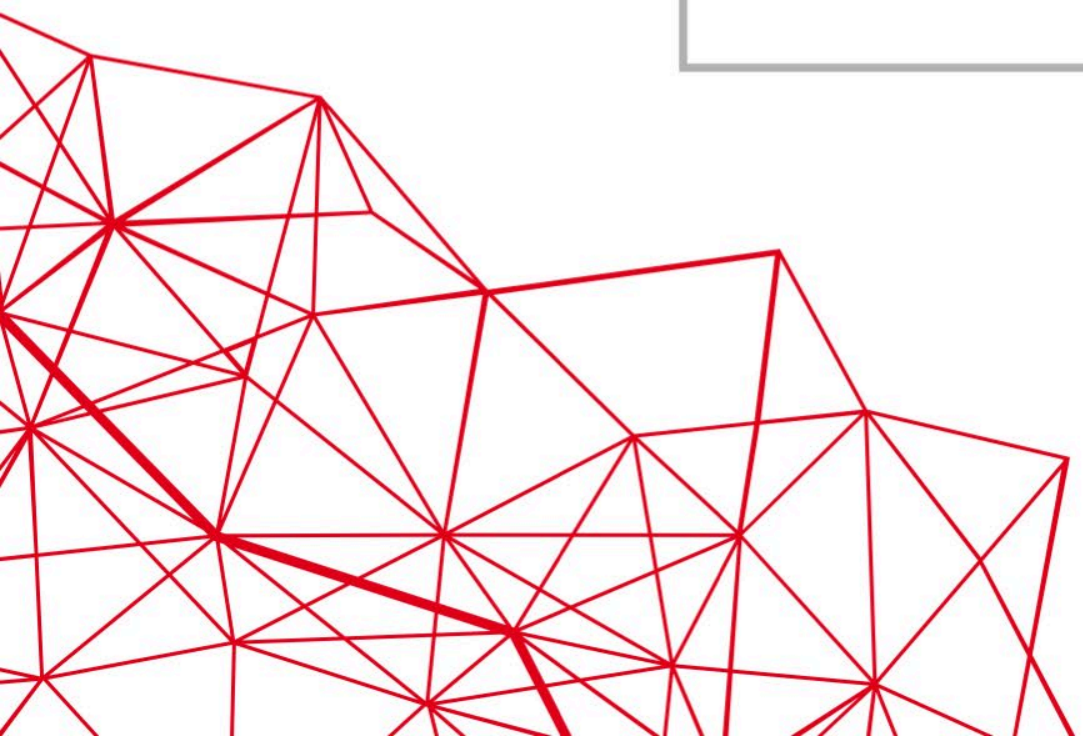


ISC High Performance

IMAGINE TOMORROW

MAY 21 – 25, 2023 | HAMBURG, GERMANY

The European High Performance Computing Joint Undertaking

LEADING THE WAY IN EUROPEAN SUPERCOMPUTING: USER OPPORTUNITIES AND LATEST UPDATES FROM THE EUROHPC JU

ISC 2023 | 23.05.2023 | **Anders Dam Jensen**

WHO ARE WE?

- An EU body & a legal and funding entity
- Created in 2018 and autonomous since September 2020
- Based in Luxembourg
- A team of 30 employees, still in the process of recruiting additional employees throughout 2023

OUR MISSION

The EuroHPC JU pools together the resources of its members to:

- Develop, deploy, extend & maintain a world-leading supercomputing, quantum computing, service & data infrastructure ecosystem in Europe
- Support the development of innovative supercomputing components, technologies, knowledge & applications to underpin a competitive European supply chain
- Widen the use of HPC & quantum infrastructures to a large number of public & private users wherever they are located in Europe and supporting the development of key HPC skills for European science and industry

OUR MEMBERS

- 33 participating countries
- The European Union (represented by the European Commission)
- 3 private partners

Each of our members is represented in the EuroHPC JU's Governing Board

The Governing Board also takes advice from the EuroHPC Industrial and Scientific Advisory Board (INFRAG & RIAG)

BDV BIG DATA VALUE ASSOCIATION

QUIC European Quantum Industry Consortium

ETP 4 HPC EUROPEAN TECHNOLOGY PLATFORM FOR HIGH PERFORMANCE COMPUTING

INDUSTRIAL AND SCIENTIFIC ADVISORY BOARD

The two advisory groups provide advice on R&I and Infrastructure, drawing up draft multiannual strategic agendas to guide the activities of EuroHPC in these areas.

INFRAG

The Infrastructure Advisory Group (INFRAG)

- Provides advice on the acquisition and operation of the supercomputers;
- Issues recommendations on the federation and interconnection of the EuroHPC infrastructure;
- Advises on training activities for end-users and opportunities for promoting take-up and use of European technology solutions notably by the national HPC Competence Centres;
- Consults with public and private stakeholders to inform them and collect feedback.

Chaired by Sinead Ryan

RIAG

The Research and Innovation Advisory Group (RIAG)

- Provides advice on potential international cooperation activities;
- Issues recommendations for training and education priorities addressing key competences in HPC;
- Consults with public and private stakeholders to inform them and collect feedback.

Chaired by Jean-Philippe Nominé

LEVEL AND SOURCES OF EU FUNDING 2021-2027

Digital Europe Program

1.98B Eur

- **Infrastructure**
- **Federation of supercomputing services**
- **Widening usage and skills**

Horizon Europe Program

900M Eur

- **Technology**
- **Application**
- **International Cooperation**

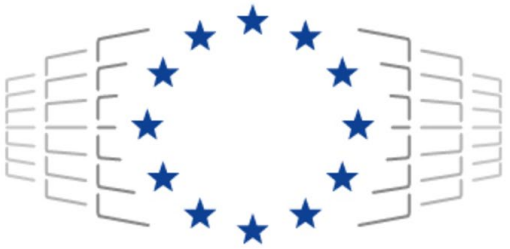
Connecting Europe Facility

200M Eur

- **Hyperconnectivity**
- **Data connectivity**

*Member states to match this with national contributions

A EUROHPC UPDATE



EuroHPC
Joint Undertaking

WORLD-CLASS MACHINES:

- LUMI and Leonardo joined the EuroHPC family and entered the TOP500 list at #3 and #4
- All EuroHPC machines in the TOP500

GROWING THE EUROHPC FLEET:

- 5 new EuroHPC systems are coming
- 4 mid-range supercomputers and the 1st European exascale supercomputer procurements ongoing
- New calls in early 2023 for further midrange systems and 2nd exascale supercomputer

GETTING INTO QUANTUM:

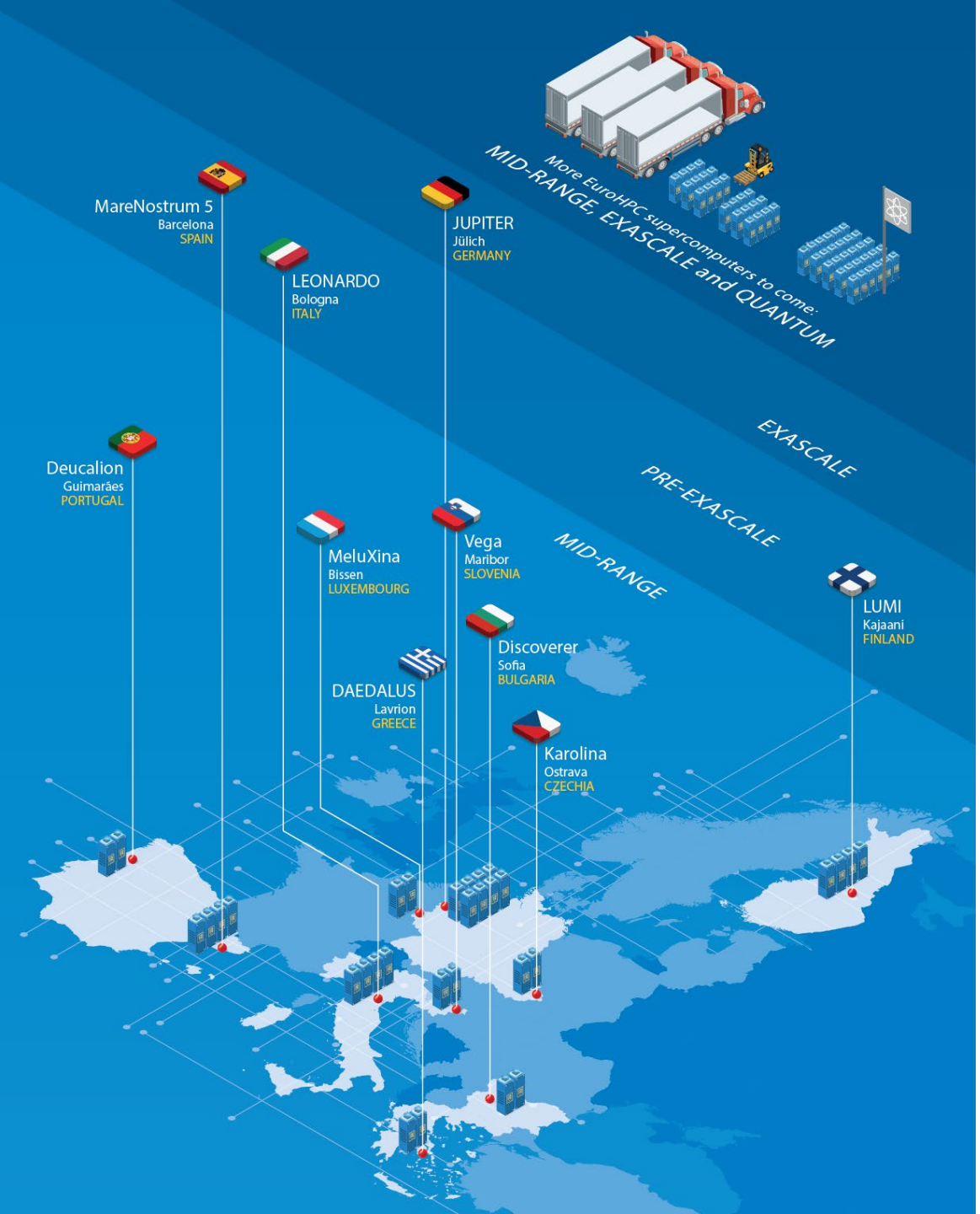
- Selection of hosting sites for 6 quantum computers
- PASQAL selected to provide two quantum simulators for HPCQS

SUPPORTING EUROPEAN INNOVATION:

- 10 EuroHPC CoEs have launched
- 39 ongoing R&I projects

INVESTING IN EUROPEAN SKILLS:

- Launch of the EUMaster4HPC programme
- Multiple calls for training and traineeships



THE EUROHPC SUPERCOMPUTERS

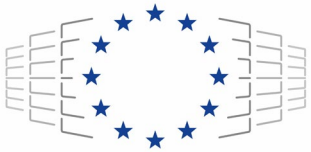
6 operational systems, all ranking among the world's most powerful supercomputers:

- Vega in Slovenia
- Karolina in Czechia
- Discoverer in Bulgaria
- Meluxina in Luxembourg
- Lumi in Finland
- Leonardo in Italy

4 systems underway:

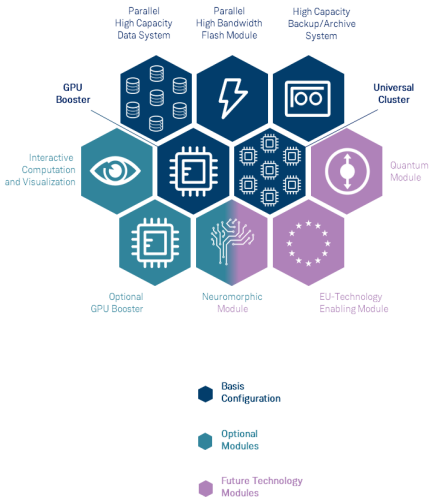
- MareNostrum5, a pre-exascale system in Spain
- Deucalion, a petascale system in Portugal
- Daedalus, a petascale system in Greece
- JUPITER, the 1st European Exascale supercomputer in Germany

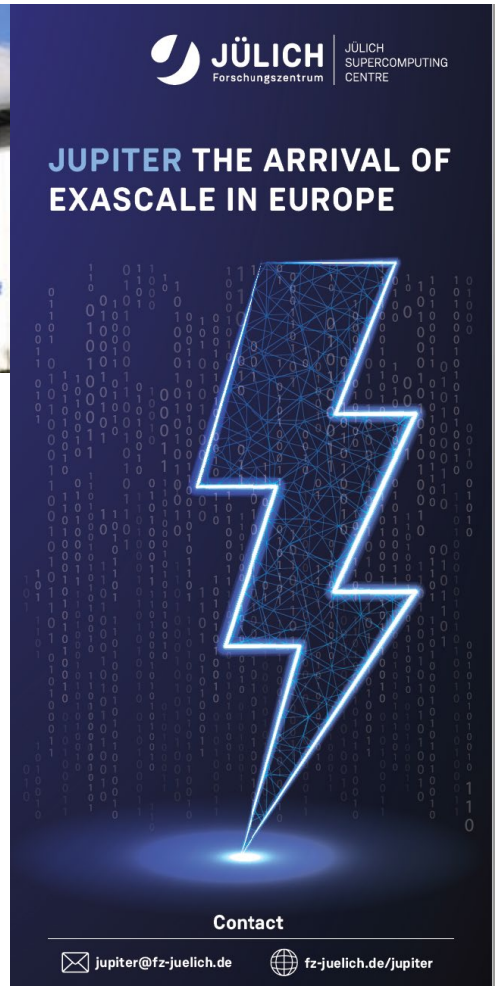
GLOBAL STANDING OF EUROHPC SUPERCOMPUTERS



JUNE 2022	TOP500	Green500
LUMI	#3	#7
LEONARDO	#4	#15
MELUXINA	#57	# 26
KAROLINA	#95	#24
DISCOVERER	#134	#219
VEGA	#166	#255

COMING SOON: JUPITER, THE FIRST EUROPEAN EXASCALE





- The first European supercomputer capable of **one trillion calculations per second**
- Based on a **modular supercomputing architecture**
- Designed to be green, **powered by green electricity**, with water cooling system and plans for intelligent use of its waste heat
- JUPITER will help to solve questions regarding climate change, pandemics, sustainable energy production as well as enabling the use of AI and data science on a large scale
- Will be installed on the campus of Forschungszentrum Julich in 2023 and operated by the Jülich Supercomputing Centre

PURSUING GREENER SUPERCOMPUTING

The EuroHPC JU is committed to building supercomputers which are both **powerful** and **eco-efficient** by:

- Procuring **energy efficient systems**, with low requirements for cooling. All our systems are **water cooled**, removing the requirement of high operational costs of air-cooled systems and in parallel reducing the energy footprint.
- Investing in the development of **next generation "green" microprocessors** that rely on energy efficient architectures.

Green and sustainable technologies are a priority for the JU, as part of the European Green Deal's aim to make Europe climate neutral by 2050

ACCESS TO EUROHPC SUPERCOMPUTERS

WHO IS ELIGIBLE?

- Academic and research institutions (public and private)
- Public sector organisations
- Industrial enterprises and SMEs

→ Open to all fields of research

WHICH TYPES OF ACCESS EXIST?

- Regular access
- Extreme scale access
- Benchmark & Development access
- Special access

Regular and extreme scale access calls are continuously open, with several cut-offs throughout the year triggering the evaluation of proposals.

WHAT ARE THE CONDITIONS FOR ACCESS?

Access is free of charge. Participation conditions depend on the specific access call that a research group has applied to.
In general users of EuroHPC systems commit to:

- acknowledge the use of the resources in their related publications
- contribute to dissemination events
- produce and submit a report after completion of a resource allocation

More information on EuroHPC access calls available at: https://eurohpc-ju.europa.eu/participate/calls_en

ACCESS TO EUROHPC SUPERCOMPUTERS IN NUMBERS

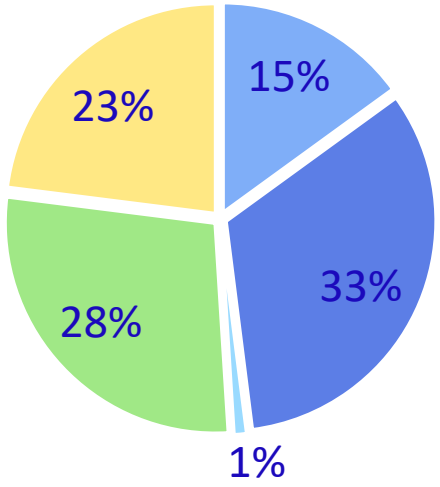
CORE HOURS AWARDED FOR REGULAR ACCESS

VEGA	383,379,687
KAROLINA	140,900,667
DISCOVERER	151,310,720
MELUXINA	121,207,896
LUMI (CPU only)	765,204,976

Total core hours awarded across all systems:
1,562,003,946

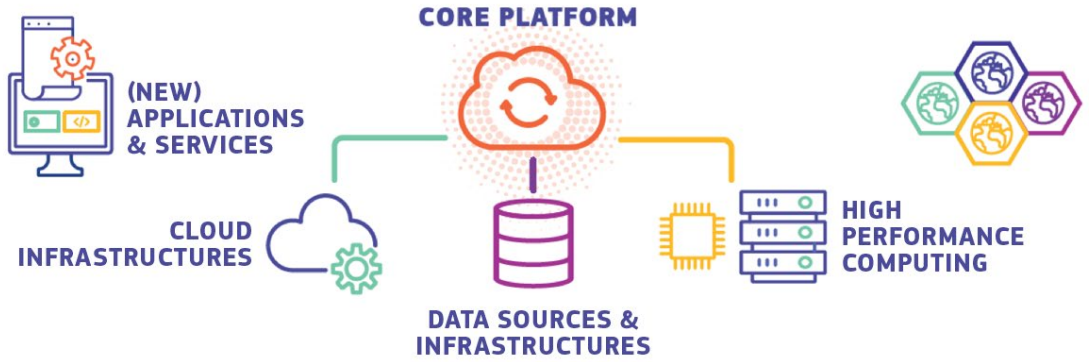
- Biochemistry, Bioinformatics, Life Sciences, Physiology and Medicine
- Chemical Sciences and Materials, Solid State Physics
- Earth System Sciences
- Computational Physics: Universe Sciences, Fundamental Constituents of Matter
- Engineering, Mathematics and Computer Sciences

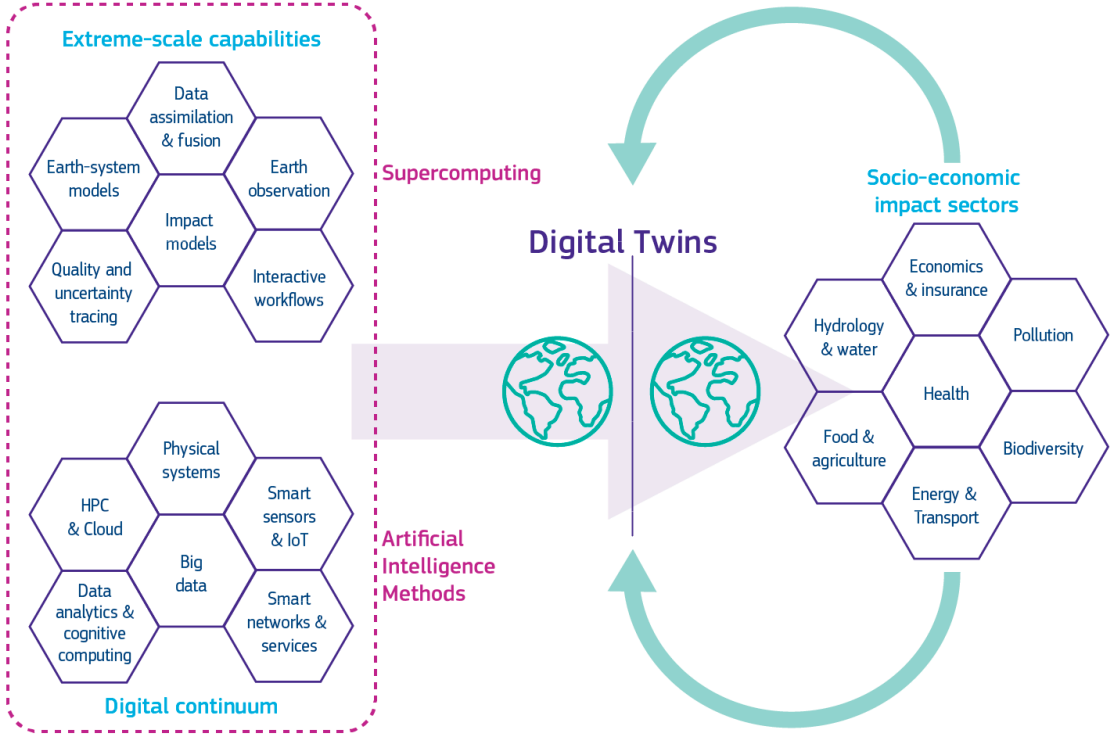
RESEARCH DOMAINS DISTRIBUTION ACROSS ALL CUT-OFFS



SPECIAL ACCESS – DESTINATION EARTH

- The EuroHPC JU can grant special access to **strategic European Union initiatives** considered to be **essential** for the public good, or in emergency and crisis management situations
- The Destination Earth initiative has been granted **Special Access** to EuroHPC supercomputers
- The project aims to develop a highly accurate digital model of the Earth - **a 'digital twin'** - to monitor and predict environmental change and human impact to support sustainable development
- Users will have cloud–based access to DestinE models, algorithms, applications and natural and socioeconomic data to exploit and test their own models. The overall system and its components (open core platform, digital twins, and services) will be user-friendly and flexible to adapt to a wide spectrum of user needs and scenarios





RESEARCH & INNOVATION

- EuroHPC JU funds an R&I programme to develop a full European supercomputing ecosystem
- Aiming to support European digital autonomy and reduce Europe's dependency on foreign manufacturers
- Currently **39** ongoing projects focusing on a number of areas including **technologies, applications and skills**

EuroHPC
Joint Undertaking

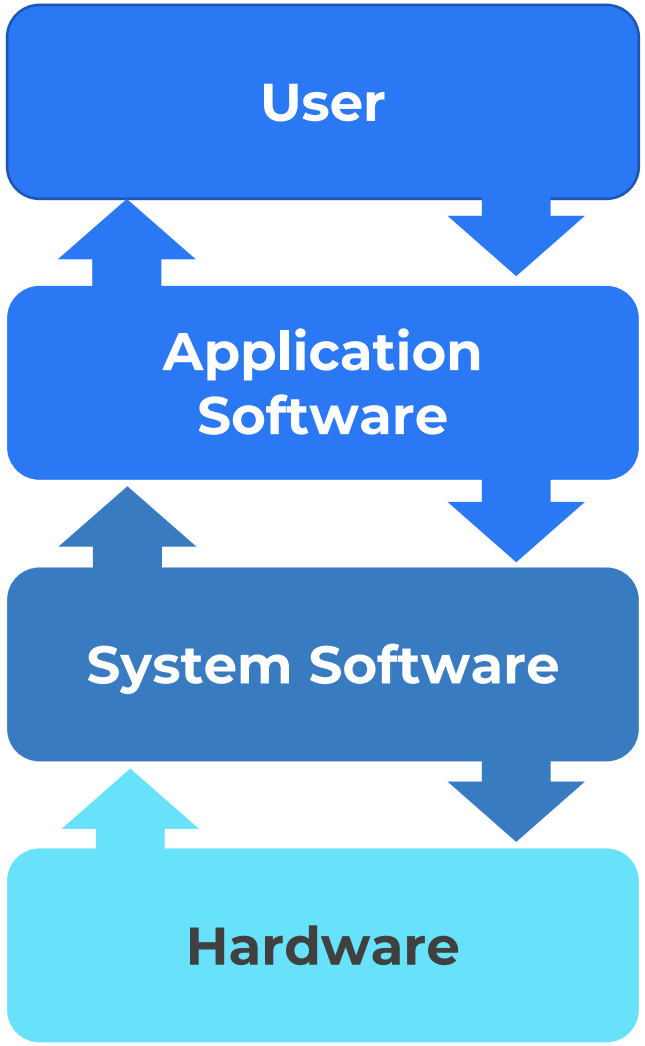
STRATEGIC R&I – INTERVENTION AREAS

Leadership in Use & Skills
Competence Centres and training programmes in HPC commensurate with the labour market.

Applications and Algorithms
Centres of Excellence for HPC Applications and new algorithms for European exascale technology.

European Software Stack
Software and algorithms, programming models and tools for exascale and post exascale systems.

European Open Hardware
Ecosystem for the low power high-end general purpose processor and accelerator.



WHAT'S NEXT FOR THE EUROHPC JU?

The JU has launched a number of calls for upcoming initiatives:

- EU–JAPAN partnership in HPC
- Initiative for an HPC ecosystem based on RISC-V
- Call for CoEs for exascale applications
- Training activities
- Procurements in Quantum Computing

Upcoming EuroHPC infrastructure:

- Two recent calls for new mid-range and high-end supercomputers
- Ongoing procurement processes
- Upcoming quantum computers
- Hyperconnectivity and user requirements studies

Building up the EuroHPC user forum

- Establish effective feedback mechanisms between JU and users
- Support a demand-oriented and user-driven HPC ecosystem
- Ensure user requirements are met by EuroHPC infrastructure
- Include new and underrepresented user communities to address their requirements and support HPC uptake

LEARN MORE ABOUT EUROHPC JU OPPORTUNITIES

WORKSHOP: What's next in European Supercomputing and How to Get Access to Europe's Biggest Supercomputers for Free?

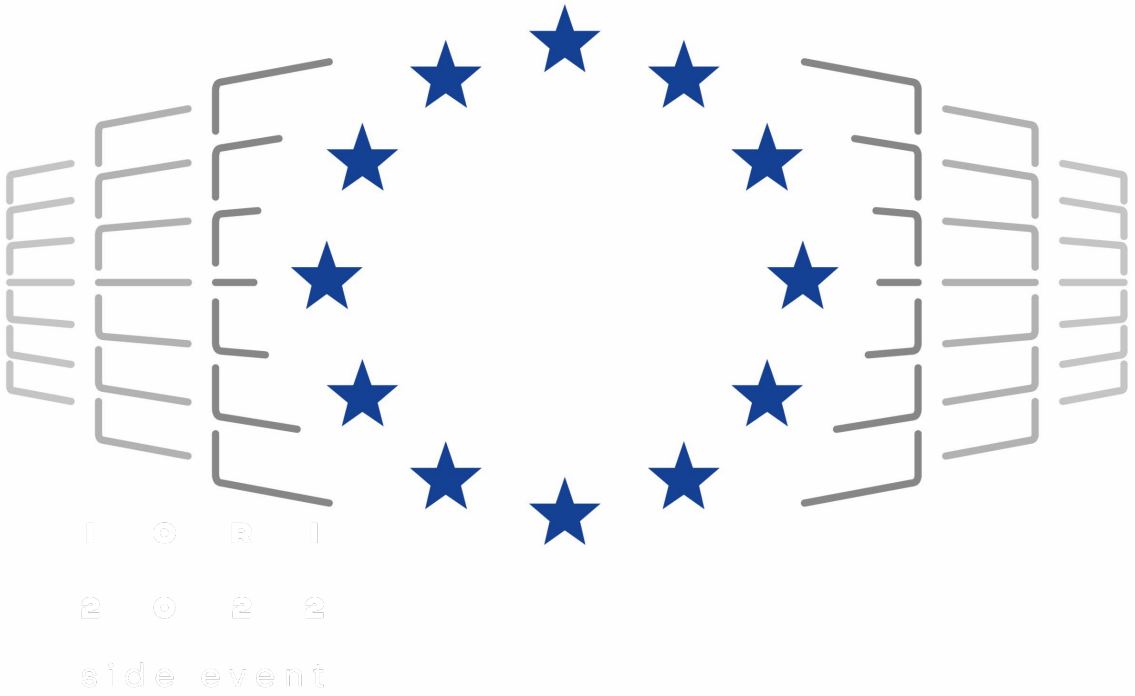
Part 1 – Updates from the EuroHPC JU | With Anders Dam Jensen

Part 2 – Focusing on Access | With Evangelos Floros and Klara Mestrovic

Part 3 – Support to Users for Access | With Daniel Opalka, Lilit Axner, Bastian Koller and Guy Lonsdale

Thursday 25 May – 9h00 to13h00 – Hall Y7 – 2nd Floor

THANK YOU



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