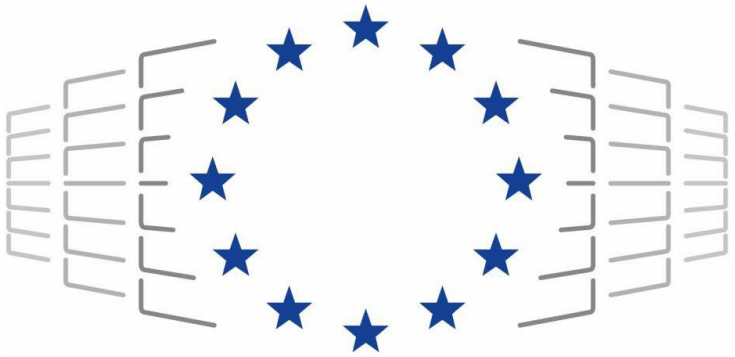
The European High Performance Computing Joint Undertaking

LEADING THE WAY IN EUROPEAN SUPERCOMPUTING

JENA Computing Workshop | 12.06.2023 | **Evangelos Floros**

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



EuroHPC
Joint Undertaking

OUR MISSION

The EuroHPC JU mission is to lead the supercomputing activities in Europe. EuroHPC pools together the resources of its members to:

Infrastructure	Research & Innovation	Skills
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

QIC European Quantum Industry Consortium

ETP 4 HPC EUROPEAN TECHNOLOGY PLATFORM FOR HIGH PERFORMANCE COMPUTING

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

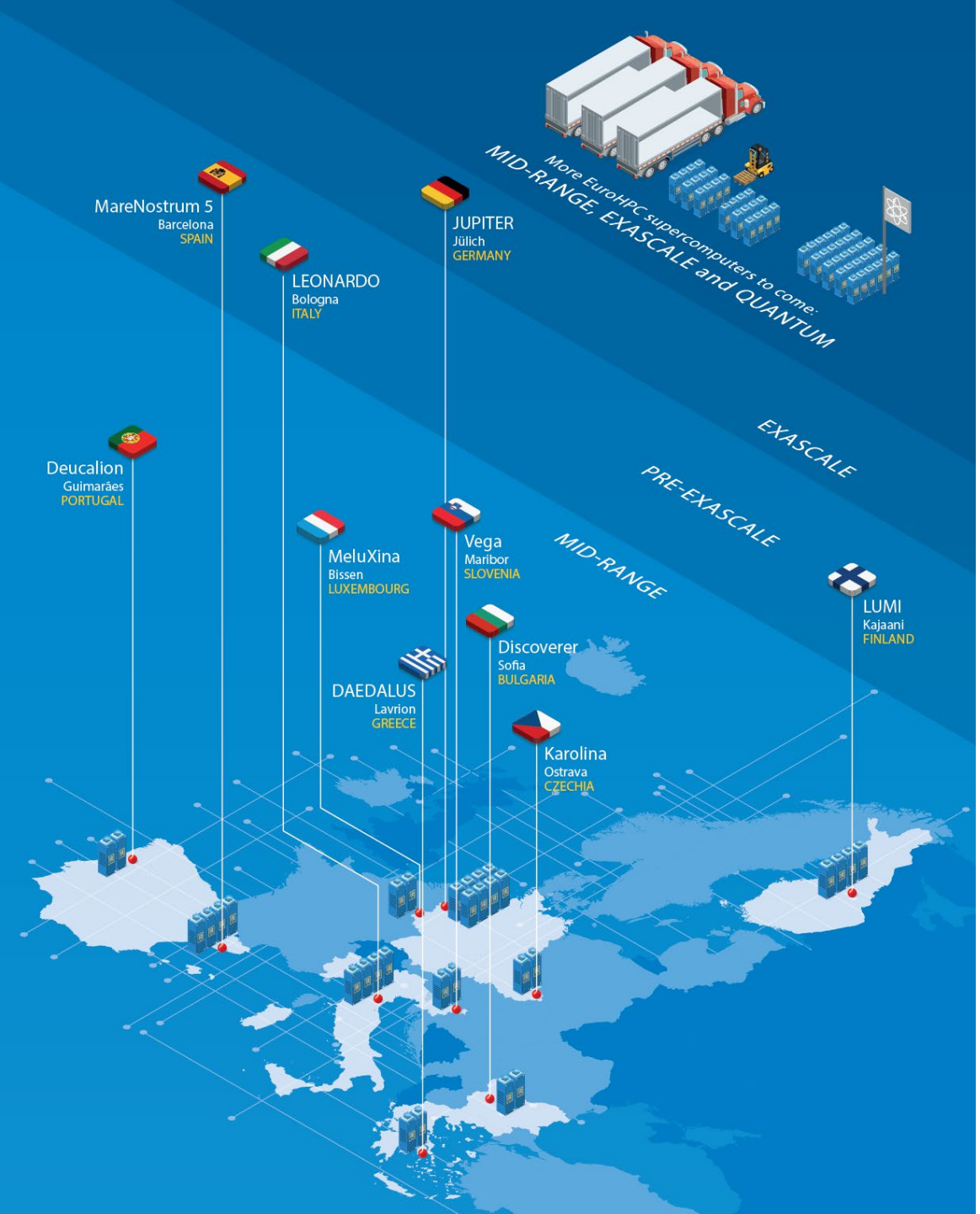
- **Technology**
- **Application**
- **International Cooperation**

Connecting Europe Facility

200M Eur

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

*Member states to match this with national contributions



THE EUROHPC SUPERCOMPUTERS

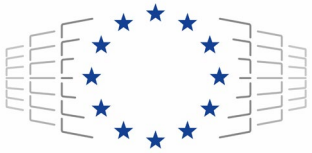
6 operational systems, all ranking among the world's most powerful supercomputers:

- 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

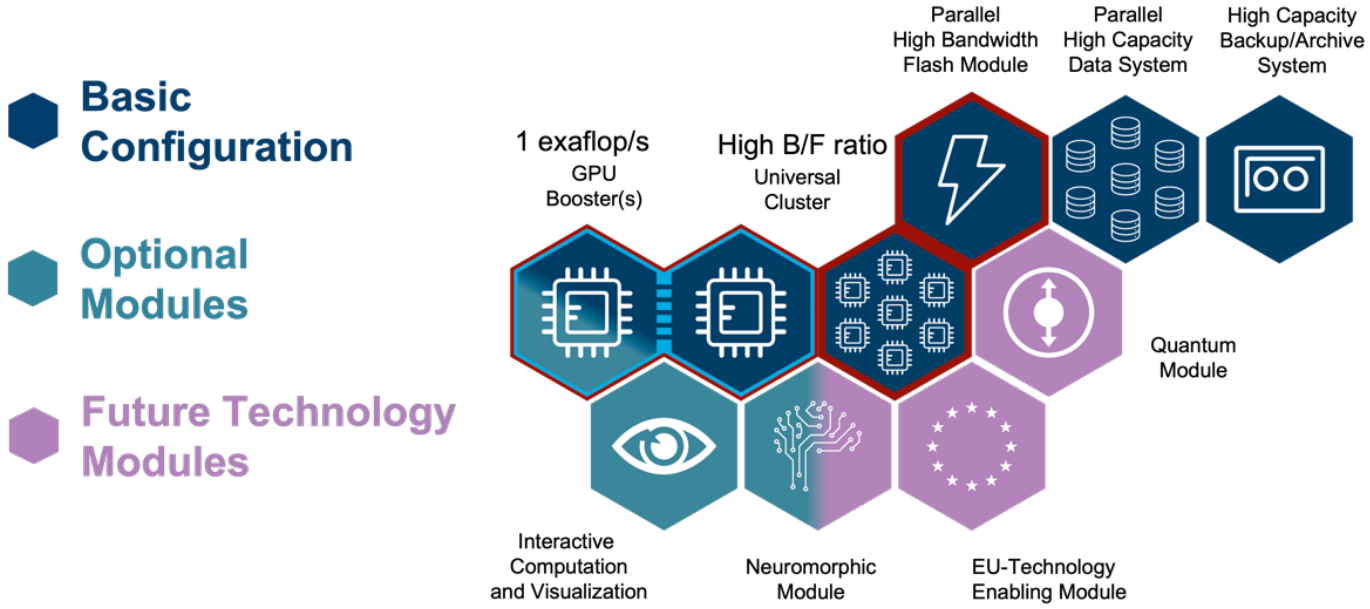
JUPITER Exascale System

Hosted by Julich Supercomputing Center (Germany)

- *Sustained **1 EFlops** performance*
- *Implementing a dynamic **Modular Supercomputing Architecture (MSA)***
- *Hosted in **containerised** data center*
- *Integration of **European hardware***

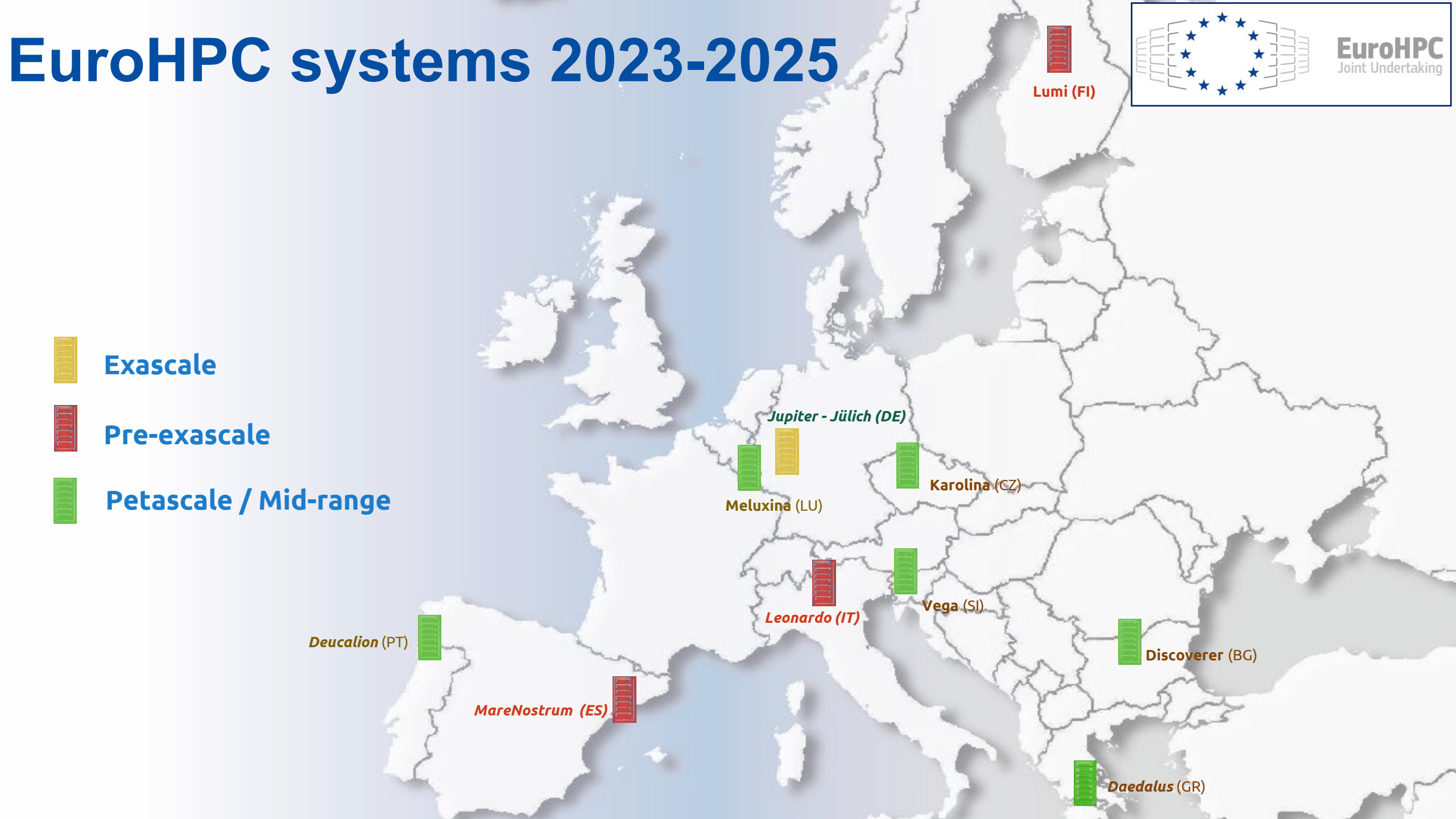
Procurement status

- *Competitive dialogue (now in Dialogue Phase).*
- *Total budget: **273 Million Euro** (including options)*
- *Contract signature target: **Q4 2023***
- *Start of installation: **Q1 2024***
- *Acceptance (Phase 1): **Q4 2024***

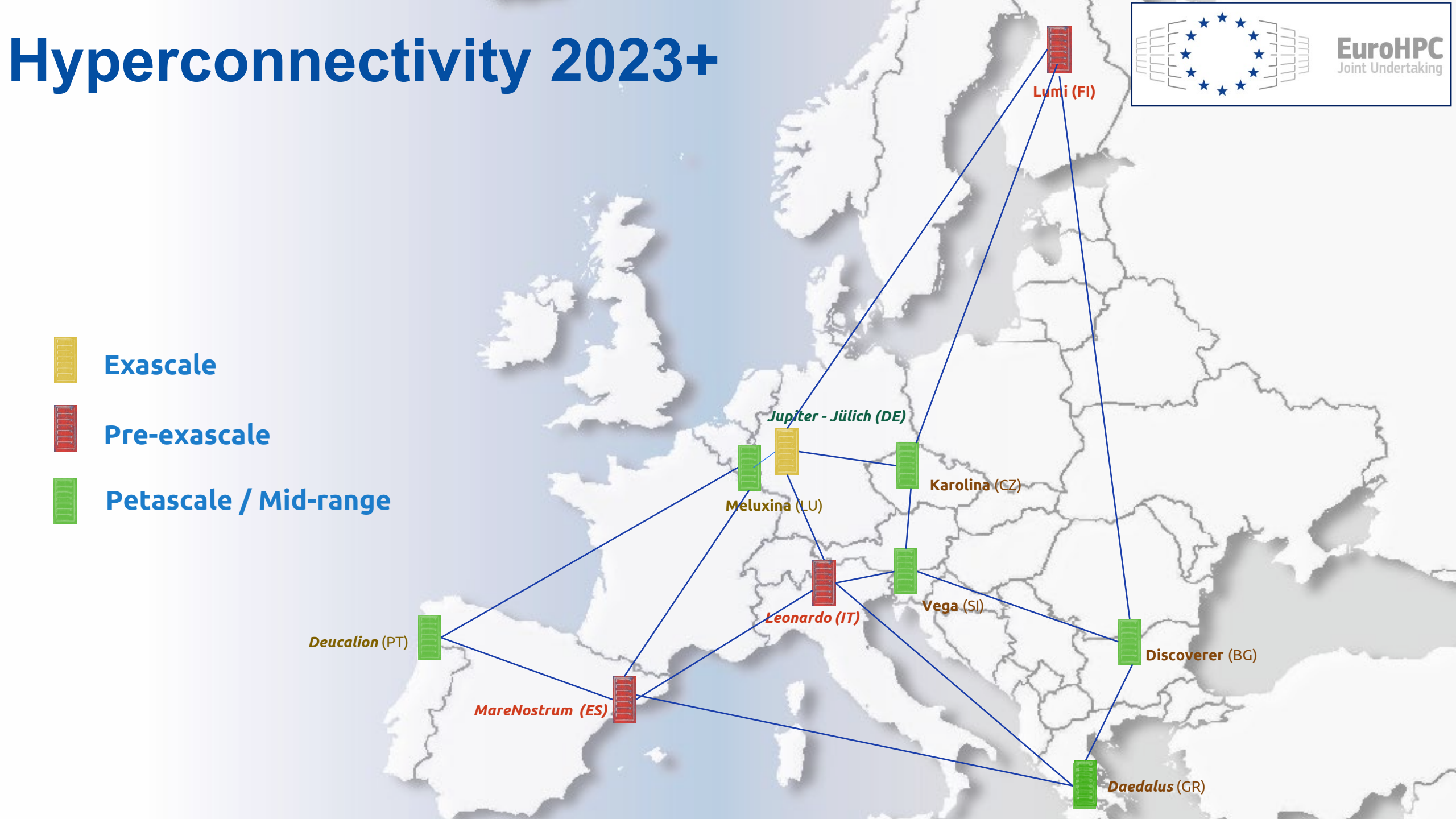


EuroHPC systems 2019-2023

EuroHPC systems 2023-2025



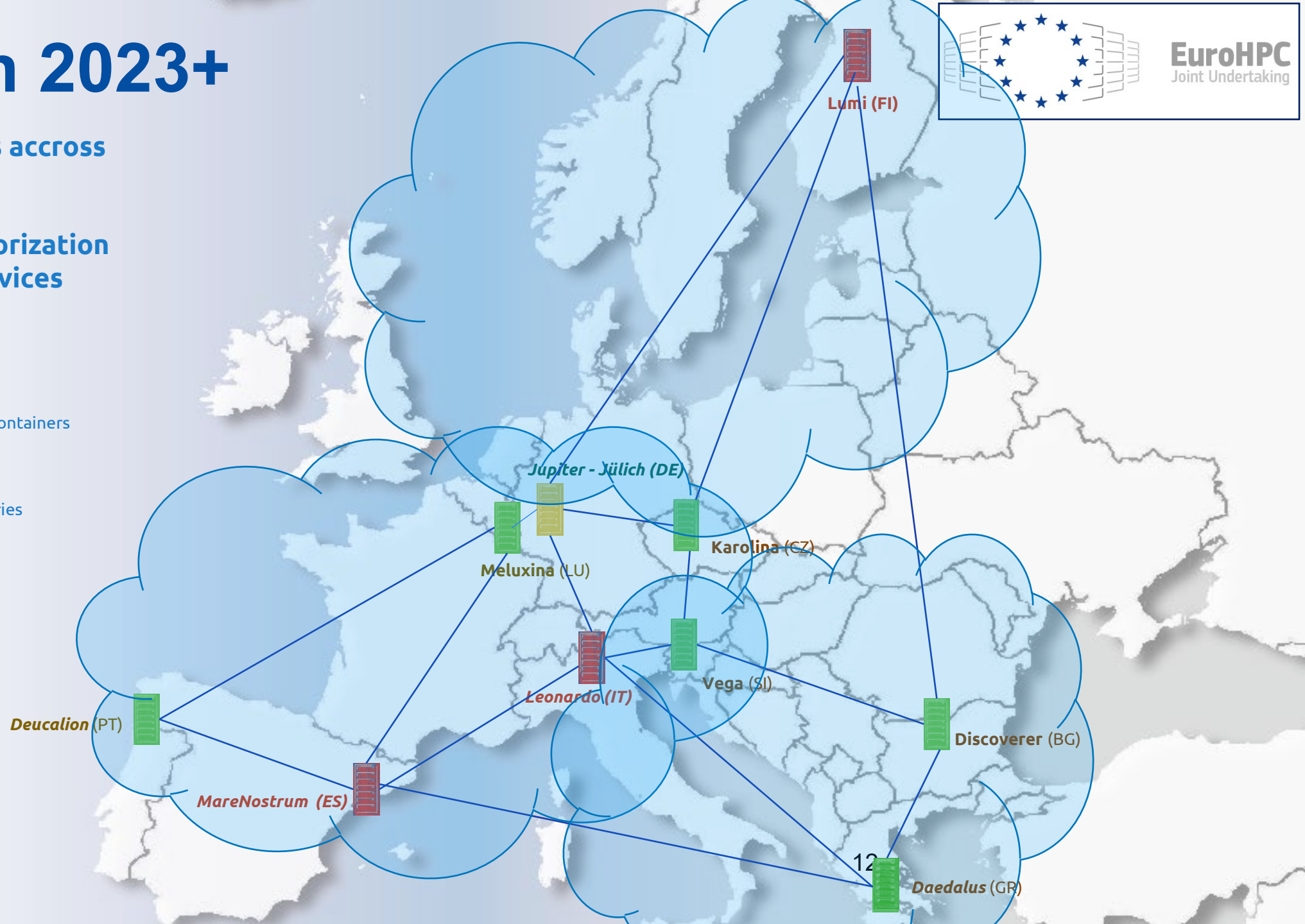
Hyperconnectivity 2023+



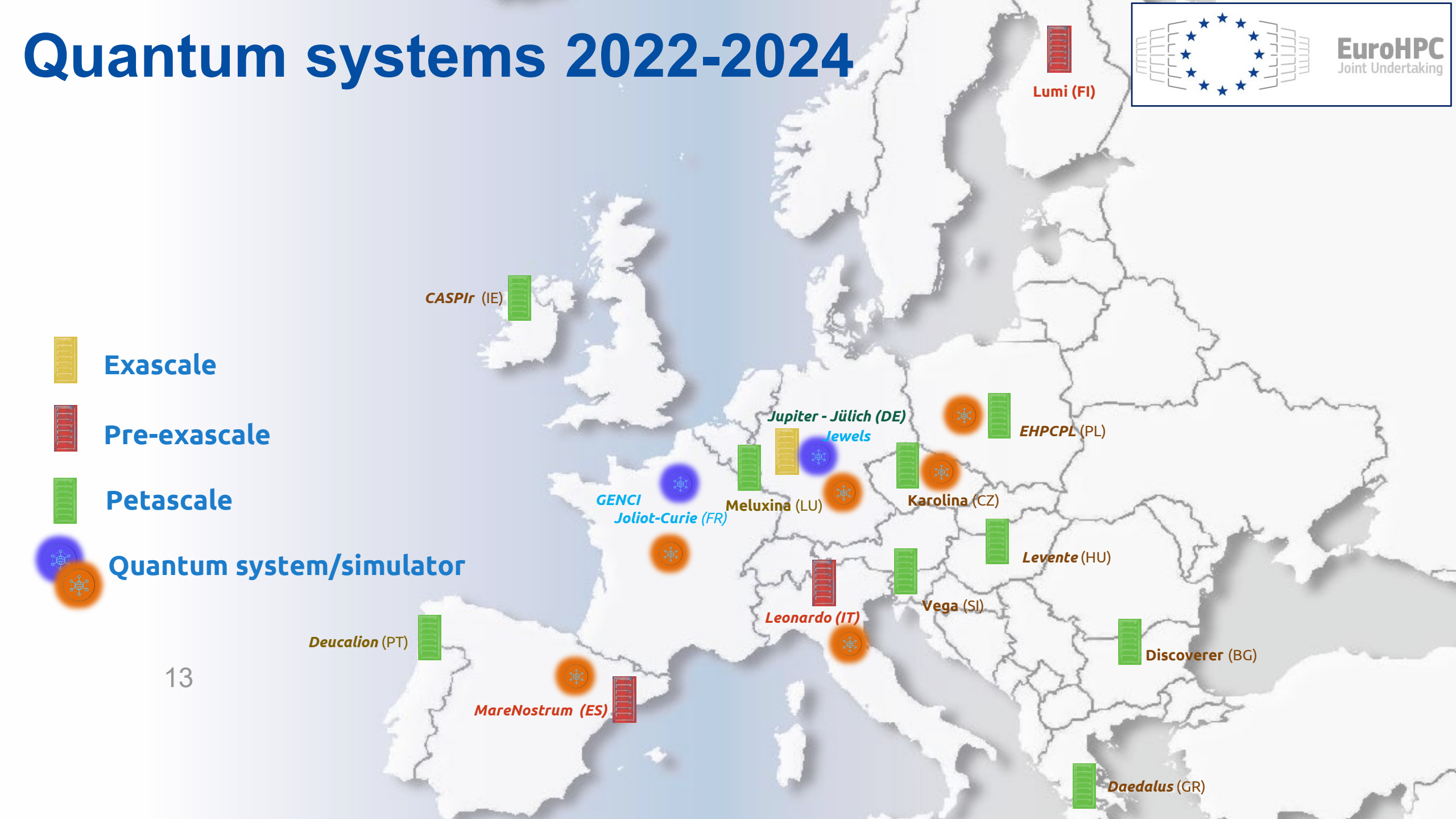
Federation 2023+

Federate HPC resources accross all EuroHPC systems

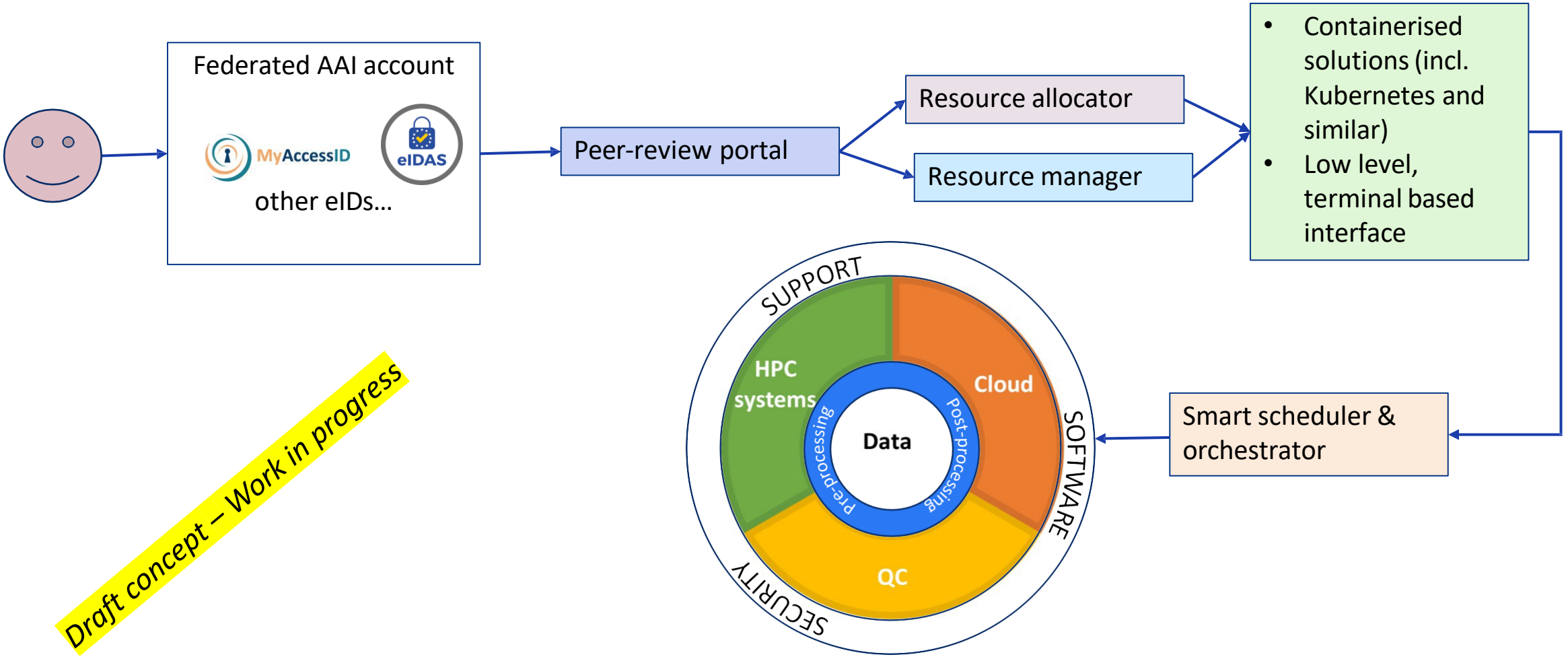
- **Authentication, Authorization and Identification services (AAI)**
- **Computing services**
  - Interactive Computing
  - Cloud access – Virtual Machines - Containers
- **Data services**
  - Archival Services and Data repositories
  - Data mover / transport services
- **User and Resource management**



Quantum systems 2022-2024

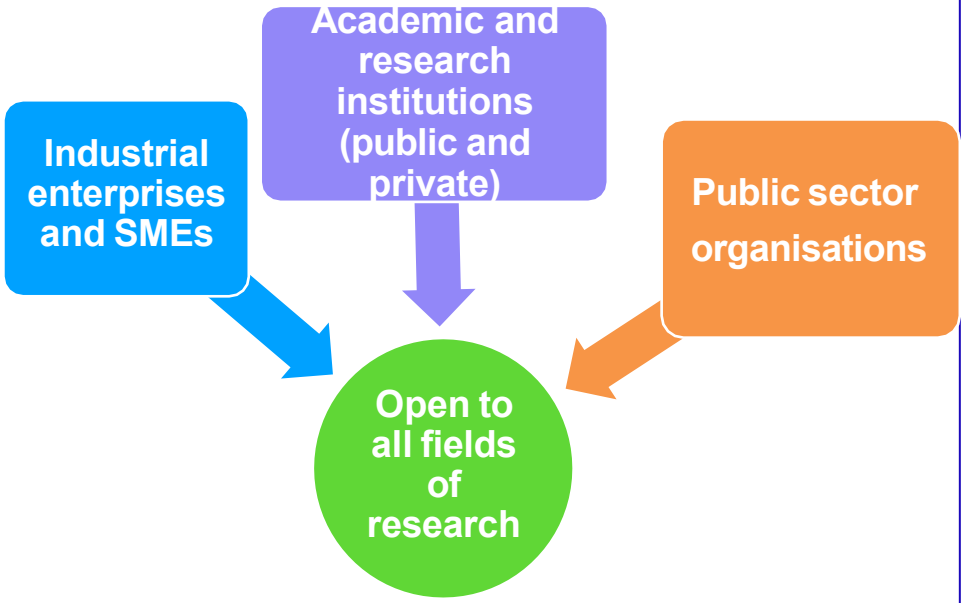


Federation of Supercomputing Services

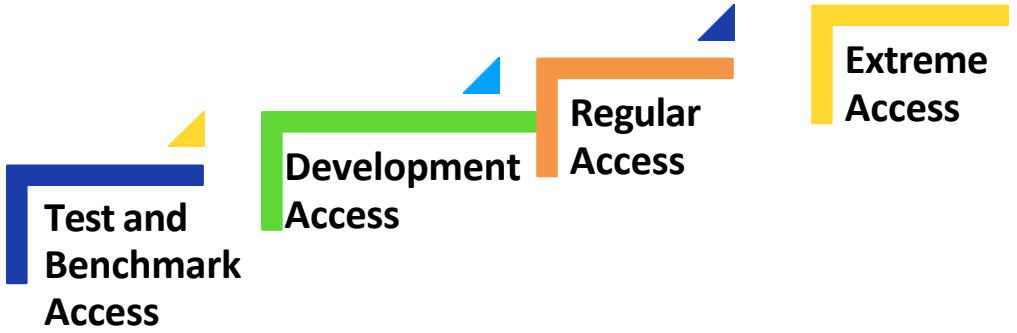


Access to EuroHPC Supercomputers

WHO IS ELIGIBLE?



WHICH TYPES OF ACCESS EXIST?



- Special access*

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/

ACCESS TO EUROHPC SUPERCOMPUTERS IN NUMBERS

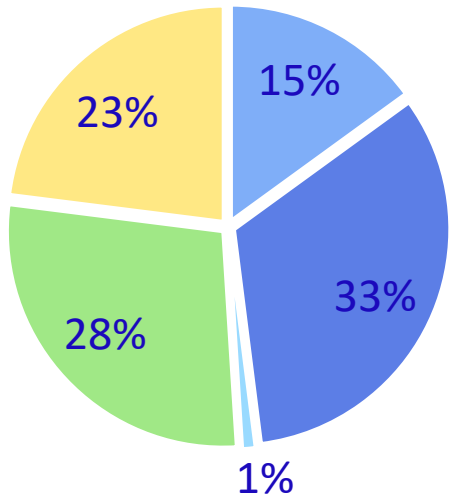
CORE HOURS AWARDED FOR REGULAR ACCESS

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

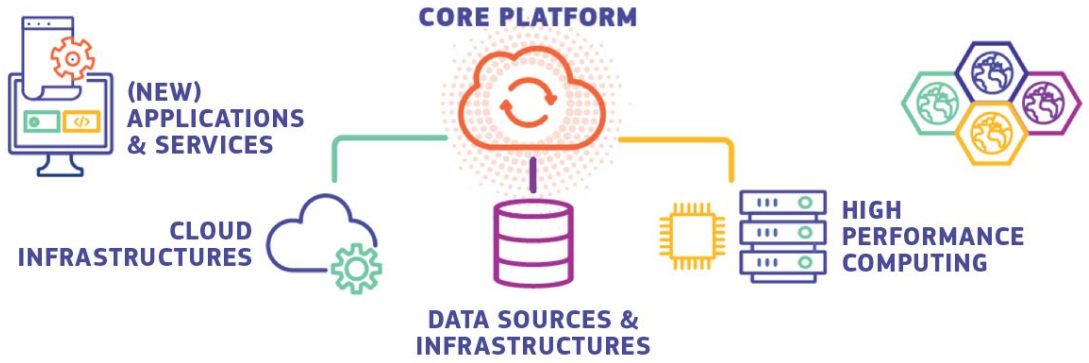
- Biochemistry, Bioinformatics, Life Sciences, Physiology and Medicine
- Chemical Sciences and Materials, Solid State Physics
- Earth System Sciences
- Computational Physics: Universe Sciences, Fundamental Constituents of Matter
- Engineering, Mathematics and Computer Sciences

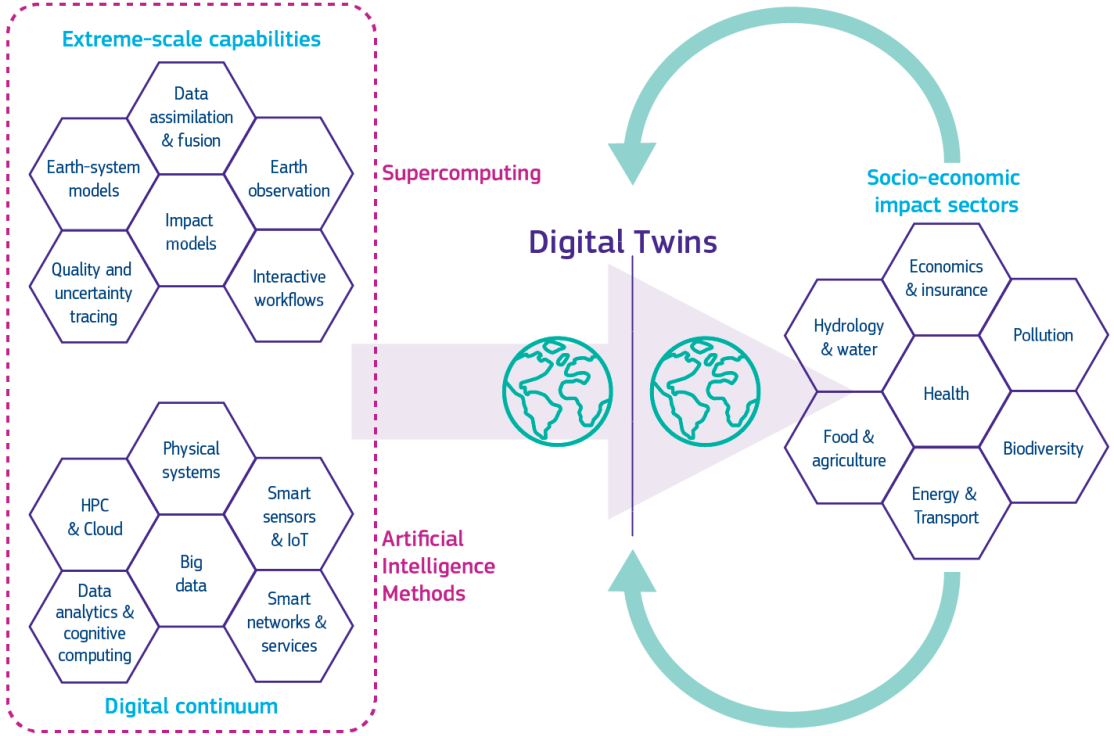
RESEARCH DOMAINS DISTRIBUTION ACROSS ALL CUT-OFFS



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

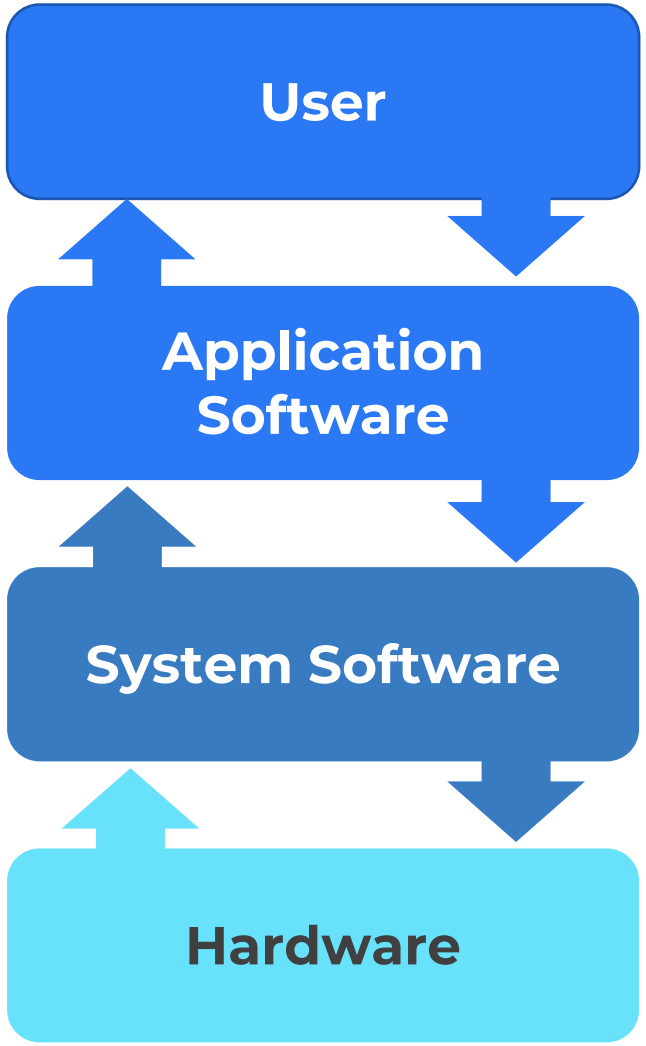
STRATEGIC R&I – INTERVENTION AREAS

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

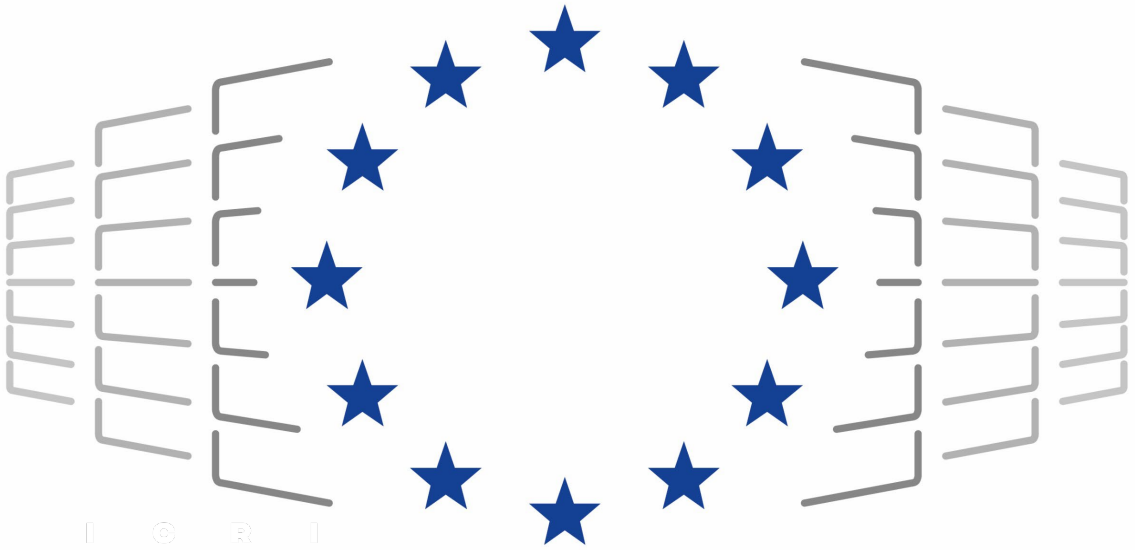
Upcoming EuroHPC infrastructure:

- 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

THANK YOU



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