Open Source at CERN

Giacomo Tenaglia UGA OSPO Inauguration 24th September 2025





BY 4.0

2025 CERN, CC

CERN Mission



- Perform world-class research in fundamental physics;
- Provide particle accelerator facilities in an environmentally responsible and sustainable way;
- Unite people from all over the world to push the frontiers of science and technology;
- Train new generations of physicists, engineers and technicians;
- Engage all citizens in research and in the values of science.

CERN

Organisation and Statistics



- 25 Member States
- 1 Pre-stage Membership States
- 8 Associate Member States
- 4 Observers



- 1,400,000,000 CHF Budget (2025)



- 3,800+ Personnel
- 2,000+ Contractors
- 15,000+ Engineers, Scientists and Researchers
- 110+ Nationalities



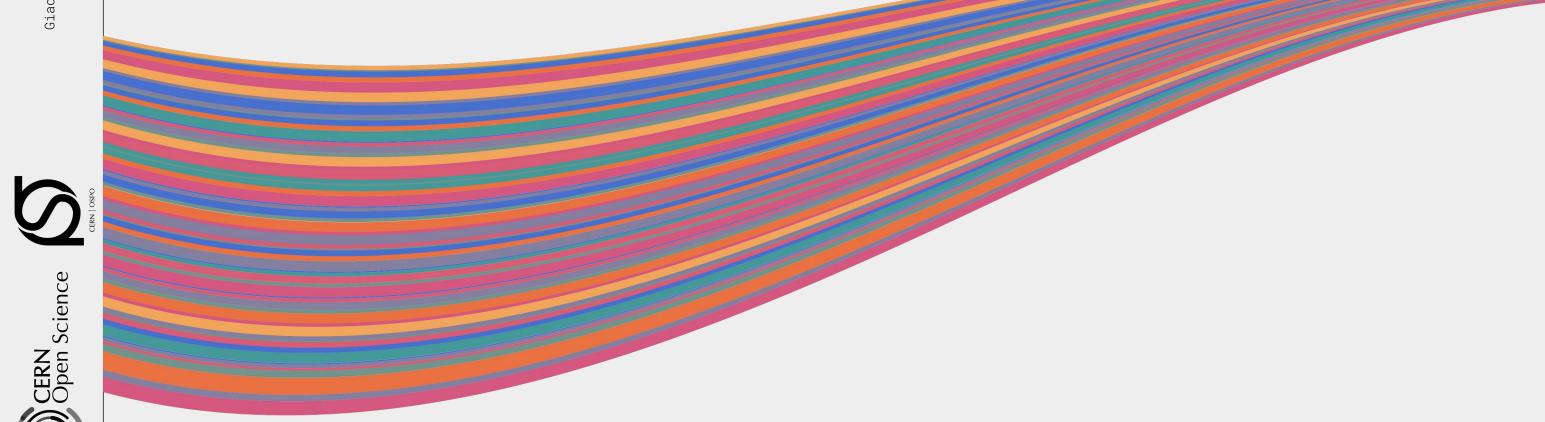
The Large Hadron Collider CERN's flagship

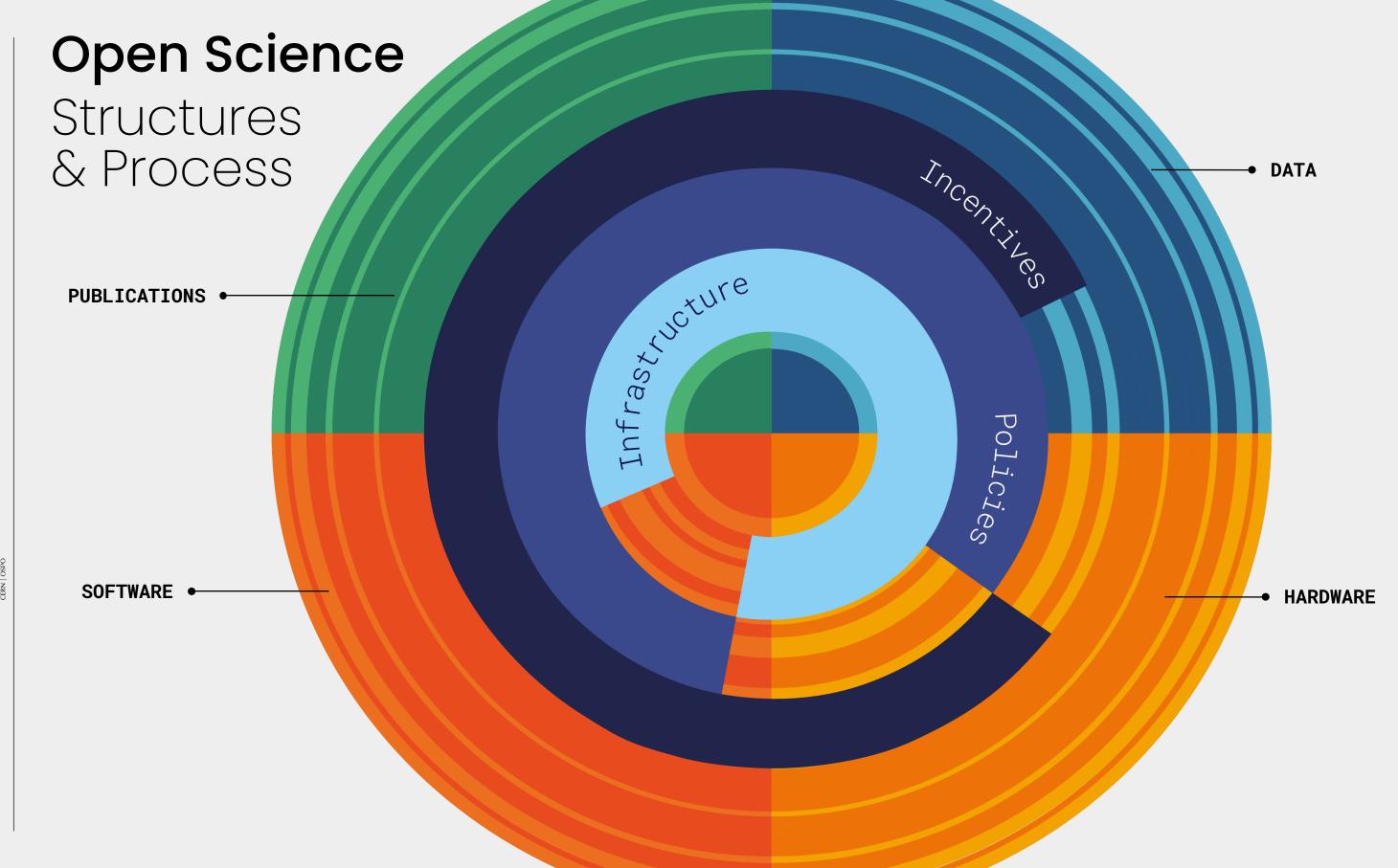
- 100m underground
- 27km circumference
- Coldest known place in the universe (-271°C)
- Hottest place in the solar system (100000x the sun)
- 2.4 billion particle collisions per second
- Detectors collect 1 PB of data per second



"... and the results of its experimental and theoretical work shall be published or otherwise made generally available."

CERN CONVENTION, 1953





Open Science

Governance Framework

Director of Research and Computing

chairs

Open Science Steering Board

oversees activities

Creating efficient and effective coordination of CERN's Open Science efforts.



Open Data WG

CoARA Implementation WG

Open Science **Office**

... Working Group

.. Interest Group

Open Source Programme Office

Scientific **Policy Board**

Information

Open Source at CERN

Milestones



Gamma Function for

MA and WGAMMA calculat

$$\Gamma(z) = \int_0^\infty e^{-t}t$$

$$-n, (n = 0, 1, 2, \cdots).$$

i WGAMMA is available or

1983-4 HEPVM & cernlib

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1970 CERN School of Computing

1994

ON ONLY

Licensing the web as FOSS

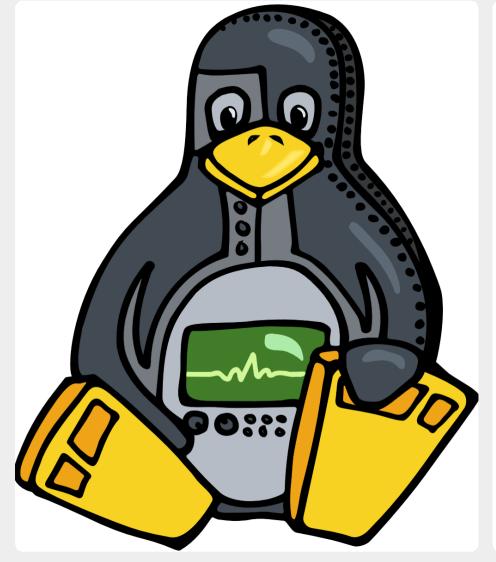
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re Technology Interest Group) news

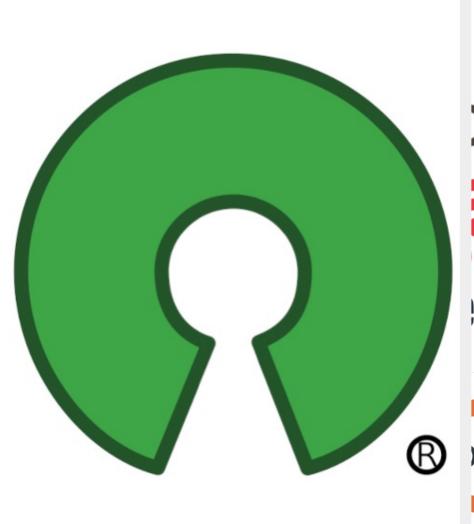
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Open Source at CERN

Milestones



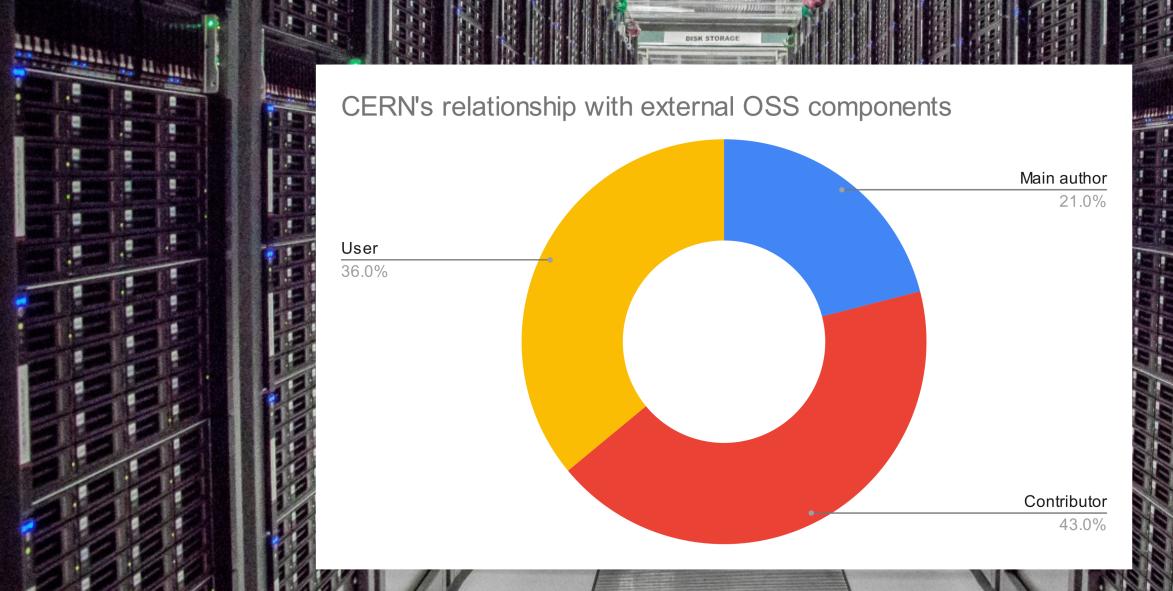






2012 Open Source License Task Force 2013
Massive FOSS tools adoption

From an OSS-based IT infrastructure... 2022 survey: 70% of CERN IT services rely on a major FOSS component.



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CERN Science Science

...to OHW projects

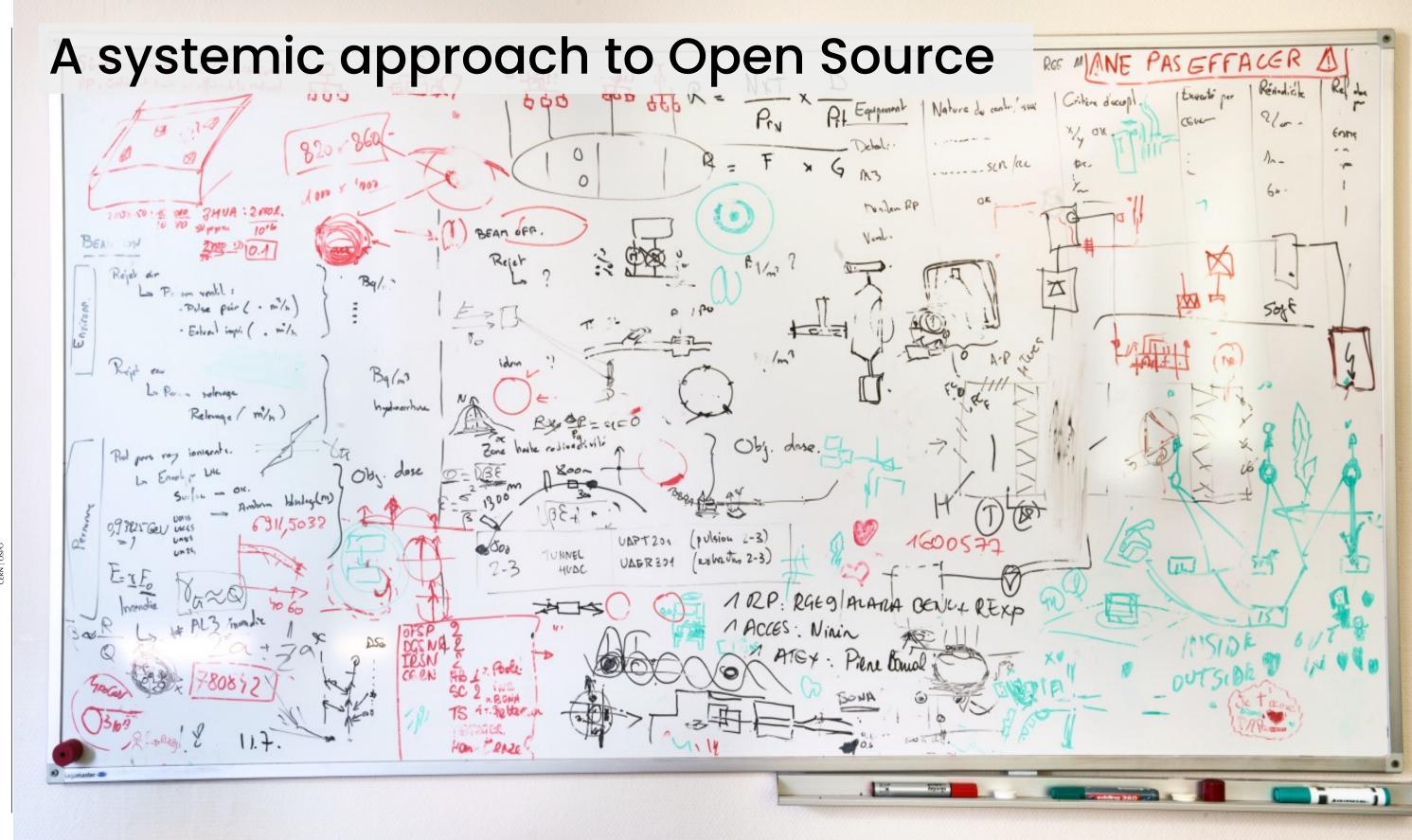
Radiation-tolerant lightning (2018)





Conclusion

- · Very challenging and rewarding project.
- Average cost for our first batch of lights was only 415€ each. This saved us approx 3.3M€, compared to buying from the specialists, almost the entire project budget.
- Manufacturing took longer than expected, but we got the lights installed before the end of LS2.
- · All the lights are still working...
- Design since adapted for use in accelerators in Austrlia and the USA (The Australian Synchrotron, SLAC and Jefferson Lab)



Giacomo Tenaglia |

Open Source Program Office Mandate (2023)





CERN Open Science

INTERNAL MANDATE

- Consult, advise, train on Open Source best practices, tools licenses, etc.
- Advises on open-sourcing CERN software and hardware.
- Identify dependencies and compatibility for critical services.
- Advises CERN on Open Source matters.

EXTERNAL MANDATE

- Showcase CERN's Open Source contributions
- Facilitate partnerships with external entities, e.g. companies.
- Promote CERN as an Open Source lab.

Contact: Open.Source@cern.ch

opensource.cern

Mandate: cds.cern.ch/record/2B79995

CERN Open Science

Open Source Program Office In practice

CROSS-ORGANISATION BOARD OF PRACTITIONERS

- 12 departmental representatives.
- Different backgrounds: physicists, engineers, developers, legal advisers, open science …
- Time allocated: 10-20%.

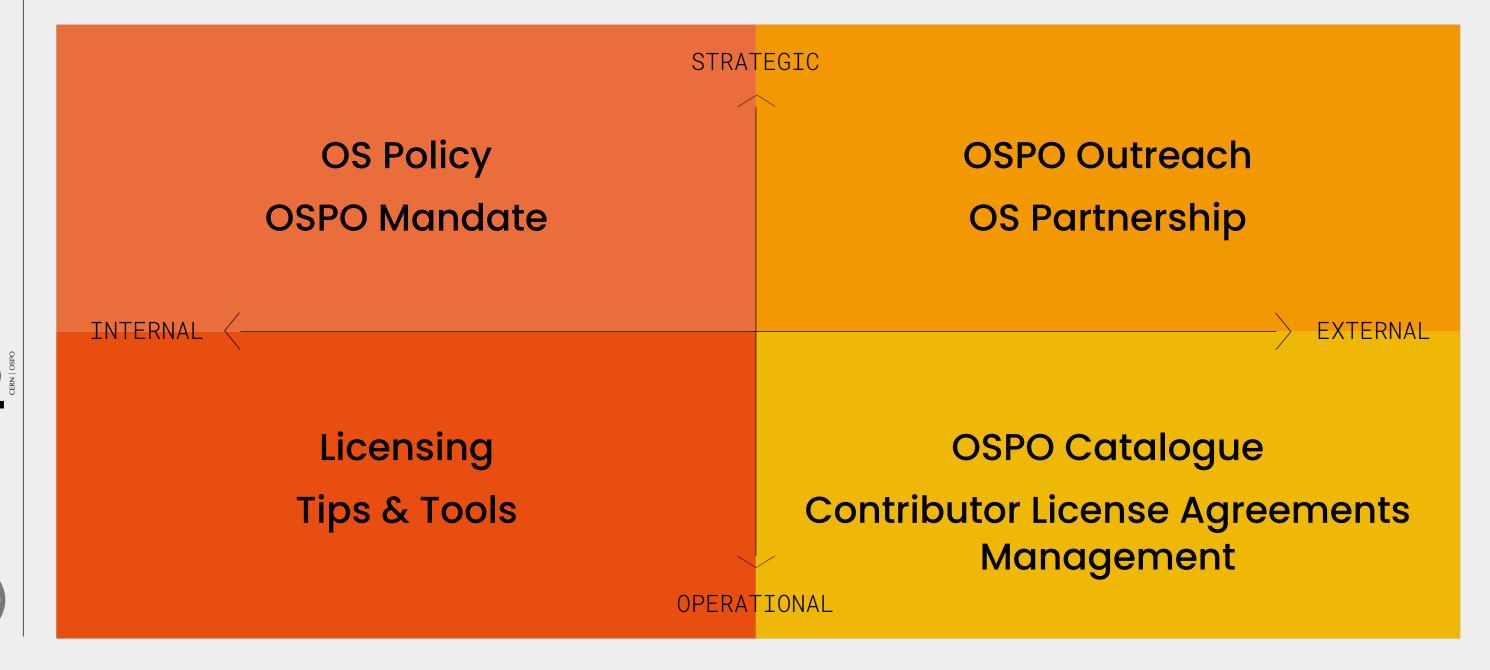




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Activities overview



CERN OSPO

Yes

No

License

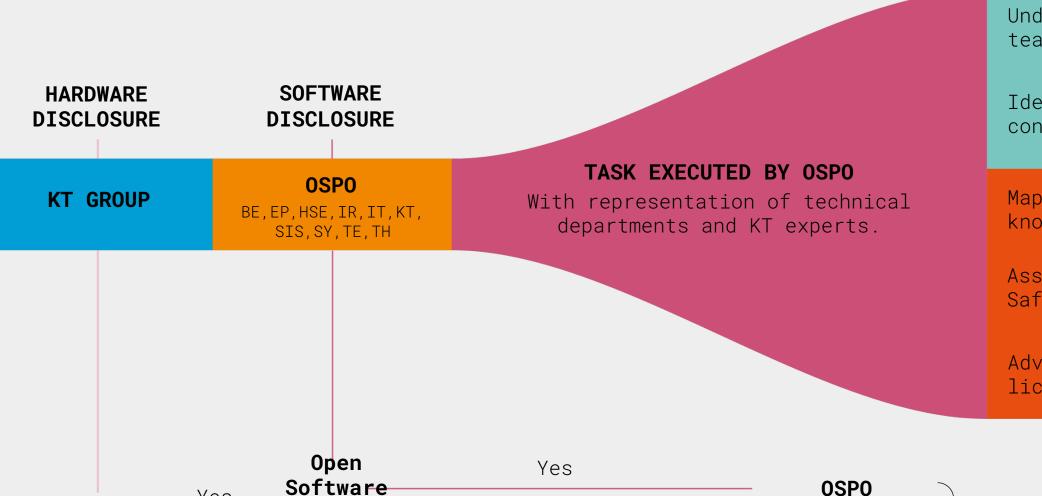
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Hardware

License

Disclosure process

Executed by KT



No

Understand Software/Development team ambitions.

Identify contributions, contributors, ownership.

Map potential use for knowledge transfer.

Assessment of legal reputational, Safety risk.

Advise on recommended licencing scheme.

Catalogue

Proprietary

Catalogue

Potential for CERN to demonstrate knowledge transfer and societal impact

Open Source Program Office

In practice

We would like to get some advice on the way to release a code we essentially develop at X LABS, related to some project of track reconstruction with the ATLAS detector.

In our team we have codes that utilize the X and Y libraries (which are under GPL licenses). The code executables are shared with other labs and universities. Are we obligated to release also our software under a GPL license due to the utilization of these components?

OPERATIONAL & INTERNAL:

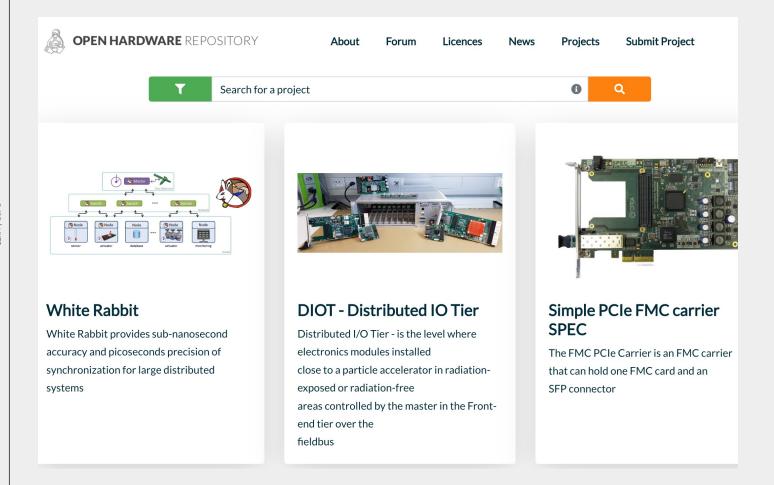
Licensing and due diligence

If this is feasible, I would appreciate the opportunity to discuss the necessary steps, including repository setup, package publication, licensing, and any other technical or procedural considerations.

I want to release it also outside CERN. However, I have a non-trivial licensing issue which may need legal advice from a lawyer.

Open Source Program Office In practice

Open Hardware Repository – https://ohwr.org



OPERATIONAL & EXTERNAL:

Catalogues and CLA signature processes

OSS CATalogue (ETA Q4/2025)



Brought to you by CERN's Open Source Program Office.

Q Search Repositories ...

LATEST RELEASES



BROWSE

jens

CAIMIRA

CERN Airborne Model for Indoor Risk Assessment The Puppet librarian for those who collide particles.

Open Source Program Office

In practice



Open Science Policies

CERN Open Science Policy

The CERN Open Science Policy covers all elements of the Open Science relevant to CERN. This includes, in particular operesearch publications, data, software and hardware, as well as research integrity, infrastructure, education and outreach supporting or enabling open science practices.

Supported by long term financial investments from its Member and Associate Member States, with significant contributions also from non-Member States, CERN is committed to the advancement of science and the wide dissemination of knowledge by embracing and promoting practices making scientific research more open, collabo and responsive to societal changes. ... CERN accordingly recognizes the holistic practice of open science as one of it guiding principles.

STRATEGIC & INTERNAL:

Advising on policies and strategy



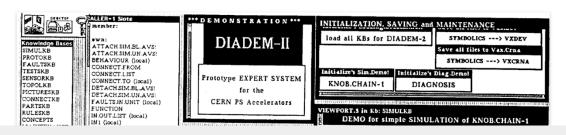
News → News → Topic: At CERN

Voir en <u>français</u>

Building CERN's AI Strategy

Artificial intelligence has been used at CERN since the 1980s; now a new Steering Committee is helping the Organization adopt it more widely

19 AUGUST, 2025





Open Source Program Office

In practice

Software Heritage

Mission V Archive

Community ~

Grants

Support us

The treasure hunt for CERN's open-source contributions

At the heart of this partnership is the challenge of mapping CERN's open-source contributions scattere across numerous platforms and repositories. It's estimated that about 10% of the "official" open source code is produced by employees. That leaves the other 90% from visiting researchers who work togethe devise solutions, finish projects, publish papers and code before moving on. The decentralized nature c these contributions makes capturing the full scope of CERN's impact a complex task.

"This project is a treasure hunt," says <u>Axel Naumann</u>, Chair of CERN's Open Source Program Office (OSPO). "We know some of the gems out there, but the question is, how many more are waiting to be discovered? By tracing our contributions through Software Heritage, we hope to gain a clearer picture of CERN's true impact on the global open-source landscape."



Outreach and partnerships







CERN Cience

OSPO at CERN Challenges on the horizon

- ML/LLM/AI, OSAID, ...
- Paths to projects "discovery"
- "Scale up" frameworks
- Understand critical FOSS dependencies
- "Contribute back" / fund
- Impact measurement & assessment
- A sovereign European infrastructure for Science
- . . .



https://opensource.cern
https://ospo.docs.cern.ch

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