Open Source at CERN

Giacomo Tenaglia
UGA OSPO Inauguration
24th September 2025

CERN Open Science

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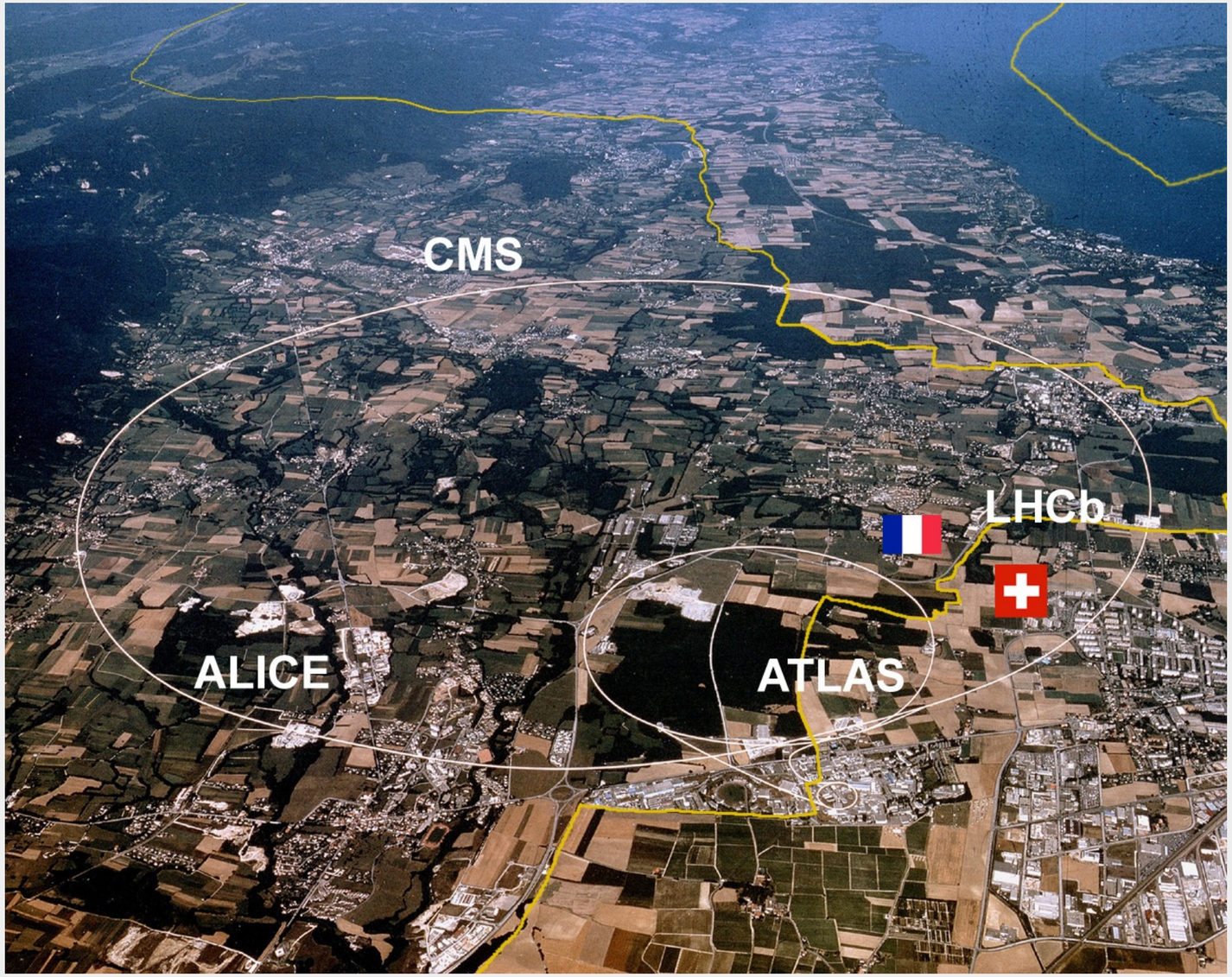
CERN Mission



- 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

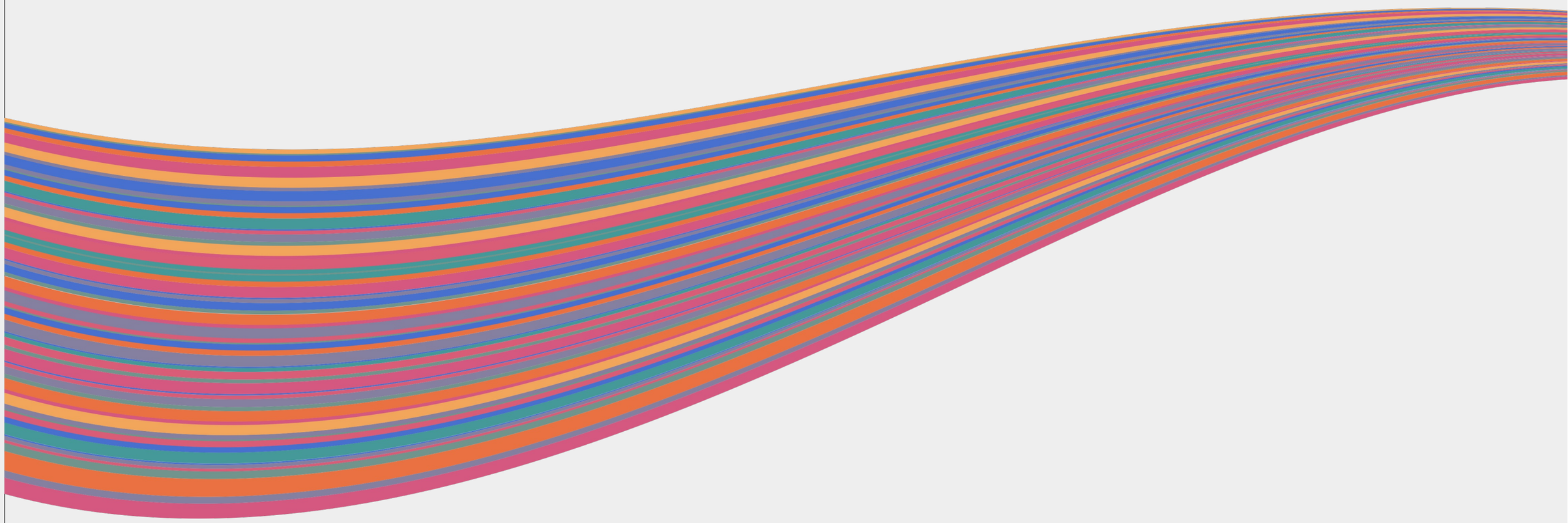
The Large Hadron Collider

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

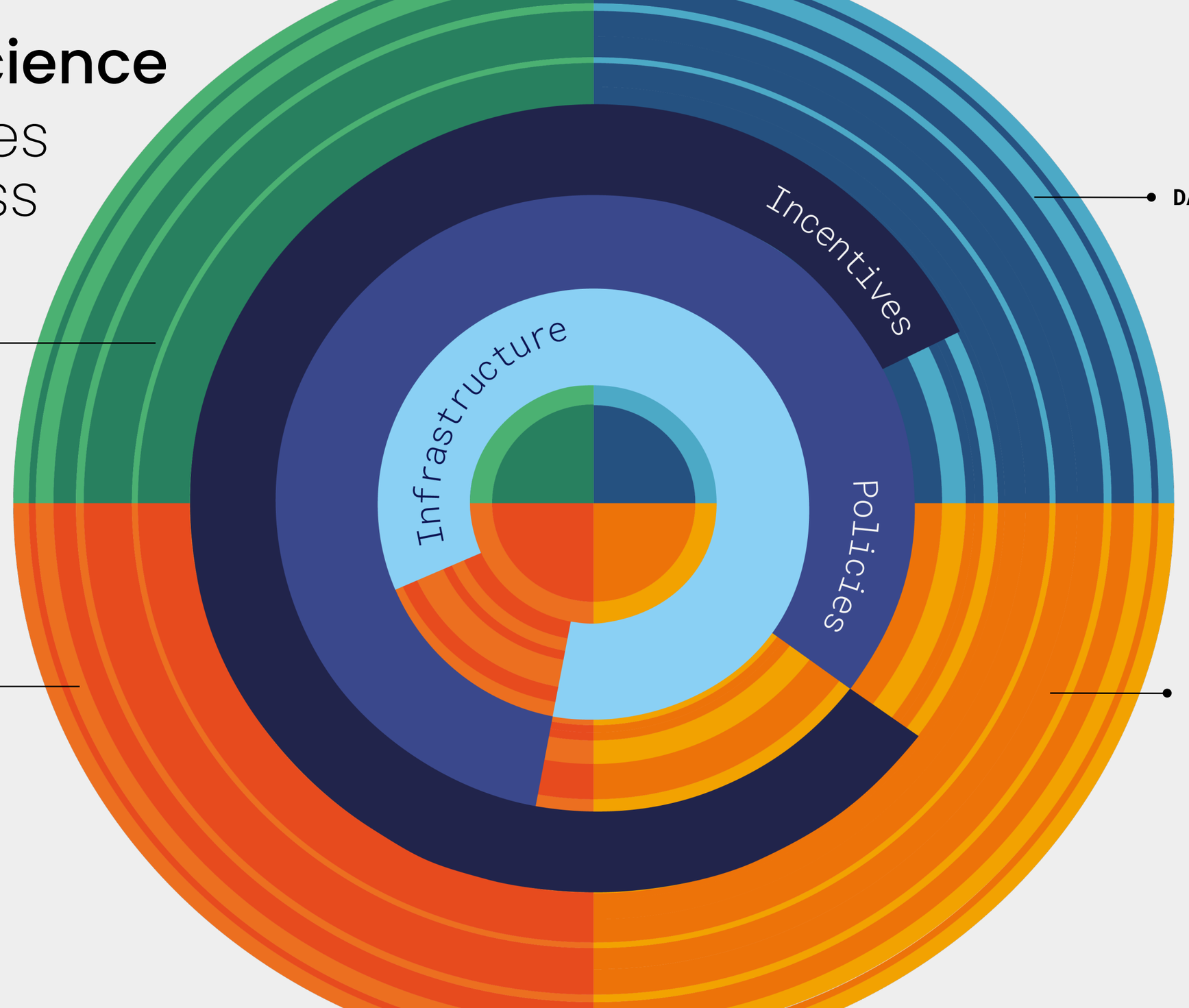
“… and the results of its experimental and theoretical work shall be published or otherwise made generally available.”

CERN CONVENTION, 1953



Open Science

Structures & Process



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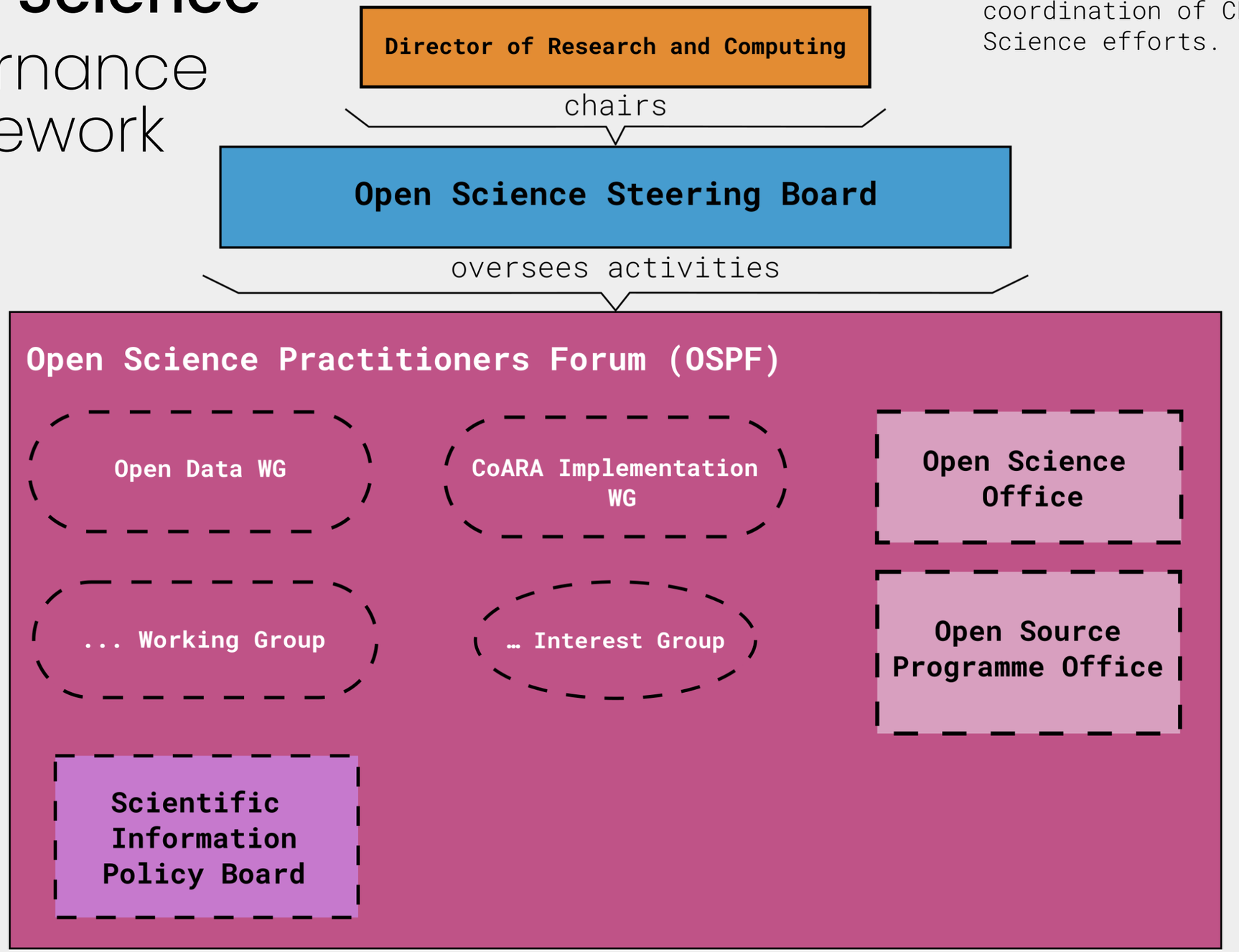
Open Science Governance Framework

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



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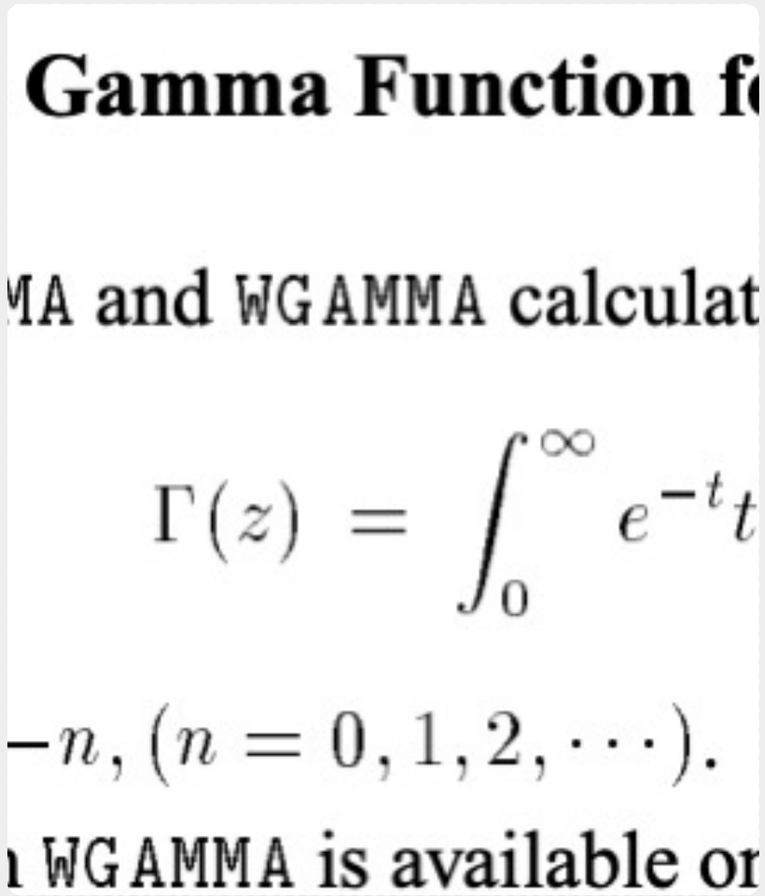
Milestones

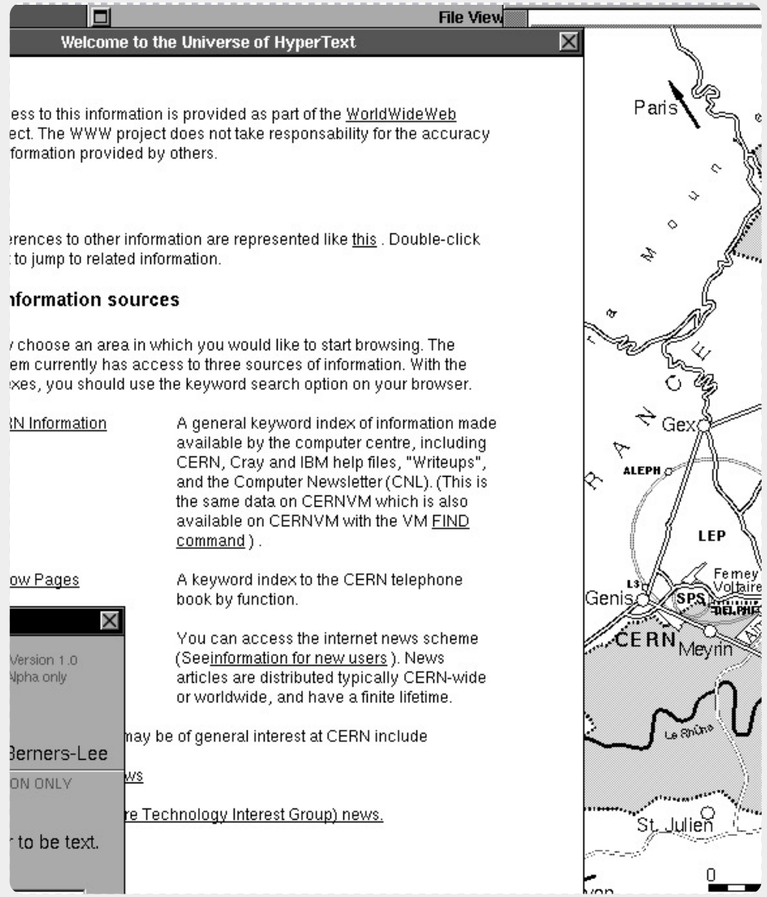
1970

CERN School of Computing



1983-4

HEPVM & cernlib



1994

Licensing the web as FOSS

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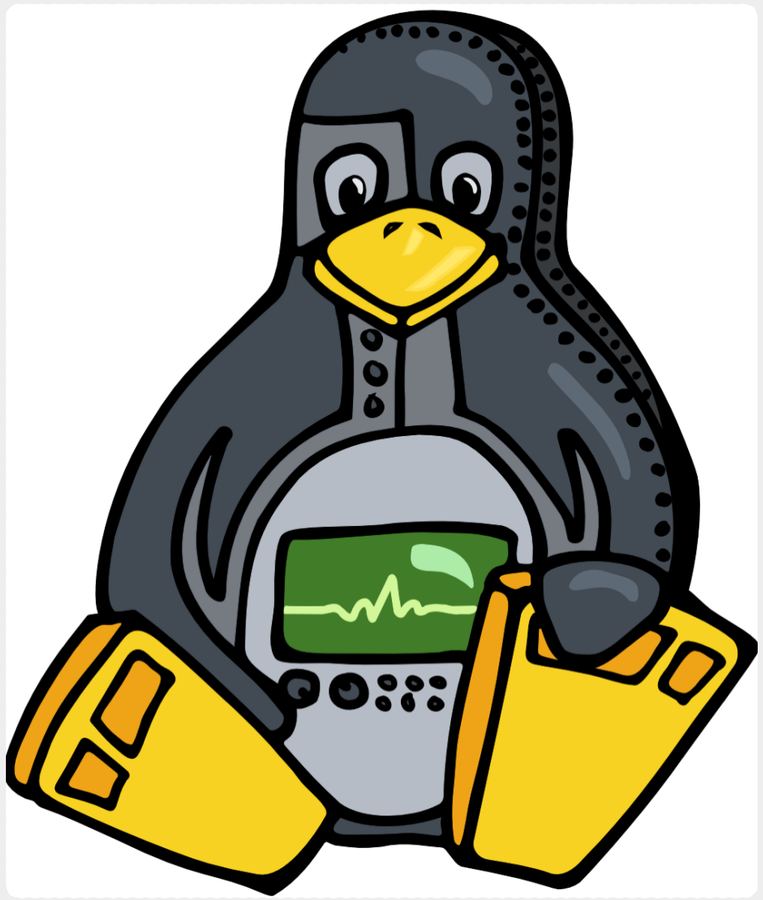
Milestones



2011

CERN Open Hardware Licence

2012

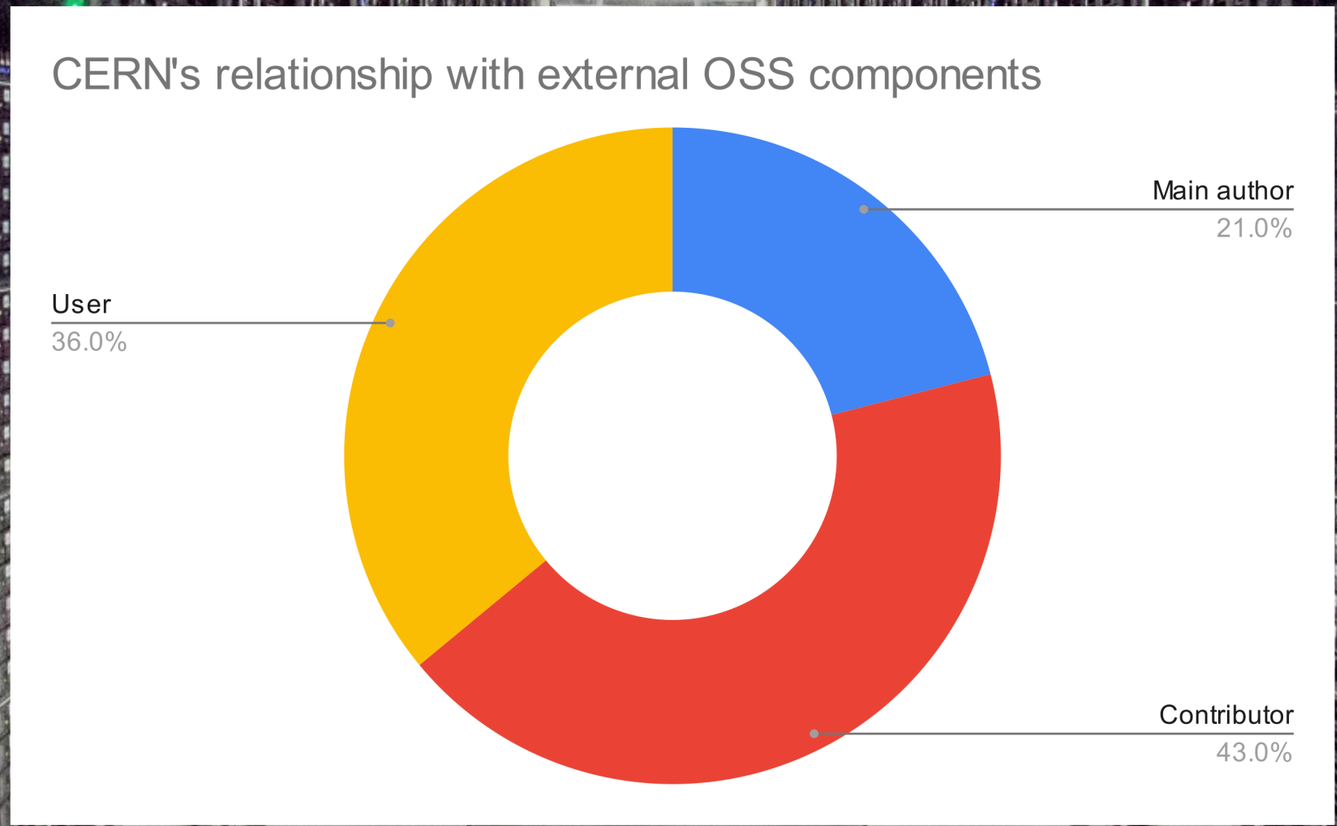
Open Source License Task Force

2013

Massive FOSS tools adoption

From an OSS-based IT infrastructure...

2022 survey: 70% of CERN IT services rely on a major FOSS component.



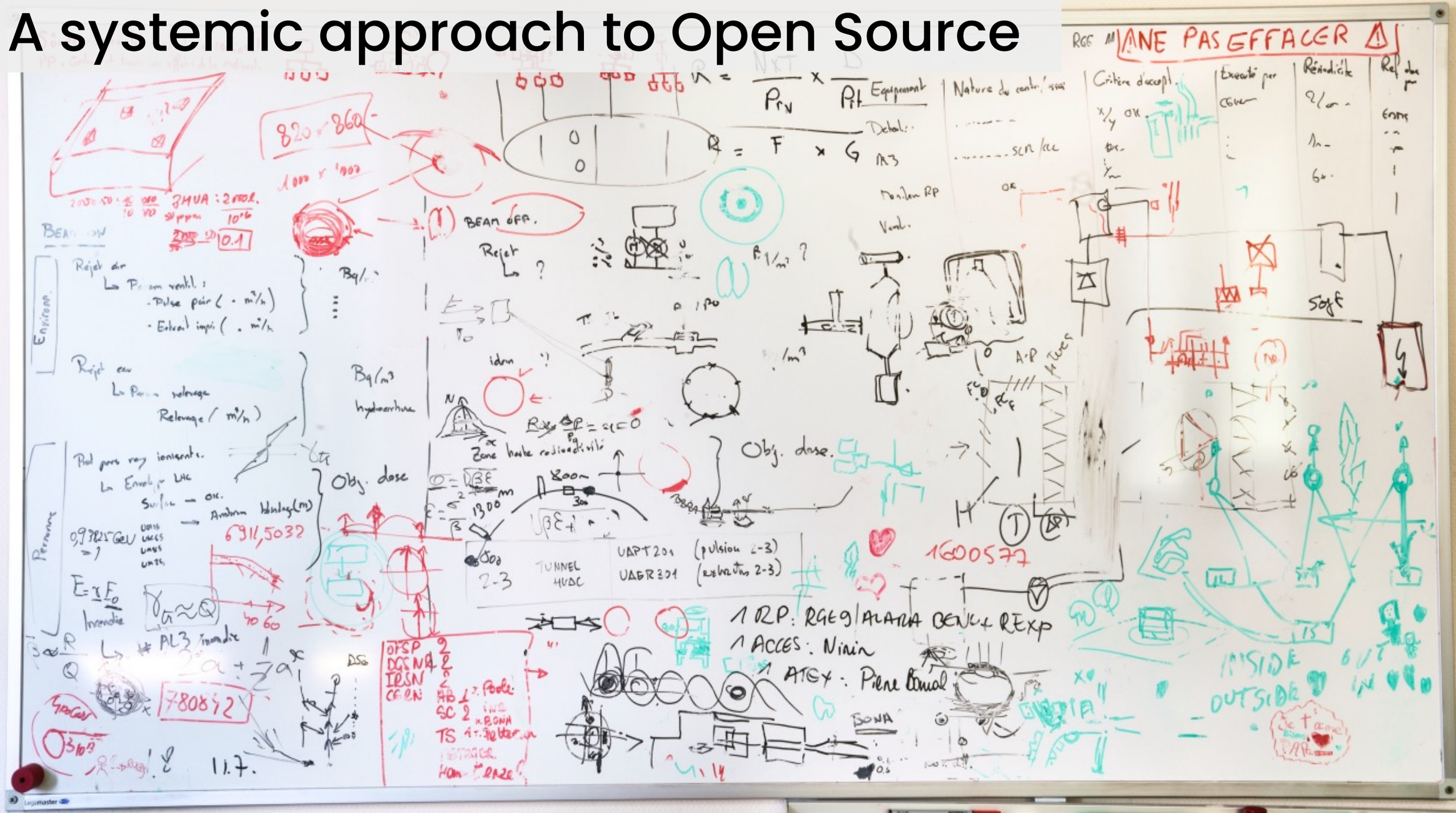
...to OHW projects

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)**

A systemic approach to Open Source



Open Source Program Office Mandate (2023)

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

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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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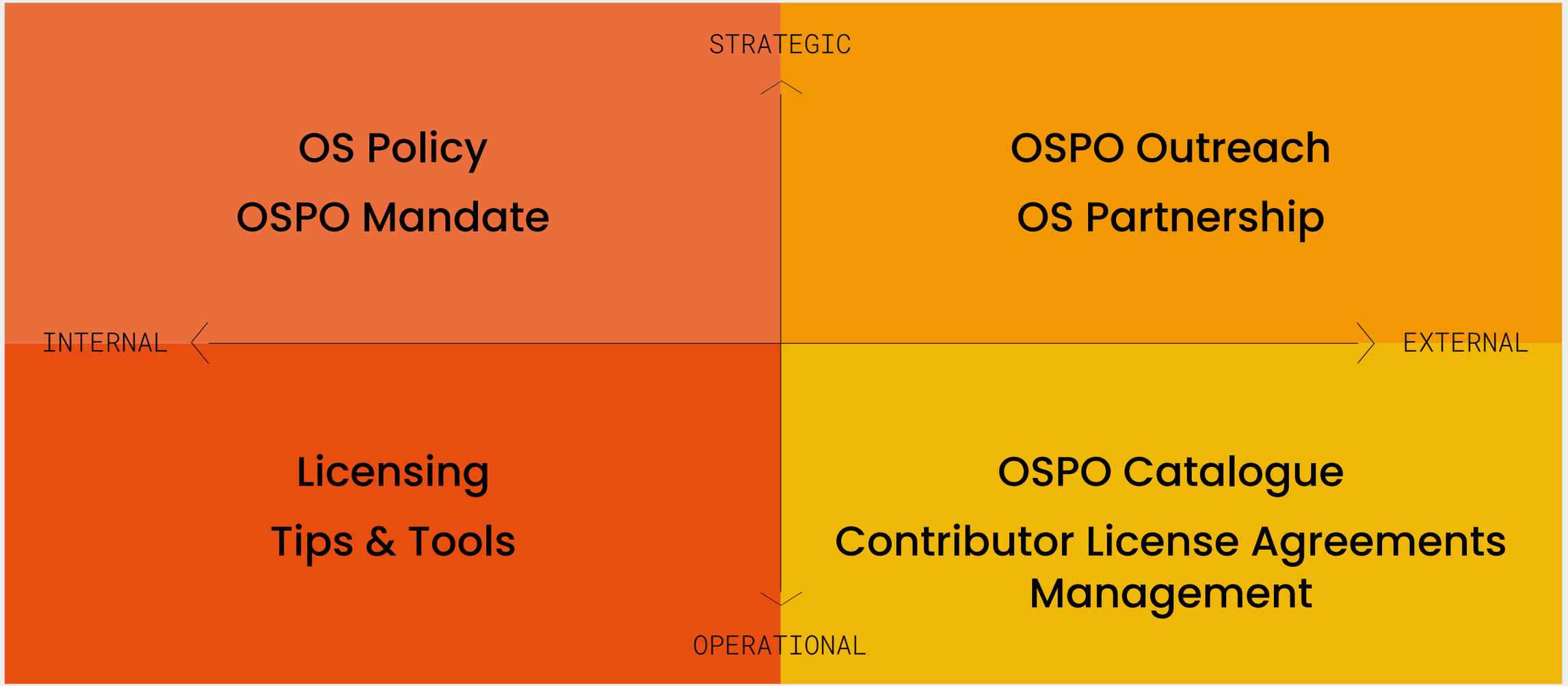
Activities overview



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Disclosure process

HARDWARE DISCLOSURE

SOFTWARE DISCLOSURE

KT GROUP

OSPO
BE, EP, HSE, IR, IT, KT, SIS, SY, TE, TH

TASK EXECUTED BY OSPO
With representation of technical departments and KT experts.

Executed by KT

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.

Open Hardware License

Yes

Open Software License

Yes

OSPO Catalogue

No

Proprietary Catalogue

No

Potential for CERN to demonstrate knowledge transfer and societal impact

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In practice

OPERATIONAL & INTERNAL:

Licensing and due diligence

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.

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.

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?

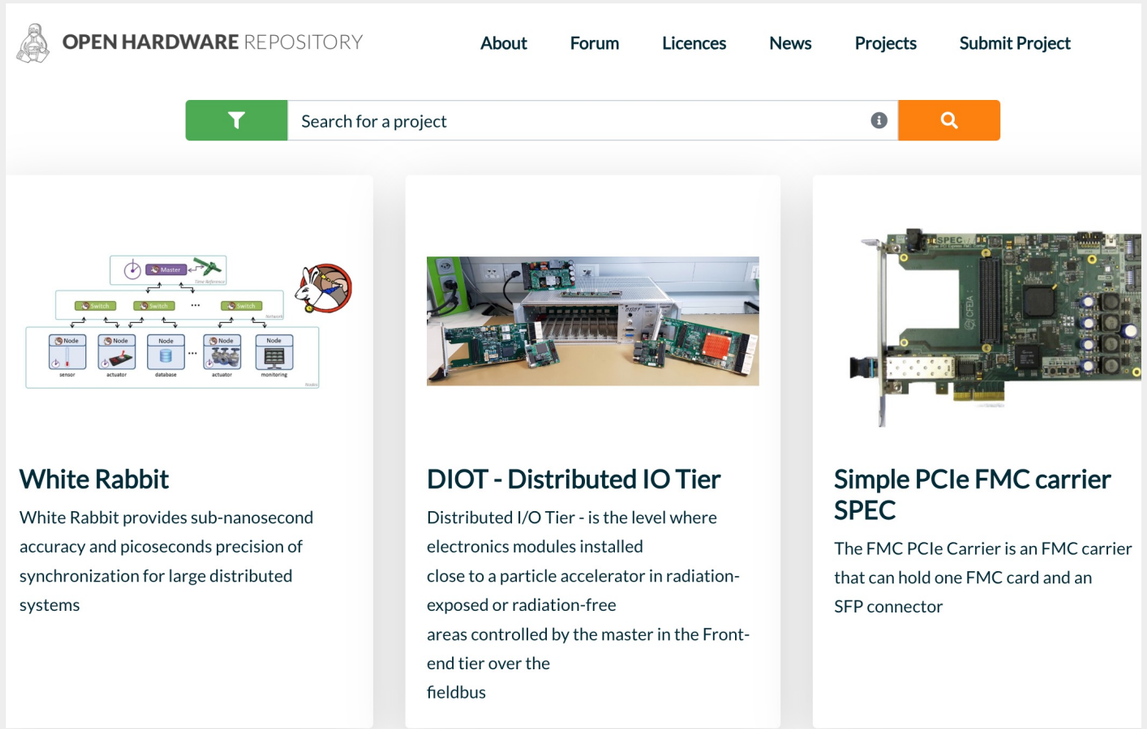
I want to release it also outside CERN. However, I have a non-trivial licensing issue which may need legal advice from a lawyer.

Open Source Program Office
In practice

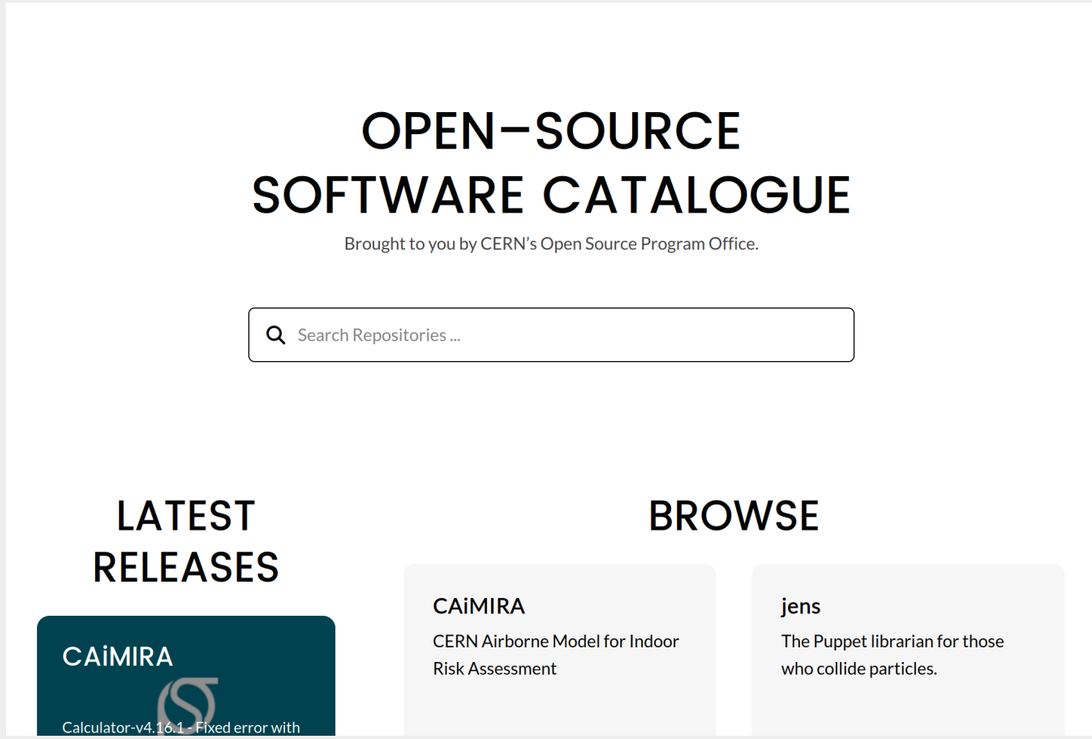
OPERATIONAL & EXTERNAL:

Catalogues and CLA signature processes

Open Hardware Repository – https://ohwr.org



OSS CATalogue (ETA Q4/2025)



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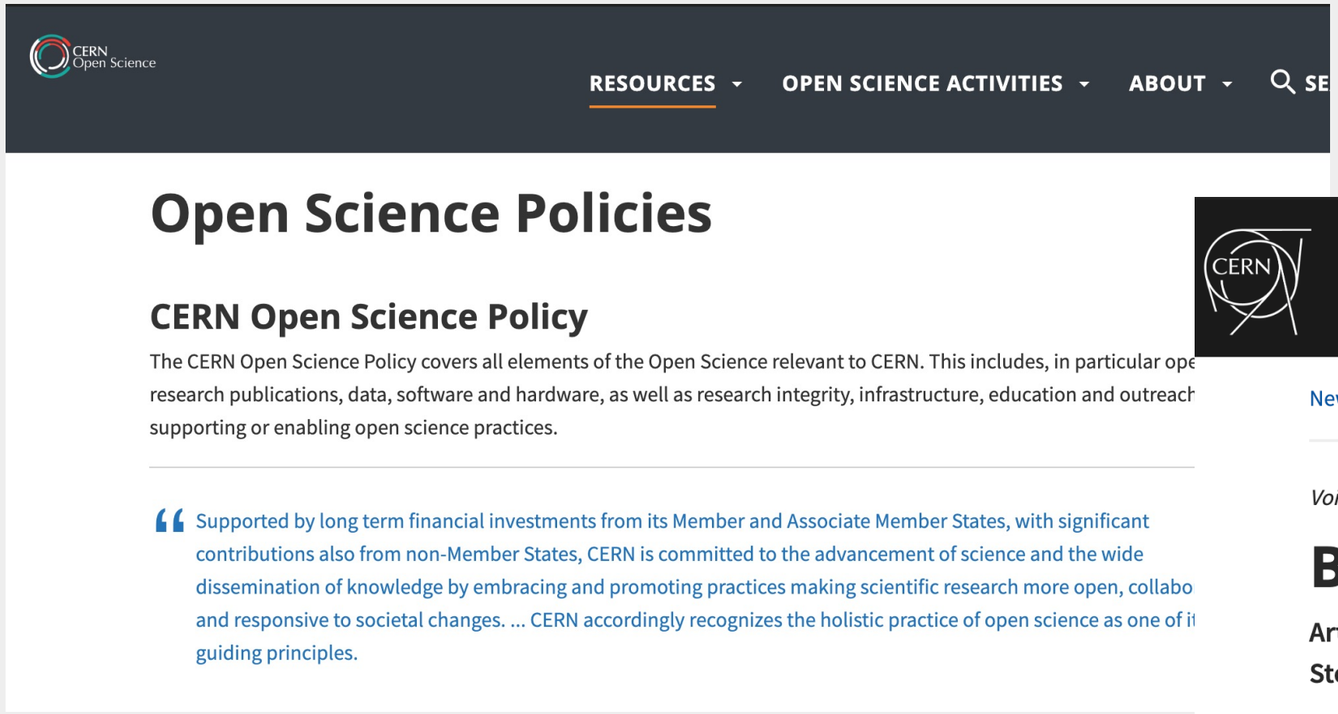
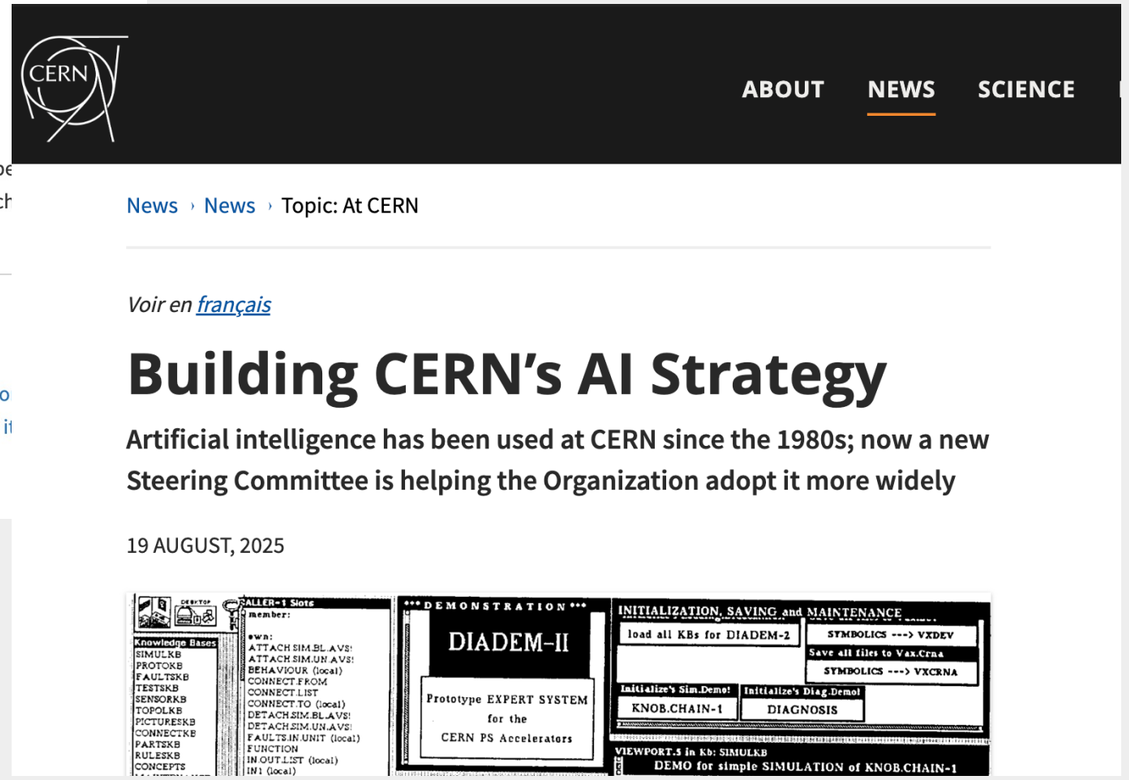
STRATEGIC & INTERNAL:

Advising on policies and strategy





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In practice

STRATEGIC & EXTERNAL:

Outreach and partnerships

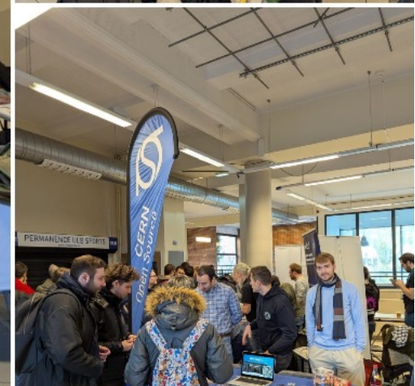
Software Heritage

Mission 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 o these contributions makes capturing the full scope of CERN's impact a complex task.

"This project is a treasure hunt," says Axel Naumann, 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 o CERN's true impact on the global open-source landscape."



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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
- ...

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Thank You

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https://ospo.docs.cern.ch

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