

# Supporting the Software Pillar of Open Science

A framework for academic OSPOs in France

Roberto Di Cosmo

Director, Software Heritage  
Inria and Université de Paris Cité

September 2025



Software Heritage  
THE GREAT LIBRARY OF SOURCE CODE

- 1 Introduction
- 2 From principles to operations
- 3 Today's work & outputs

# Short Bio: Roberto Di Cosmo

Computer Science professor in Paris, now working at INRIA

- 35+ years of research (Theor. CS, Programming, Software Engineering, Erdos #: 3)
- 25+ years of Free and Open Source Software
- 15+ years building and directing structures for the common good



1999 *DemoLinux* – first live GNU/Linux distro

2007 *Free Software Thematic Group*

150 members 40 projects 200Me

2008 *Mancoosi project* [www.mancoosi.org](http://www.mancoosi.org)

2010 *IRILL* [www.irill.org](http://www.irill.org)

2015 *Software Heritage* at INRIA

2018 *National Committee for Open Science*, France

2021 *EOSC Task Force on Infrastructures for Software*,  
European Union

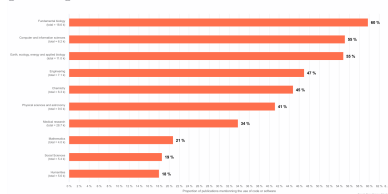
# Software is a pillar of Open Science

## Software powers modern research

Proportion of publications in France that mention the use of code or software by discipline

Sort by:

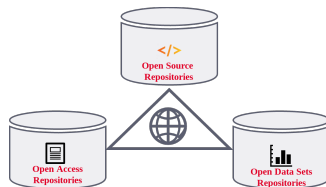
☐ Highest volume ☒ Highest use ratio



Over 20% of articles using software across all disciplines share it

2024 French Open Science Monitor

## Key pillar: software



Links are **important**

## Nota Bene

software may be a *tool*, a *research outcome* and a *research object*

access to the *source code* is essential!

- Reproducibility, transparency, reuse, and long-term access depend on source code.
- From **historic** code (e.g., Apollo 11 guidance systems) to modern AI pipelines: code carries **methods** and **intent**.

# What is at stake for research software

## ARDC

- **Archive** for retrieval (*reproducibility*)
- **Reference** for identification (*reproducibility*)
- **Describe** for discovery and reuse
- **Cite/Credit** for credit and evaluation

## Before ARDC

- **Development** practices and tools (VCS, build system, test suites, CI, code quality, ...)
- **Opening up** towards a community (documentation, organization, communication)

Need training, tooling, infrastructures, best practices

## Beyond ARDC

- **Policies** (dissemination, reuse, careers, ...)
- **Sustainability** (legal, financial, etc.)
- Technology transfer
- Advanced technologies and tools (quality, traceability, etc.)

a humbling challenge, and a complex one (we are not in a vacuum)

# French National plan for Open Science, 2021-2024

## SECOND FRENCH PLAN FOR OPEN SCIENCE

Generalising open science in France 2021-2024



### Second French Plan for Open Science

Launch on 6 July 2021 by Frédérique Vidal, Minister for Higher Education, Research and Innovation

- Multiplying the **levers for change** in order to **generalise open science practices**
- Structuring the **policy for opening up or sharing research data**
- New commitments to the **opening of source code** produced by research
- **European and international inclusion** in the context of the French Presidency of the European Union
- **Disciplinary and thematic variations**: open science policies must be adapted to disciplinary specificities

GENERALISING  
OPEN SCIENCE  
IN FRANCE 2021-2024

### Path Three : Opening up and promoting source code produced by research

7

Recognize and support the dissemination under an open source license of software produced by publicly funded research programmes

« The opening of software source code is a major challenge for the **reproducibility** of scientific results. »

8

Highlight the production of **source code** from higher education, research and innovation

« Distribution of software products under **open source licence** will be preferred. »

9

Define and promote an **open source software policy**

#### Define and promote an open source software policy

- Produce a **National Charter for Open Source Software** coming from higher education, research and innovation
- Develop the **link between data and software** through a network of **Chief Data Officers** in the various universities and research performing organisations.
- Develop the **economic models of open source software** and make them known within commercialization services
- **Support Software Heritage** and recommend it for the archiving and referencing of source code

#### Recognise source code as a contribution to research

- Create an **open source research software prize**
- **Provide greater recognition** for software production in the career of researchers, research support staff

#### Build an ecosystem that connects code, data and publications

- Develop **proper coordination** between software forges, open publication archives, data repositories and the scientific publishing sector.

## Key points from the plan

- Recognize **open-source dissemination of research software** as the norm.
- **Catalog & monitor** research software at national level
- **Connect** code  $\leftrightarrow$  data  $\leftrightarrow$  publications.
- **Archive & reference** source code and version history via Software Heritage and HAL.
- Enable proper **citation** and **career recognition**.
- Address **sustainability** issues (economic model) and proper **infrastructure support**

# National coordination: the Software College in the CoSO

## Five action lines (see [details online](#))

Since April 2022

- Identifying and highlighting research software production
- Technical and social tools and best practices
- Valorization and sustainability
- Liaison and animation at national, European, and international levels
- Recognition and careers

## Source Code primer key concepts



- for students
- for teachers
- for researchers



## Report on software forges in academia (FR):



- needs
- options
- limitations



## Annual award

*Establishing a national  
research software award.*

Open Research Europe

2023





- 1 Introduction
- 2 From principles to operations
- 3 Today's work & outputs

# The (ideal) Role of an OSPO

University OSPOs are the local **execution engines** for these policies

- **interface** between researchers and key University bodies: tech transfer, legal, open science, etc.
- **follow** closely national and local **policy evolution**
- create a **view of the software** production for the University
- provide **practical advice** and training to researchers/engineers/PhD students on:
  - **Archive & Reference**: in Software Heritage and HAL
  - **Describe & Cite**: codemeta.json, software citation, link to outputs and evaluation
  - **Compliance & License**: open by default; decision flow; legal support; compatibility
  - **Development & Dissemination**: forges, CI/testing, packaging, onboarding communities

# Specificities by context

Dimension	Industry OSPO	Academic OSPO
Mission focus	Product/market outcomes	Open science, reproducibility, scholarly credit, public good
Time horizon	Roadmap-aligned, multi-year product lifecycles	Grant-driven, semester/PhD cycles; exploratory projects
Primary stakeholders	Engineering, Product, Security, Legal, Comms	Labs/PI, students, Tech Transfer, Libraries, Research Office, Open Science VP
Compliance emphasis	Customer/partner obligations, export/IP risk	License literacy, citation, deposit/archival, ethics & data governance
Security posture	Supply-chain resilience, ERT, SOC processes	Baseline hygiene; leverage community mirrors/archives; reproducible builds
Infrastructure scope	Often owns dev toolchain (VCS/-CI/CD/package proxy)	Campus IT separate; OSPO brokers policy/process, not ops of en-

# Specificities by context

Dimension	Industry OSPO	Academic OSPO
Contribution model	Planned upstream work tied to product strategy	Mixed: course work, theses, short fellowships; high turnover and mentoring
Project incubation	Incubate/release strategic projects; clear productization	Research prototypes; curation, archival, hand-off to foundations when mature
IP & licensing	Protect differentiation; CLA/DCO, trademark diligence	Balance openness with TT office; educate on permissive vs copyleft trade-offs
Standards & policy	Participate for interoperability & market positioning	Engage for scholarly norms (citation IDs, metadata, archival) and policy input
Metrics of success	Risk reduction, time-to-market, adoption, upstream influence	Reproducibility, citations, deposits, student training, community uptake

# Key takeaways

- Same core: policy, compliance, security, community, education, standards, metrics.
- Different levers: **industry** optimizes product & risk; **academia** optimizes openness, credit, and continuity despite short cycles.
- Practical setup in academia: separate campus IT → OSPO prioritizes **policy, training, archival (e.g., deposits, PIDs), and upstream bridge-building** over operating product pipelines.

- Software Heritage+HAL (archiving & referencing); national catalogs/monitors.
- Training: Carpentries-style curricula; reproducible research practices.
- Communities: CURIOS-like networks, RDA/ReSA; national working groups.
- Internal partners: libraries/data stewards, RSEs, valorisation/juridique, DSI/IT.

- 1 Introduction
- 2 From principles to operations
- 3 Today's work & outputs

# Objectives for today's workshop

- Define the **Top missions** of a university OSPO  
Example trigger questions:
  - “What decisions do researchers/engineers struggle with weekly?”
  - “What indicators are useful for the University governance?”
  - “What subjects require interaction with what other University service?”
  - “What national/international connections and resources can an OSPO leverage?”
- Draft **criteria** for a possible future ministerial recognition
  - support growth path, identify: **Required / Should / Optional**
- KPIs and measures of impact



## Example items

---

Governance & mandate	Charter aligned with PNSO2, roadmap
Catalog & monitoring	
Archiving & referencing	SWH support, HAL deposit moderation
Description & Citation	”
Licensing & compliance	Decision tree/Flowchart/Kifekoi
Skills & training	SWEng (CI, packaging), metadata,...
Services & security	Service desk
Valorization & sustainability	Liaison with TT, Legal, Research
Metrics & recognition	Dashboard, Networks, awards