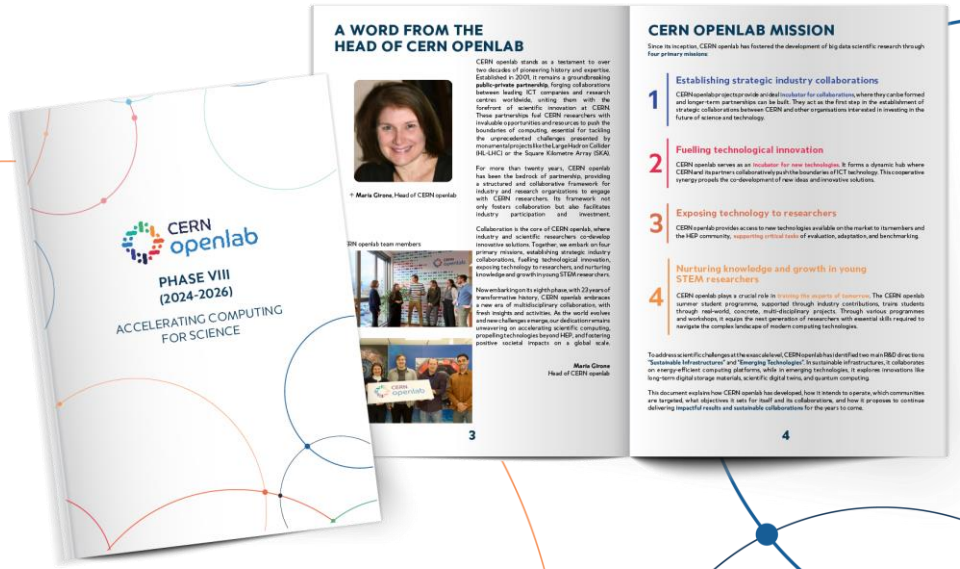
CERN openlab

PHASE VIII
ACCELERATING COMPUTING FOR SCIENCE



THE TEAM

Head of CERN openlab

Coordinates the overall programme and manages the negotiation of contracts between CERN and members with the assistance of the CERN Legal Services.

Maria Girone
Head of CERN openlab

Communication office

Manages CERN openlab's communication needs, especially agreements with industrial partners about communication.

Mariana Velho
Chief Communications Officer

Marina Banjac
Junior Communications Officer

CTO office

Contributions from experts in CERN IT technical groups. Assesses technology for projects. It functions as a central hub for proposals evaluation and project coordination and maintains close ties with CERN technical groups and other CERN departments.

Thomas Owen James
CTO for AI and Edge Devices

Antonio Nappi
CTO for Platforms and Workflows

Luca Mascetti
CTO for Storage

Luca Atzori
CTO for Computing

Killian Verder
CTO Office

Administrative & Financial office

Handles administrative tasks, including organising the summer student programme and events.

Kristina Gunne
Chief Administrative Officer

Fariza Oulashova
Junior Project Assistant

Joelma Tolomeo
Chief Financial Officer

CERN OPENLAB

Since its inception, CERN openlab has fostered the development of big data scientific research through **four primary missions.**

Four primary missions:

1. Establishing strategic industry collaborations
2. Fuelling technological innovation
3. Exposing technology to scientists
4. Nurturing knowledge and growth in young STEM researchers

COLLABORATION MODEL

CERN openlab operates within **structured three-year phase cycles** designed to systematically assess technological evolution, anticipate future needs, and delineate overarching thematic priorities.

LHC START

Large industrial partners

x86 64-bit processors, multi-core devices, high-performance networking, peta-byte storage, highly-available databases

LHC STEADY OPERATIONS

Broader portfolio of companies, dynamic market

Multi-core devices, accelerated hardware, specialized architectures, fast disk storage, cloud infrastructures

PREPARING FOR HL-LHC

Focussed and agile projects, strategic partnership incubator

Sustainable infrastructures, heterogeneous architectures, energy-efficient computing, advanced storage, AI applications and algorithms, emerging technologies

INCEPTION
I-IV
2003-2014

CONSOLIDATION
V-VII
2015-2023

THE NEXT PHASES
VIII-X
2024-2034

CERN OPENLAB PHASE VIII
Objectives, R&D Directions and Activities

To address scientific challenges at the exascale level, CERN openlab has identified two main R&D directions "**Sustainable Infrastructures**" and "**Emerging Technologies**".

OBJECTIVES

High-level: Accelerating Computing for Science

Pioneering sustainable and emerging computing and storage solutions

Harnessing heterogeneous computing and AI for a greener future

Fostering synergies and technology transfers between industry and sciences

R&D DIRECTIONS

R&D ACTIVITIES

Sustainable Infrastructures	Emerging Technologies
Heterogeneous computing platforms and infrastructures	New materials for long term digital storage
Computer architectures and software engineering	Digital twins
Storage and data management	Quantum computing and networks
Artificial intelligence algorithms, platforms and applications	
Applications for society and environment	

IMPLEMENTATION MODEL

The CERN openlab **implementation model relies on two main approaches:**

Establishing a managed portfolio of small to medium-size, agile projects with technology providers with clear impact on the CERN IT Technology Roadmap.

Identifying a few collaborations, especially at the level of the computing infrastructures, of high potential impact and act as an initial incubation step for longer-term collaborations.

Foster strategic industry-science partnerships

Maximise technical impact

Harness the potential of innovative technologies

Amplify CERN openlab core strengths

R&D ACTIVITIES PLAN

Focussed, agile projects → **Strategic partnership incubator**

- Heterogeneous architectures testbed (x86, Arm, GPUs, FPGAs, AI accelerators)
- AI workflow optimization on HPC
- AI applications in low latency environments
- Real–time data processing on CXL architectures
- Advanced storage solutions
- Analysis facilities on the cloud
- New materials for long-term storage
- Foundation models
- Low-latency interconnects
- Data compression acceleration
- AI on edge devices and SoCs
- Digital Twins of accelerators and detectors
- Hybrid HPC and QCS integration
- Generative AI

STAKEHOLDERS

CERN openlab's primary role is to act as conduit and facilitator for collaboration in computing science and technology between two categories of stakeholders:

The science communities
(CERN departments and groups; R&D teams at CERN; Research centres)

Technology Providers
(industry)

CURRENT INDUSTRY AND RESEARCH MEMBERS

UNIVERSITÀ
DEGLI STUDI DI TRIESTE

INDUSTRY AND RESEARCH MEMBERS IN PRE-AGREEMENT STAGE

COMMUNICATION, EDUCATION & OUTREACH

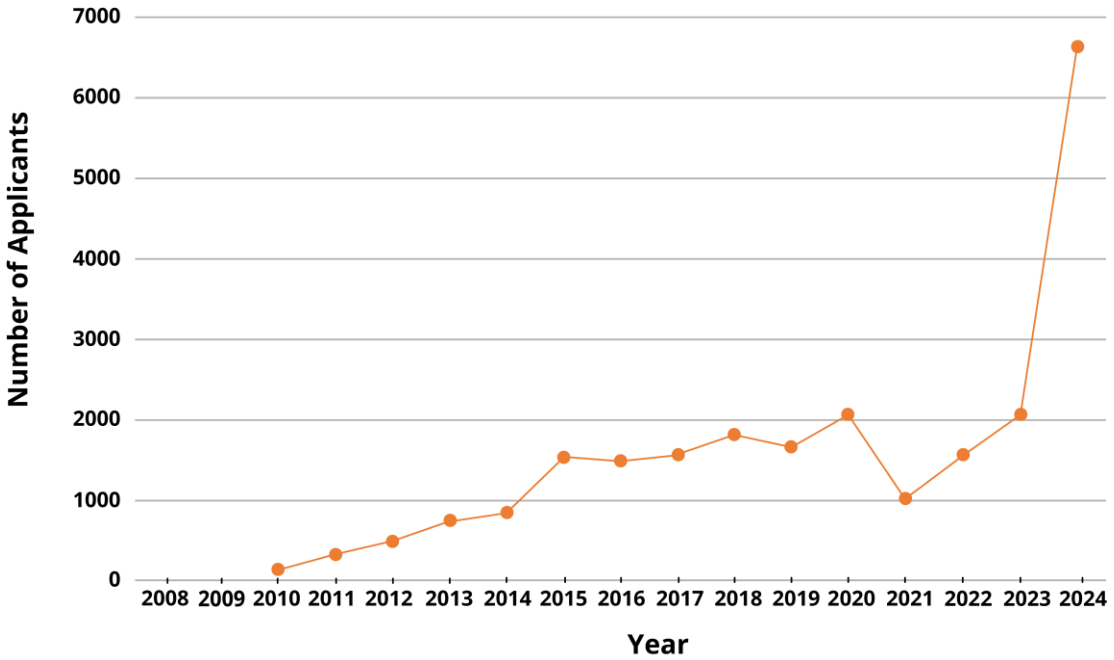
As a part of the education and training programme, CERN openlab **runs various initiatives that support participation of young scientists and other research organisations**

Summer Student Programme

Provides undergraduate and master's level students with an opportunity to work on one of the R&D projects for nine weeks under experts' supervision

This year there was a record of more than 6600 applicants!

Number of CERN openlab Summer Student Programme applicants throughout the years



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Throughout the year, CERN openlab summer student program had more than 20,000 applicants and received more than 400 students.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Applicants	NI*	NI*	92	330	490	750	850	1540	1479	1580	1820	1658	2074	1022	1568	2067	6626	23946
Selected	13	15	15	15	15	22	23	40	39	37	41	40	39	27	32	30	30	473

NI* - No Information

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TODAY!!

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Technical Workshop

Annual workshop to review the R&D projects carried out during the last year and discuss **future plans**. The event features technical talks, a poster session and a technology track dedicated to our industrial partners

Lectures & Training

Open access to CERN openlab **lectures that cover a wide range of computing topics**, from AI to exascale computing and quantum technologies. Regular **specialised technical training** to members of the scientific community

CERN openlab relies on Communication, Education & Outreach actions

CERN openlab

THANK YOU!!!!!