The future of research software lies in building robust networks that bridge academic excellence with practical applications, creating sustainable ecosystems for innovation and knowledge transfer.