

# THE EUROPEAN HIGH PERFORMANCE COMPUTING JOINT UNDERTAKING

**The EuroHPC Supercomputing Infrastructure  
Full Speed Ahead**



**EuroHPC**  
Joint Undertaking

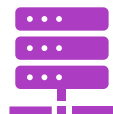
- EU body and funding entity, established in 2018, based in Luxembourg
- Governed by a Board composed of the EC, 37 Participating States and 3 Private Members
- Mission:
  - Acquire, deploy and maintain a HPC and quantum Infrastructure in Europe
  - Fund R&I projects to develop HPC applications, software and hardware and foster a European supply chain
  - Provide access to HPC and quantum users across Europe and support the development of skills
  - Develop and operate AI Factories to support the growth of a competitive and innovative AI ecosystem in Europe



# The EuroHPC Supercomputing Ecosystem



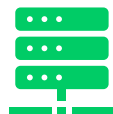
EXASCALE



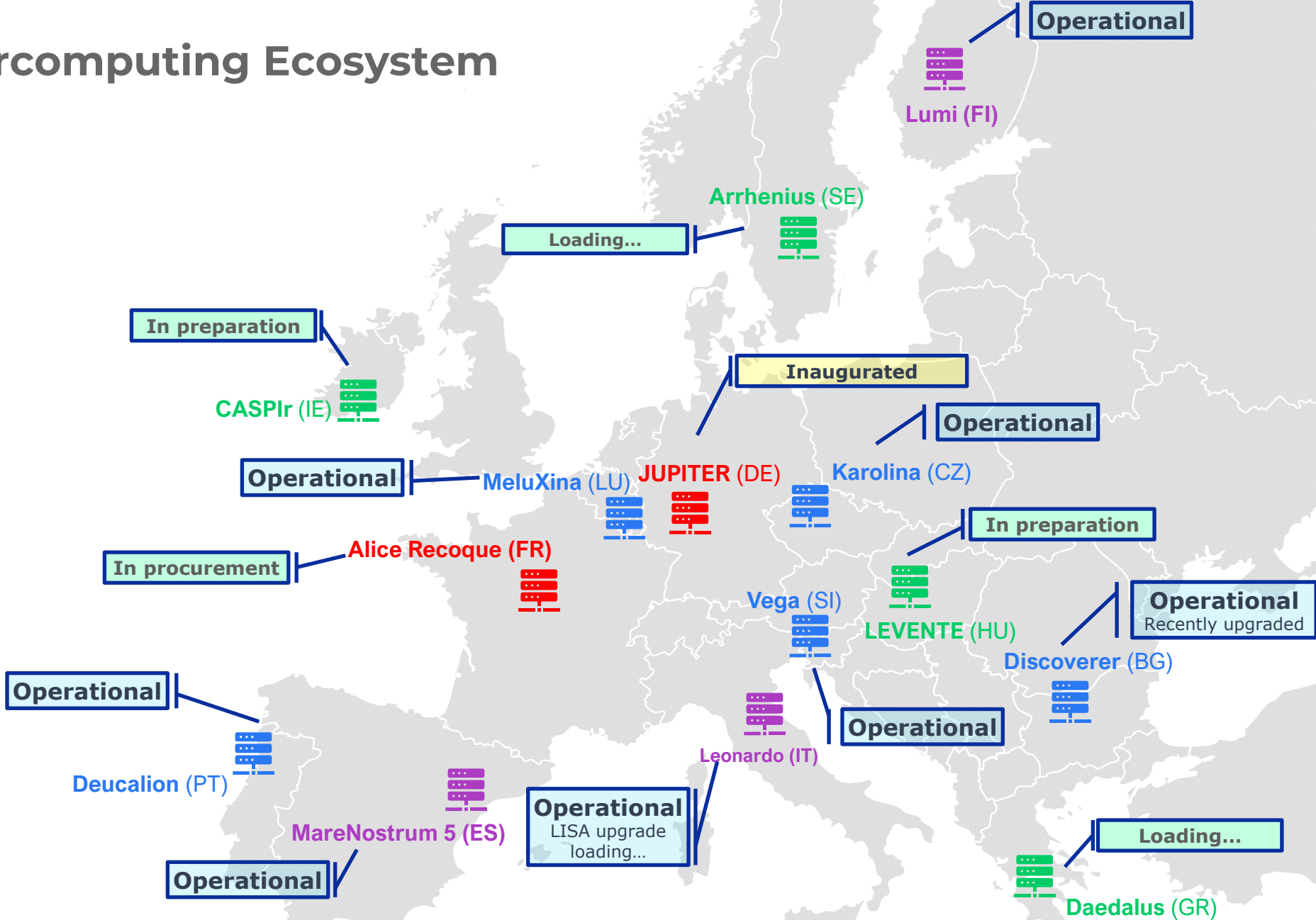
PRE-EXASCALE



PETASCALE



MID-RANGE





# JUPITER



*Julich, Germany*



The first exascale system in Europe



Europe's fastest, ranked #4 on the TOP500 list



The most energy-efficient system among the top 5 fastest systems



JEDI module #1 in the Green500 list

# The EuroHPC Supercomputing Ecosystem – The numbers

## Computing Performance

**8\*** systems comprising **21** partitions offering

**~900 PFlops**

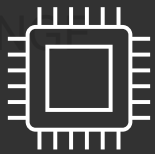
of aggregated sustained Linpack performance  
...soon to be increased\*\* to

**~2 ExaFlops**

**15597** CPU Nodes (AMD/Intel x86 and Fujitsu ARM)  
**7869** GPU Nodes

**30324** GPUs (Nvidia A100/H100/H200,  
AMD MI250X)

**27104** GPUs coming \*\* soon (NVIDIA GH200)



## Budget (CapEx)

Pre-exascale – Petascale program

Total budget: **510,000,000 €**  
EU Contribution: **240,000,000 €**

Exascale program

Total budget: **567,800,000 €**  
EU Contribution: **283,900,000 €**

Mid-range & upgrades program

Total budget: **153,100,000 €**  
EU Contribution: **53,600,000 €**



## Impact

Open for user access since Dec 2021

**145,161,896** node hours Awarded to

**2,334** Projects

Powering strategic applications

- **Destination Earth**
- **AI Boost – Training of European LLMs**

Across all EuroHPC Member States

\* Operational systems (petascale, pre-exascale)

\*\* JUPITER, Daedalus and Arrhenius

Budget refers to acquisition costs only.  
EuroHPC co-funds operating costs for  
Pre-exascale/Exascale systems (50%) and  
Mid-range/Upgrades (35%).

# Hyperconnected

## Contract

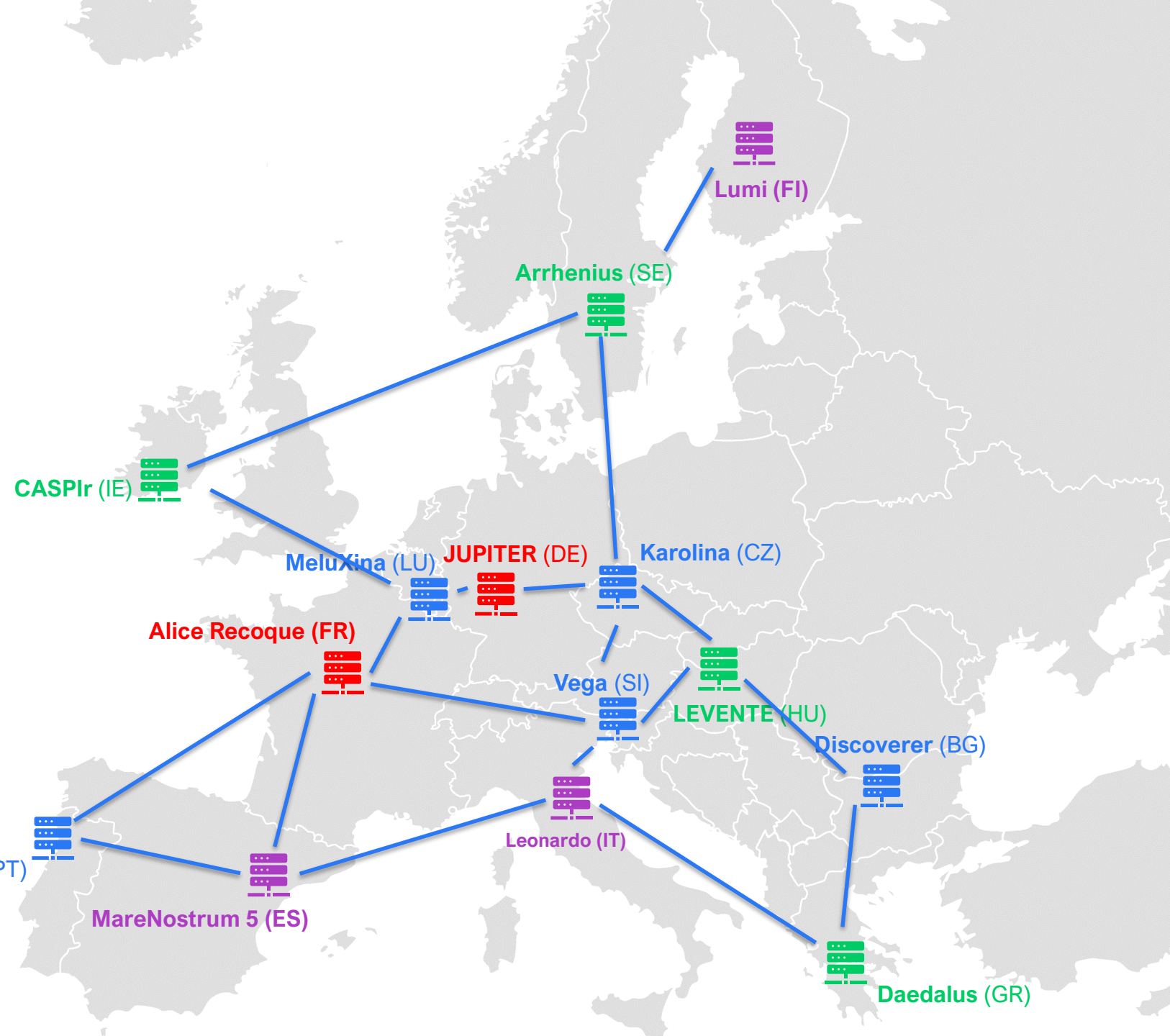
- **GÉANT**, the Association of European National Research and Education Networks (NRENs)– Implementing partners
- Contract value: **€60 million**
- Duration: **48 months**

## Goals

- Build a secure, federated, and future-proof connectivity infrastructure for AI, HPC and Quantum systems across Europe.
- **222 Points Of Interest (PoIs)**
- Deliver terabit-per-second capacity with robust security, flexible, and future-proof services
- To benefit: research communities, SMEs, startups, public sector, industry, and innovation stakeholders

## Timeline

- **2026** – High Level Design (HLD) and HyperConnectivity Service Area (HCSA) delivered; inclusion of Priority POIs 1&2
- **2026 –2029** – Progressive inclusion of PoIs
- **2029** – Fully hyperconnected ecosystem in operation



# Federated

## Goals



A **single federated identity** across all AI and HPC machines for each user (eIDAS based, e.g. SME registry, EU Wallet etc.)



Uniform and **secure** access to all federated machines



Provision of **multitenancy in secure environment**



**Interactive web-based usage**



Advanced features for **workflows and interactive graphical AI usage** interface (e.g. Kubernetes)



**Data transfer** methods such as S3 and similar to and from external and internal data clouds, data lakes and data spaces.



**Unified AI and HPC software** across all federated machines



**Smart scheduling capabilities** to optimize compute usage and increase the level of abstractions for the provided compute capacity



**Connection to HPC in Europe** portal that serves as EU training coordination place

## Contract

- A consortium led by **CSC – IT Center for Science**, with NORDUnet, University of Tartu, Ghent University, and VSB Technical University of Ostrava's IT4Innovations and GEANT.
- Expected duration: **5 years**
- **Total budget: 20.000.000,00 €**

## Timeline

- Project start **January 2025** (Contract signed December 2024)
- **1st phase (2025-2026)** The development of a Minimum Viable (Federation) Platform (MVP) covering six key areas including federated AAI, resource allocations, and complex workflow manager including smart scheduler.
  - **1st release:** Q1/2026 with integration to currently online EuroHPC HPC and AI systems
  - **2nd release:** Q4/2026 additional EFP components and integration online HEs, AI factories and quantum systems + initial integration of Fenix, SIMPL and EOSC

Deucalion (PT)

MareNostrum 5 (ES)

Daedalus (GR)

# QUANTUM

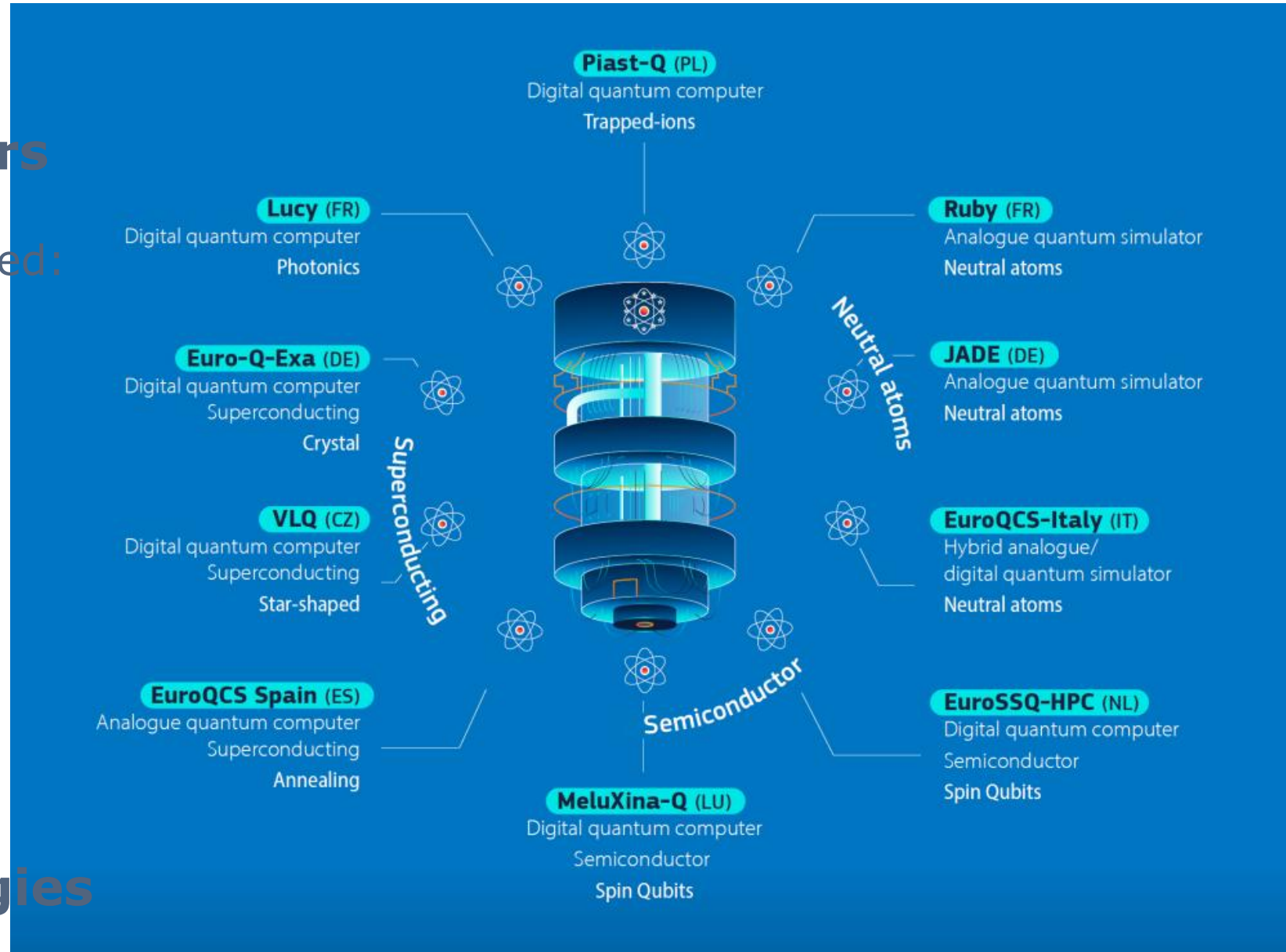
## 10 Quantum Computers

2 systems recently inaugurated:

- Piast-Q (PSNC, Poznan)
- VLQ (IT4I, Ostrava)



## 6 Different technologies

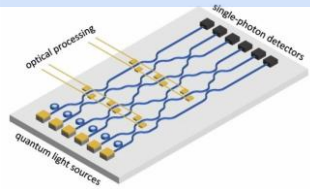




# DIVERSITY IN QUANTUM TECHNOLOGIES

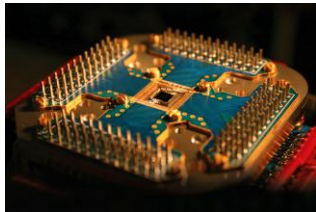
**EuroQCS-  
France**

Photonic  
quantum  
computer



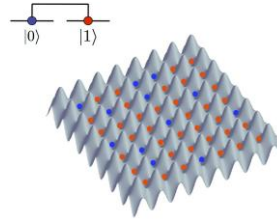
**Euro-Q-Exa  
(Germany)**

Superconducting  
qubits



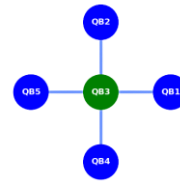
**EuroQCS-  
Italy**

Neutral  
atoms



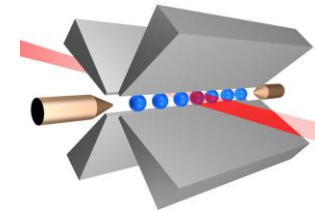
**Lumi-Q  
(Czechia)**

Superconducting  
qubits with a  
star-shaped  
topology



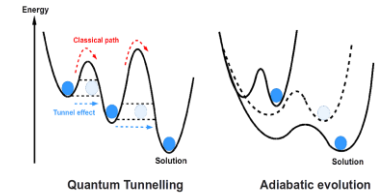
**EuroQCS-  
Poland**

Trapped ions



**EuroQCS-  
Spain**

Quantum  
annealer

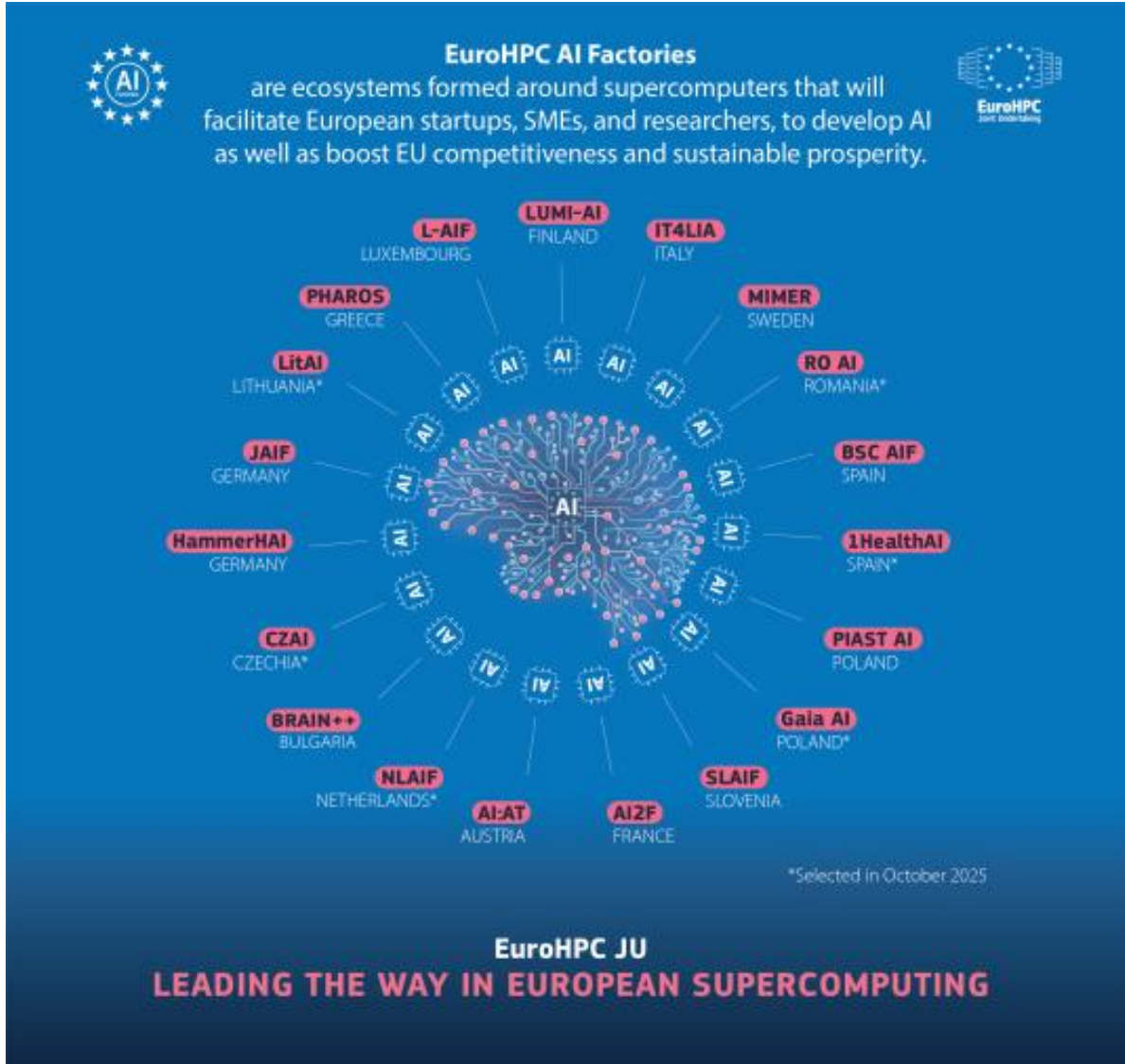


# AI Factories

- **Dynamic ecosystems, including AI-optimised supercomputers, data capacities, programming and training facilities, and human capital** to support the EU AI industrial and research ecosystems in developing large AI models and applications.
- Novel approach to AI innovation based on a **network of public supercomputers providing an open environment to AI developers.**
- **Strategic sectors:** Health/Life Science; Manufacturing; Climate/Environment; Space; Finance; Cybersecurity; Agri-tech/Agrifood; Education/Arts/Culture; and more.
- Largest AIFs expected to have each around **25 000 advanced AI processors.**
- Overall investments in supercomputing infrastructures and AI Factories around **EUR 10 billion (2021-2027).**

# THE AI FACTORIES

EuroHPC JU has selected 19 EU sites that will host AI Factories – to drive Europe’s leadership in AI.



## AI-ready EuroHPC supercomputers in:

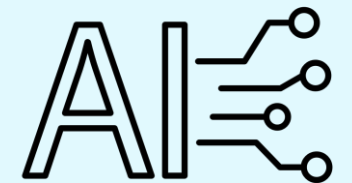
- Germany **JAIF – JUPITER**
- France **AI2F – Alice Recoque**
- Greece **Pharos – Daedalus**

## AI-upgrades to EuroHPC supercomputers in:

- Spain **BSC AIF – MareNostrum 5**

## New AI-optimized EuroHPC supercomputers in:

- Finland **LUMI-AIF**
- Germany **HammerHAI**
- Italy **IT4ALIA**
- Luxembourg **L-AIF**
- Sweden **MIMER**
- Bulgaria **BRAIN++**
- Slovenia **SLAIF**
- Austria **AI:AT**
- Poland **PIAST AIF | GAIA AI**
- Spain **1HealthAI**
- Romania **ROAI**
- Czechia **CZAI**
- Lithuania **LitAI**
- Netherlands **NLAIF**



*AI Factories pull together EU and national resources, in a collaborative effort of **23 European countries***



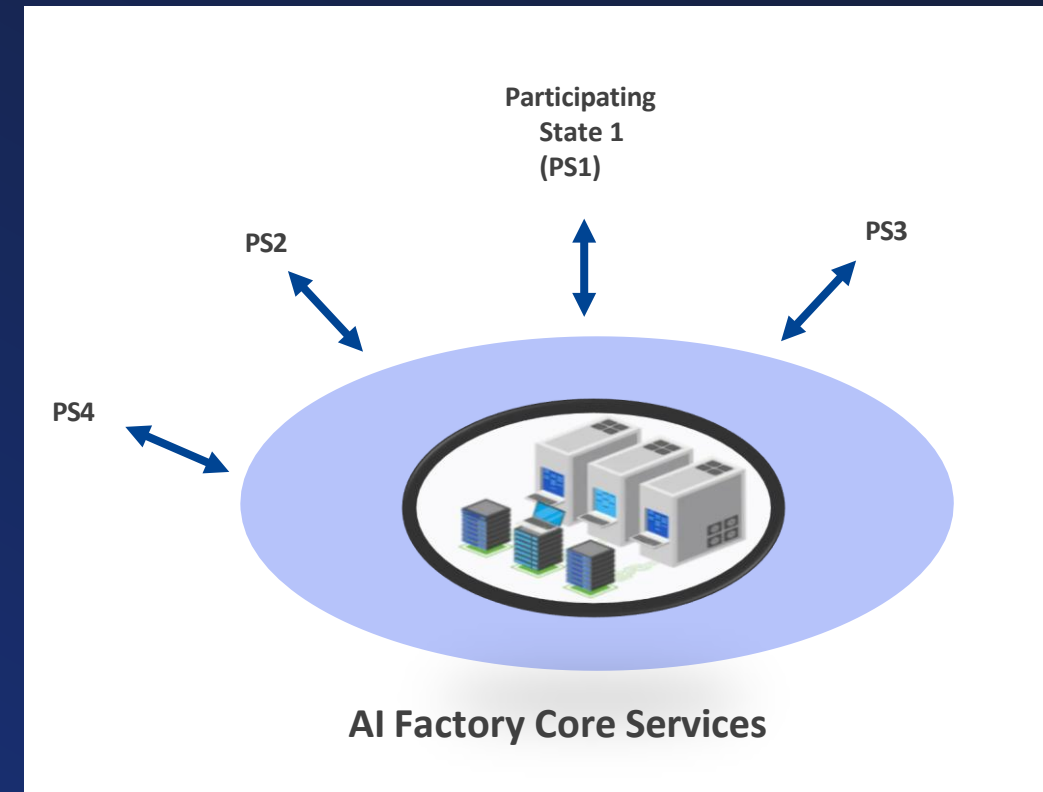
# AI Factories' strategic sectors

Key Sectors	AT	BG	DE	EL	ES	FI	FR	IT	LU	PL	SE	SI
Health & Life Sciences	●		●	●	●	●	●	●		●	●	●
Technology & Digital		●		●	●	●	●	●	●	●	●	●
Environment & Sustainability		●	●	●	●		●	●	●	●	●	●
Education & Culture	●	●	●	●	●		●	●			●	●
Manufacturing & Engineering	●	●	●			●	●				●	●
Finance & Business	●		●		●		●	●	●		●	
Agriculture & Food	●				●		●	●			●	●
Cybersecurity & Dual use							●	●	●			
Space & Aerospace		●					●		●	●		
Public Sector	●		●		●					●		

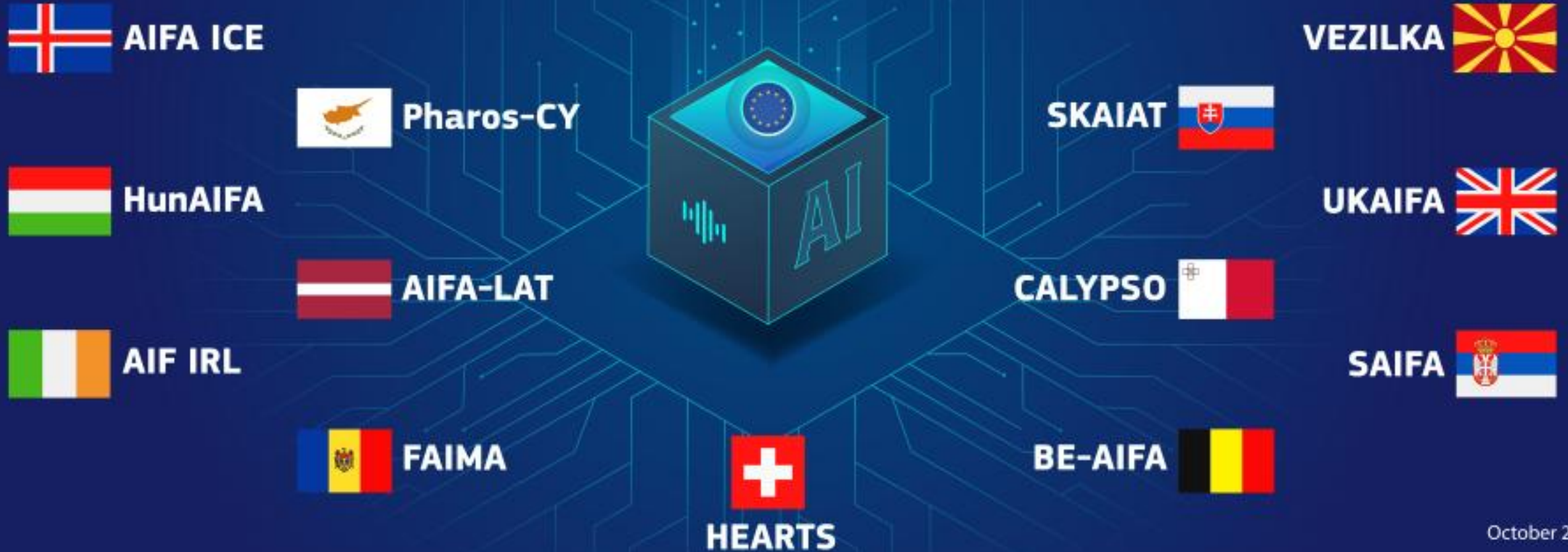
AI Factories bring unique strengths and specialised focus areas, playing a pivotal role in advancing AI applications across strategic sectors.

# AI Factory Antennas

- **National AIF Antennas** associated to the Hosting AIF (AI-optimised supercomputer and core services)
  - A way to create a **network of AIFs** all over the EU **without having to invest in a dedicated supercomputer** every time
  - Provide services and algorithmic support to the **national AI ecosystem**
  - **Ensure access** to enhanced AI-optimised computing capacity (remote)



# EuroHPC AI Factory Antennas



October 2025

- The EuroHPC Joint Undertaking has selected 13 AI Factory Antennas to complement existing AI Factories.
- This step will strengthen national AI ecosystems and extend access to AI-optimised supercomputing resources across Europe.

# AI Systems offered/planned

## AIFs proposing existing\* systems

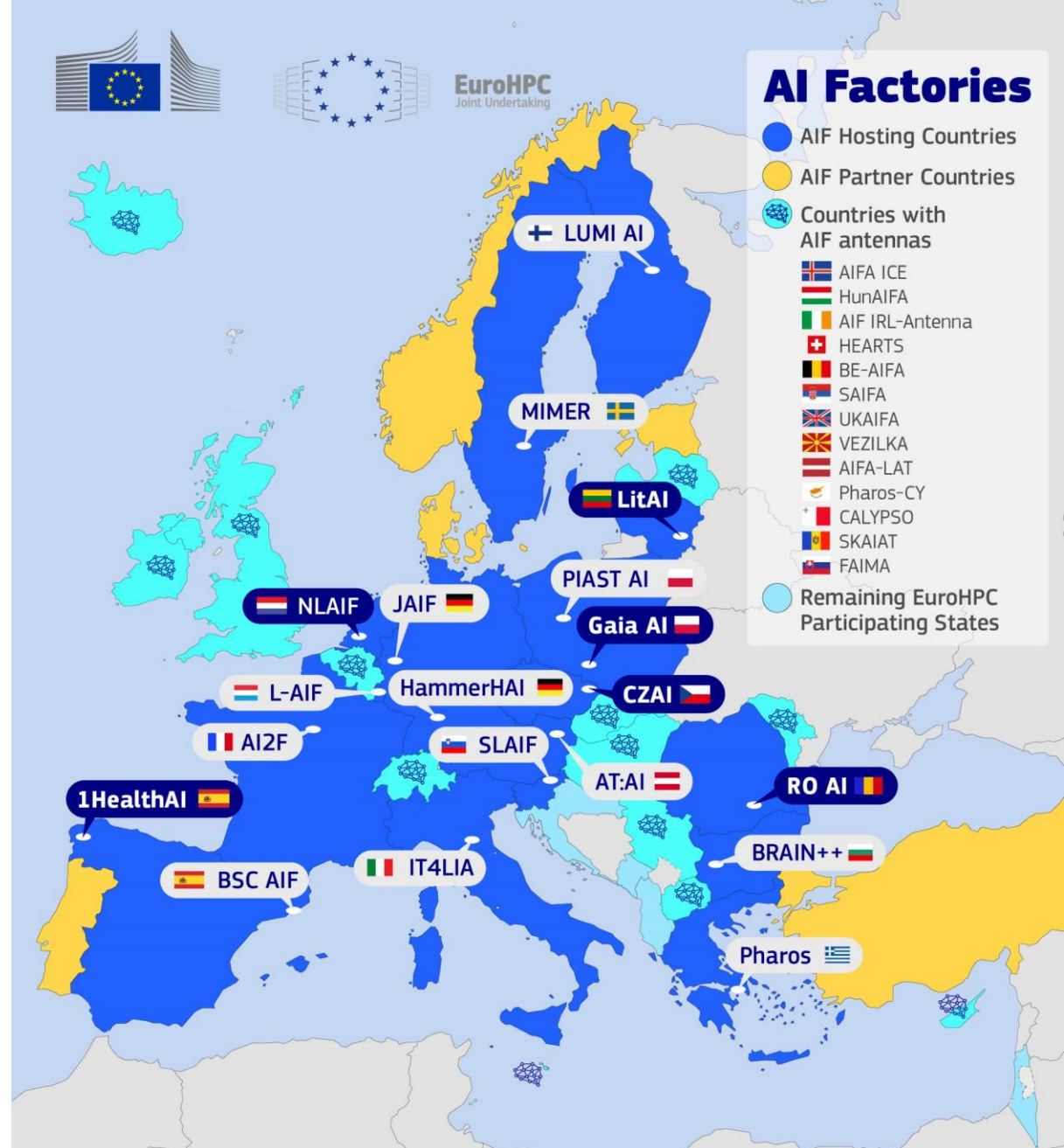
- **JAIF** (JUPITER soon in production)
- **AI2F** (Alice Recoque in procurement)
- **Pharos** (Daedalus under installation)

## AIFs temporarily offering existing systems

- **BSC** (MN5 | AI upgrade in procurement)
- **IT4LIA** (Leonardo/LISA | Leonardo-AI in procurement)
- **LUMI AIF** (LUMI | LUMI-AI in procurement)
- **LuxProvide** (MeluXina | MeluXina-AI in procurement)
- **BRAIN++** (Discoverer/+ | AI system in preparation)
- **SLAIF** (Vega | Vega-AI in preparation)

## AIFs with upcoming new systems

- **HammerHAI** | HLRS, Stuttgart (In procurement)
- **PIAST AIF** | PSNC, Poznan (in preparation)
- **AI:AT Austria** | ACA, Vienna (in preparation)
- **MIMER** | LiU, Linkoping (In procurement)
- **GAIA AI** | Cyfronet, Krakow
- **RO AI** | ICI, Bucharest
- **NLAIF** | SURF, Amsterdam
- **CZAI** | VSB/IT4I, Ostrava
- **1HealthAI** | CESGA, A Sionlla
- **LitAI** | VU, Vilnius



Switzerland's participation is contingent upon the ratification of its accession to Horizon Europe.

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# What to expect from the EuroHPC AI-optimised supercomputers



EuroHPC  
Joint Undertaking

- AI optimised GPU architectures: Emphasis on **FP32**, **FP16** and **FP8** performance
- Tightly integrated on node level – Memory coherency
  - NV Link, UALink, Infinity Fabric
- **Revised benchmarks**
  - HPL and Top500 not the driving metric.
- Dense interconnect on the partition level
  - At least one link per GPU
  - Software friendly
  - Traditional Infiniband but also Ethernet (e.g. Ultra Fast Ethernet)
- Richer software/middleware stacks
  - Slurm is not the king
  - Kubernetes, containers, virtualisation and relevant workflow and resource management tools
- **MLOPs**
  - Support for the complete AI training/inference lifecycle: Preparation, fine tuning, augmentation, model catalogues.
- **Multitenancy** and advanced security.
  - User isolation on compute, storage and network layer



**EuroHPC AI supercomputers will offer diverse architectures and design choices suited for the specific goals of the various AI Factories**





## TRADITIONAL HPC

### PREPARATORY ACTIVITIES

**BENCHMARK ACCESS**

**DEVELOPMENT ACCESS**

### PRODUCTION ACTIVITIES

**EXTREME SCALE ACCESS**

**REGULAR ACCESS**

**Access to  
EuroHPC  
systems**

<https://access.eurohpc-ju.europa.eu/>



## ARTIFICIAL INTELLIGENCE

### SCIENCE

**AI FOR SCIENCE &  
COLLABORATIVE EU PROJECTS  
ACCESS**

### INDUSTRIAL INNOVATION

**LARGE SCALE ACCESS**

**PLAYGROUND ACCESS**

**FAST LANE ACCESS**

# AI Gigafactories under the EuroHPC JU

- Large-scale facilities designed to **develop, train, and deploy the next generation most complex AI models at an unprecedented scale** (e.g., tens of trillions of parameters).
- Essential for Europe to be able to **compete on the global level** and ensure its **strategic autonomy in science and in critical industrial sectors**.
- Building on the concept of AI Factories, taking it to the next level by **integrating coherently** massive computing power, **beyond 100 000 advanced AI processors**.
- Focus on **power capacity, supply chain, cutting-edge networks, energy-efficiency, and AI-driven automation**.
- **Federated** with the **EuroHPC network of AI Factories** and **sovereign cloud**.
- Need for **public-private partnerships** given the magnitude of the required investments.



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Revised EuroHPC JU regulation mandating the JUs role, budget and expected outcome of the Gigafactories program





**EuroHPC**  
Joint Undertaking

**THANK YOU**