IT-FTI-CAP

Collaborations & Partnerships

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CERN openlab

IT-FTI-CAP
Functional Overview

Collaborations and Partnerships

The Collaborations and Partnership Section fosters strategic alliances to drive technical innovation and support CERN's mission. The section is responsible for promoting collaborations with scientific communities, industry leaders, European initiatives, and other international organizations. By engaging with key internal and external stakeholders, the section facilitates the co-development of technologies and techniques for the benefit of the IT Department, CERN experiments and CERN activities at large.

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Frontier Technologies and Initiatives

Collaborations and Partnerships	Physics Software Engineering	Computing and Data Science	Technology Infrastructures	Communications and Outreach	Learning and Education

KEY ROLES & RESPONSIBILITIES

- Promote and support collaborations by facilitating the establishment and growth of partnerships with scientific and technical communities, industry leaders, infrastructures providers, international organizations, ensuring alignment with CERN's strategic objectives.
- Develop and strengthen relationships with EuroHPC-JU and national HPC providers, participate in HPC user and access fora and publicize and coordinate HPC access opportunities.
- Drive technical innovation by initiating and executing joint projects with industry, research communities and infrastructure providers (i.e. HPC) to position CERN at the forefront of scientific and technological advancements.
- Engage with external stakeholders such as the European Commission, the CERN computing community, and other stakeholders to develop and execute programmes that attract external support, drive innovation, and foster CERN's mission.
- Foster international collaboration by identifying and developing opportunities for international collaboration across diverse scientific domains, fostering a global network of partnerships that contribute to CERN's long-term vision.

MEASURES OF SUCCESS

- Engage new industries and strategic partners: successfully attract new industry and research partners for exploratory and strategic projects, expanding CERN's collaborative network.
- Revitalize existing projects: refresh and sustain existing collaborative projects, maintaining a focus on cutting-edge innovation and ensuring continued relevance and impact.
- Enhance dissemination activities (scientific publications, annual reports, presentations at conferences, strategy documents) to promote joint activities, while increasing participation in external opportunities.
- Increase project visibility: elevate the visibility and recognition of CERN's collaborative projects, showcasing their contribution to advancing CERN's mission and their broader impact on the scientific community.
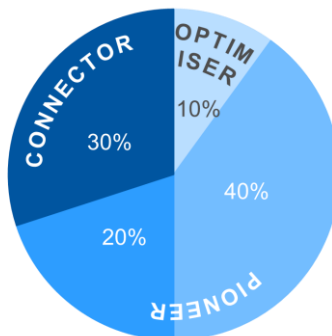
KEY CAPABILITIES

Technology Assessment and R&D	Collaboration
Knowledge Sharing	Partnership Management
Innovation	

ROLES FRAMEWORK

OPTIMISER 10%
CONNECTOR 30%
PIONEER 40%
20%

GOVERNANCE STRUCTURES

- Bi-monthly Section leaders meetings
- **Weekly section meetings** to assess technical progress, status and plans
- **Regular meetings as required by projects** and collaborations (Internal and external technical meetings, CERN openlab partnerships, EC office, PMO, KT)

PAIN POINTS ADDRESSED

- Provide better alignment of partnerships, communication, and education with the IT Dep. strategic objectives

CERN openlab – Phase VIII (2024-2026)

Strategic Directions

- Enhance industry and research partnerships, in particular within Europe, leveraging on CERN ILOs.
- CERN openlab as incubator for strategic partnerships.

R&D Directions

Sustainable Infrastructures

- Heterogenous Computing, Platforms and HPC Systems
- Computing Architectures and Software Engineering
- Advanced Storage, Data Management and Networks
- Infrastructures and Techniques for Artificial Intelligence
- Applications for Society and Environment

Emerging Technologies

- New Materials for Long-Term Digital Storage
- Digital Twins
- Quantum Computing and Networks

Structured Three-year Phase Cycles

- Systematically Assess Technological Evolution
- Anticipate future needs
- Delineate overarching thematic priorities

Established Industry and Research Members: intel, SIEMENS, Pasqal, SIMONS FOUNDATION, ORACLE, Janssen (Johnson & Johnson), micron, cerabyte, UNIVERSITÀ DEGLI STUDI DI TRIESTE, E4 COMPUTER ENGINEERING, INFN

Industry and Research Members in Pre-agreement Stage: PURESTORAGE, NOKIA, altera

Prospective Industry/Research Members: cerebras, Hewlett Packard Enterprise, AMD XILINX, NVIDIA

Europe (8): SIEMENS, cerabyte — DE; E4 COMPUTER ENGINEERING, INFN, UNIVERSITÀ DEGLI STUDI DI TRIESTE — IT; Pasqal — FR; Janssen (Johnson & Johnson) — CH; NOKIA — FI

U.S. (5): intel, altera, ORACLE, micron, SIMONS FOUNDATION, PURESTORAGE
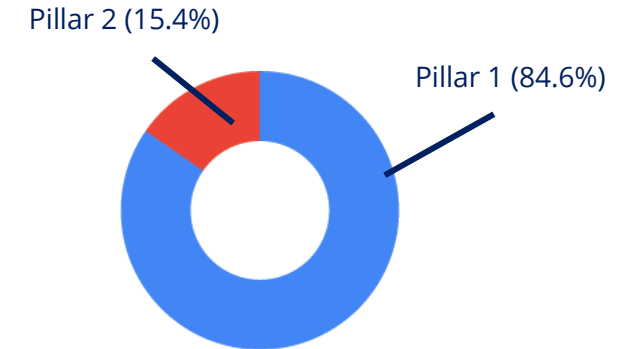
EC Projects

Horizon Europe
2021-2027

Horizon Europe Pillars:

1 Scientific Excellence

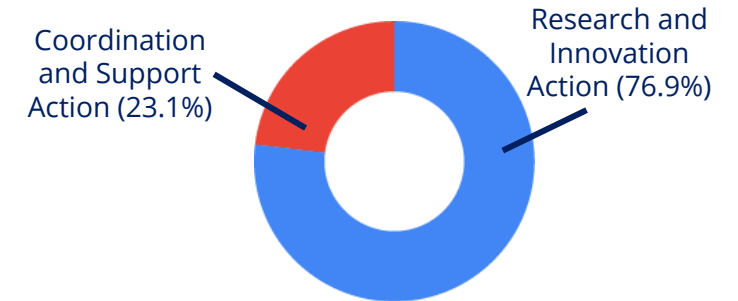2 Global Challenges and European Industrial Competitiveness

3 Innovative Europe
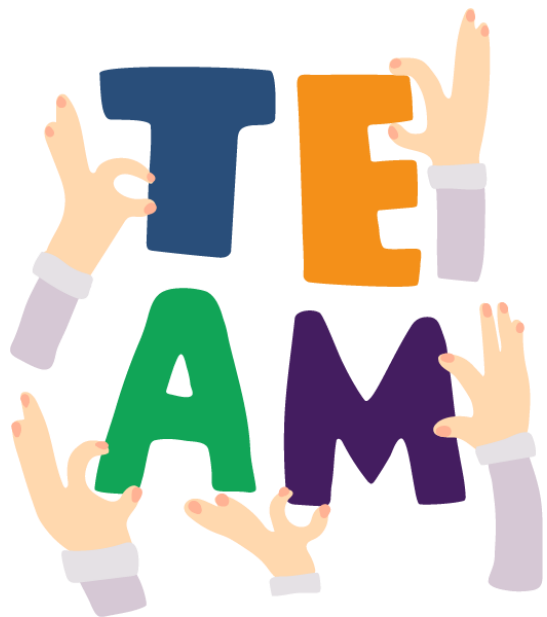
*Submitted proposals are not included in the charts

Project	Status
OSCARS	Ongoing
IT-FTI EVERSE	Ongoing
EOSC Beyond	Ongoing
Horizon-ZEN	Ongoing
IT-FTI SPECTRUM	Ongoing
AARC3	Ongoing
IT-FTI SYCLOPS	Ongoing
FAIRCORE4EOSC	Ongoing
IT-FTI interTwin	Ongoing
OpenWebSearch.EU	Ongoing
EOSC EDEN	Not Started
EOSC Data Commons	Not Started
IT-FTI ODISSEE	Not Started
IT-FTI TURING	Submitted Proposals
IT-FTI QUARK	Submitted Proposals

Approved Projects by Pillar

Pillar 2 (15.4%)

Pillar 1 (84.6%)

Approved Projects by Pillar

Coordination and Support Action (23.1%)

Research and Innovation Action (76.9%)

interTwin

CERN openlab

Matteo Bunino

Mariana Velho

Kalliopi Tsolaki

Killian Verder

Anna Elisa Lappe

Jarl Saether

Maria Girone

Stravos Portokalidis

Eric Wulff

David Southwick

European Commission
Horizon Europe
2021-2027

EuroHPC
Joint Undertaking

EC Collaborations and R&D on HPC

New Techniques and Technologies

- Enables Machine Learning and AI algorithms and processing techniques

  RAISE
  Center of Excellence

- Opens the possibility for real-time interactive simulations (Digital Twins)

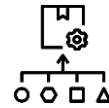 interTwin

- Burst/elastic resource scheduling

- A path to optimize energy usage

  ODISSEE
  Online Data Intensive Solutions for Science in the Exabyte Era

New Challenges and Opportunities

- New resources for processing

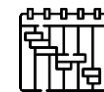- Requires technology migration and redesigning of applications

  EuroHPC
  Joint Undertaking

- Encourages stronger engagement with industry, other science communities and the HPC community

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- Requires strategic planning between CERN, WLCG, and HPC

  InPEx
  The International Post-Exascale Project (InPEx)

- Requires common solutions to overcome technical challenges, leveraging on externally funded initiatives (EuroHPC JU, EC funded projects, industry,...)
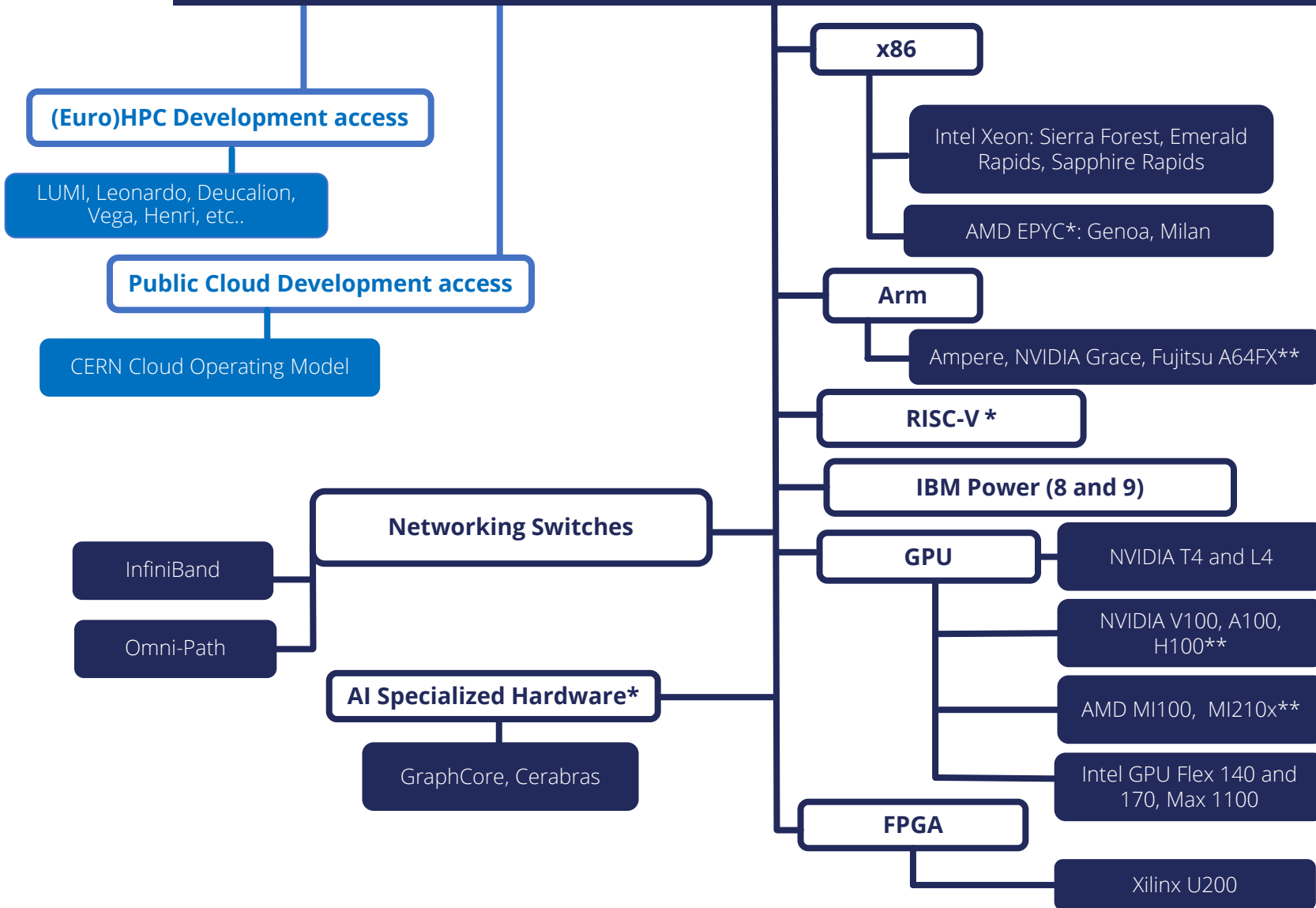
Questions

Heterogeneous Architecture Testbed: Hardware

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(Euro)HPC Development access

LUMI, Leonardo, Deucalion, Vega, Henri, etc..

Public Cloud Development access

CERN Cloud Operating Model

Networking Switches

InfiniBand

Omni-Path

AI Specialized Hardware*

GraphCore, Cerabras

x86

Intel Xeon: Sierra Forest, Emerald Rapids, Sapphire Rapids

AMD EPYC*: Genoa, Milan

Arm

Ampere, NVIDIA Grace, Fujitsu A64FX**

RISC-V *

IBM Power (8 and 9)

GPU

NVIDIA T4 and L4

NVIDIA V100, A100, H100**

AMD MI100, MI210x**

Intel GPU Flex 140 and 170, Max 1100

FPGA

Xilinx U200

100+ users & 290+ accounts

~95 systems, mostly bare-metal

Used by ATLAS, CMS, LHCb, QTI, openlab, CERN EP, IT, ATS

~200 tickets handled p/a

*Remote access via E4

**Remote access via Simons Foundation
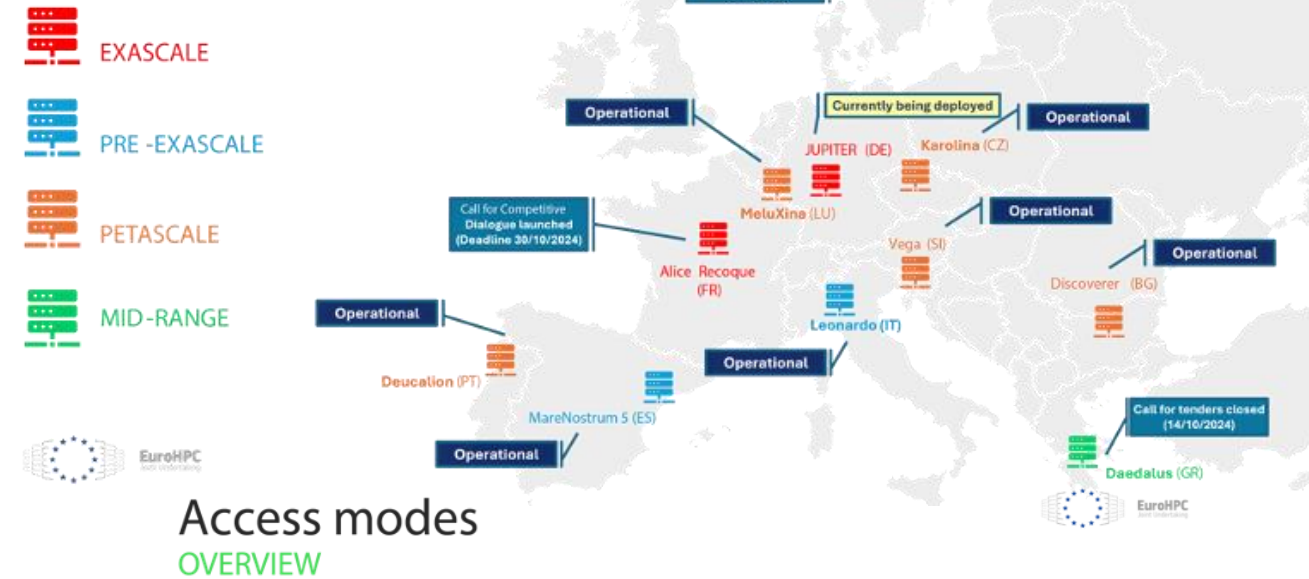
E4 COMPUTER ENGINEERING

SIMONS FOUNDATION

EuroHPC JU

EuroHPC JU is a joint initiative between the EU, European countries and private partners to develop a World Class Supercomputing Ecosystem in Europe
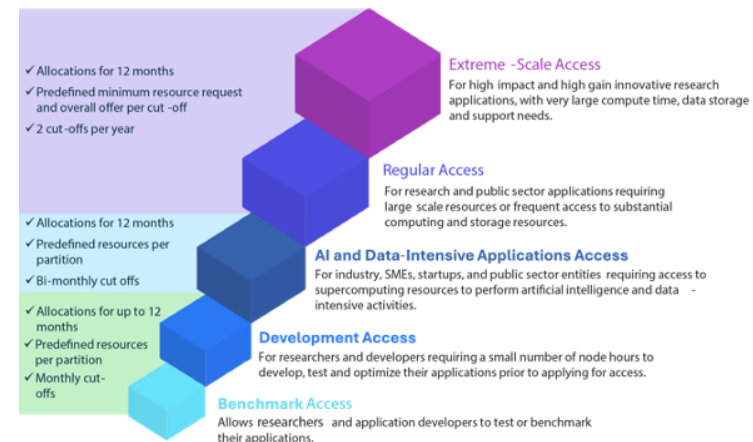
EuroHPC JU manage the access time (from 35% for petascale systems up to 50% of pre-exascale systems total capacity) of EuroHPC supercomputers

Researchers from academia, research institutes, public authorities, and industry can apply for access to computing time on EuroHPC supercomputers.