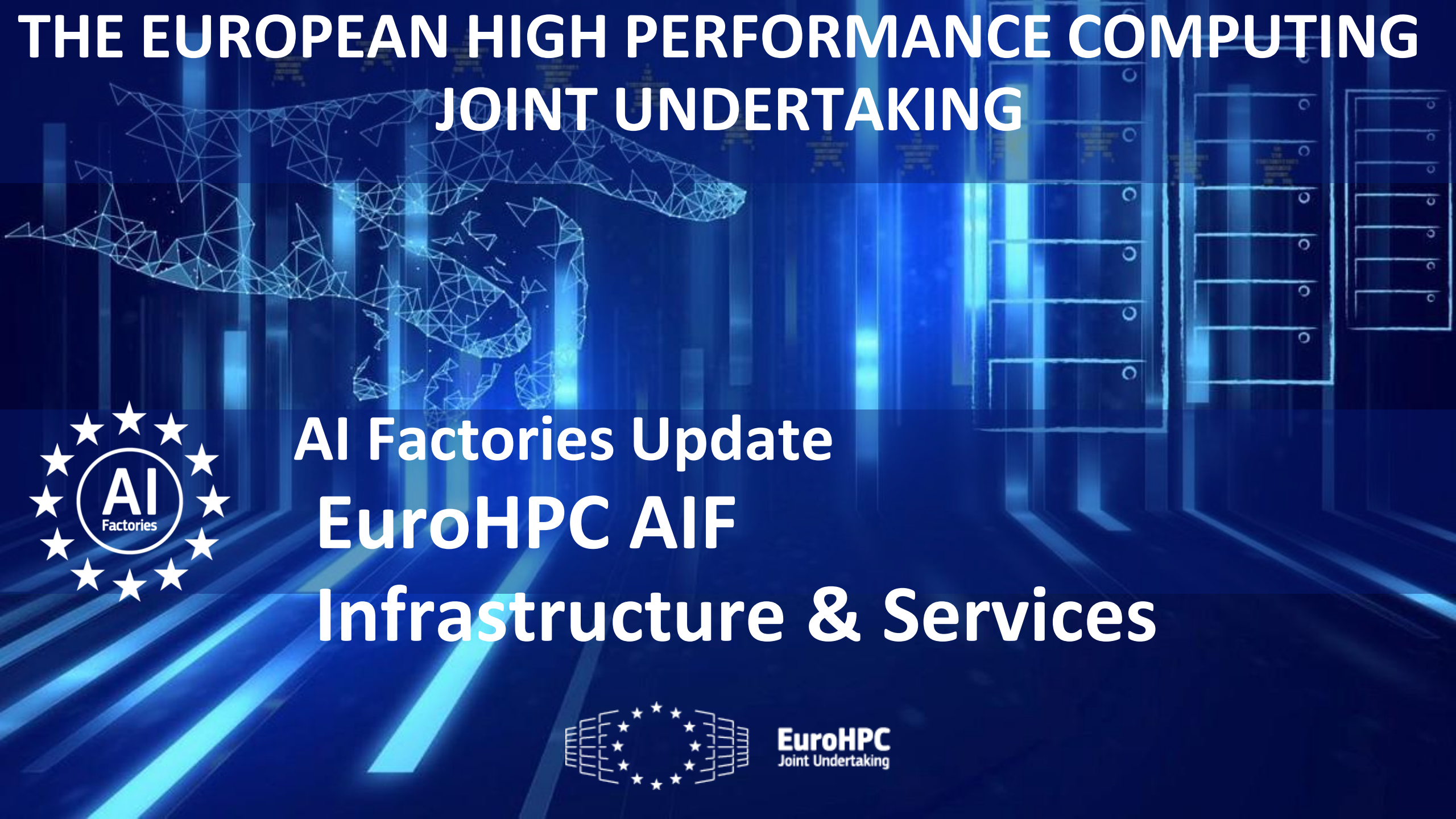
THE EUROPEAN HIGH PERFORMANCE COMPUTING JOINT UNDERTAKING



AI Factories Update

EuroHPC AIF

Infrastructure & Services

EuroHPC Joint Undertaking

The EuroHPC Joint Undertaking 2021-2027

- 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

OPERATIONAL EUROHPC SUPERCOMPUTERS

EuroHPC Joint Undertaking

JUPITER

LUMI

Leonardo/LISA

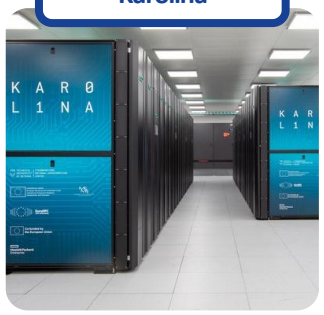
MareNostrum5

MeluXina

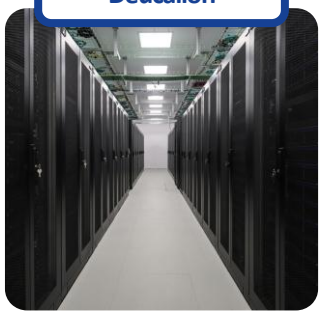
Vega

Discoverer/Discoverer+

Karolina



Deucalion



3 EuroHPC systems in Top 10 ranking of the TOP 500 The List.

Ongoing Development

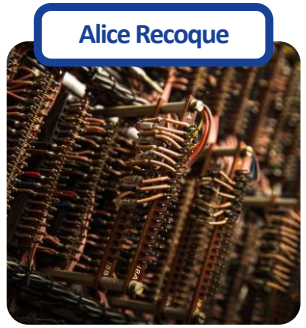
Federated platform for EuroHPC infrastructure

Hyperconnectivity

DAEDALUS

Arrhenius

Alice Recoque

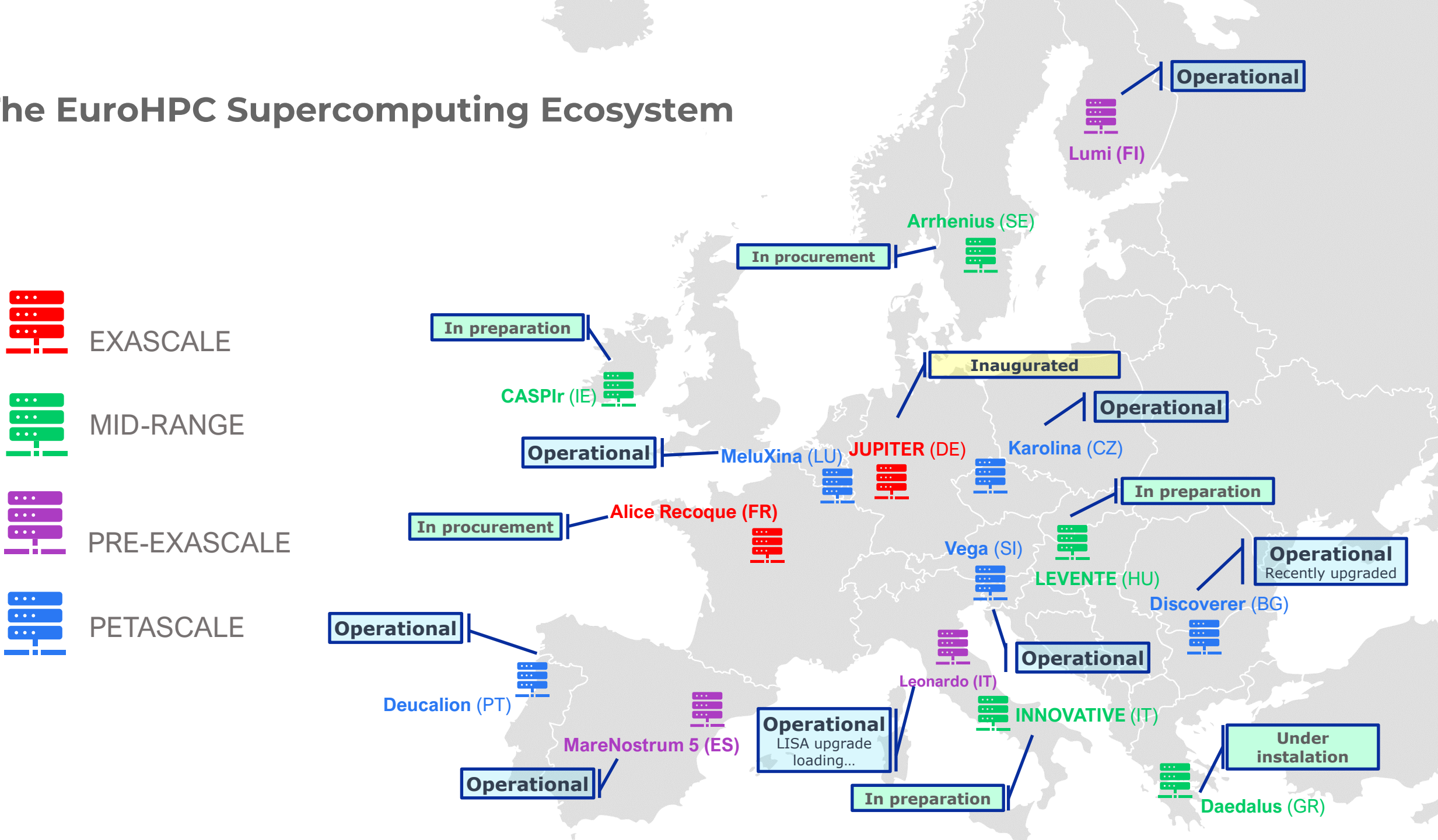


CASPIr

LEVENTE

An Industrial System

The EuroHPC Supercomputing Ecosystem



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**

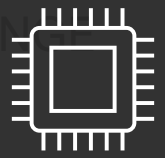
~900 PFlops

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%).

Lumi (FI)

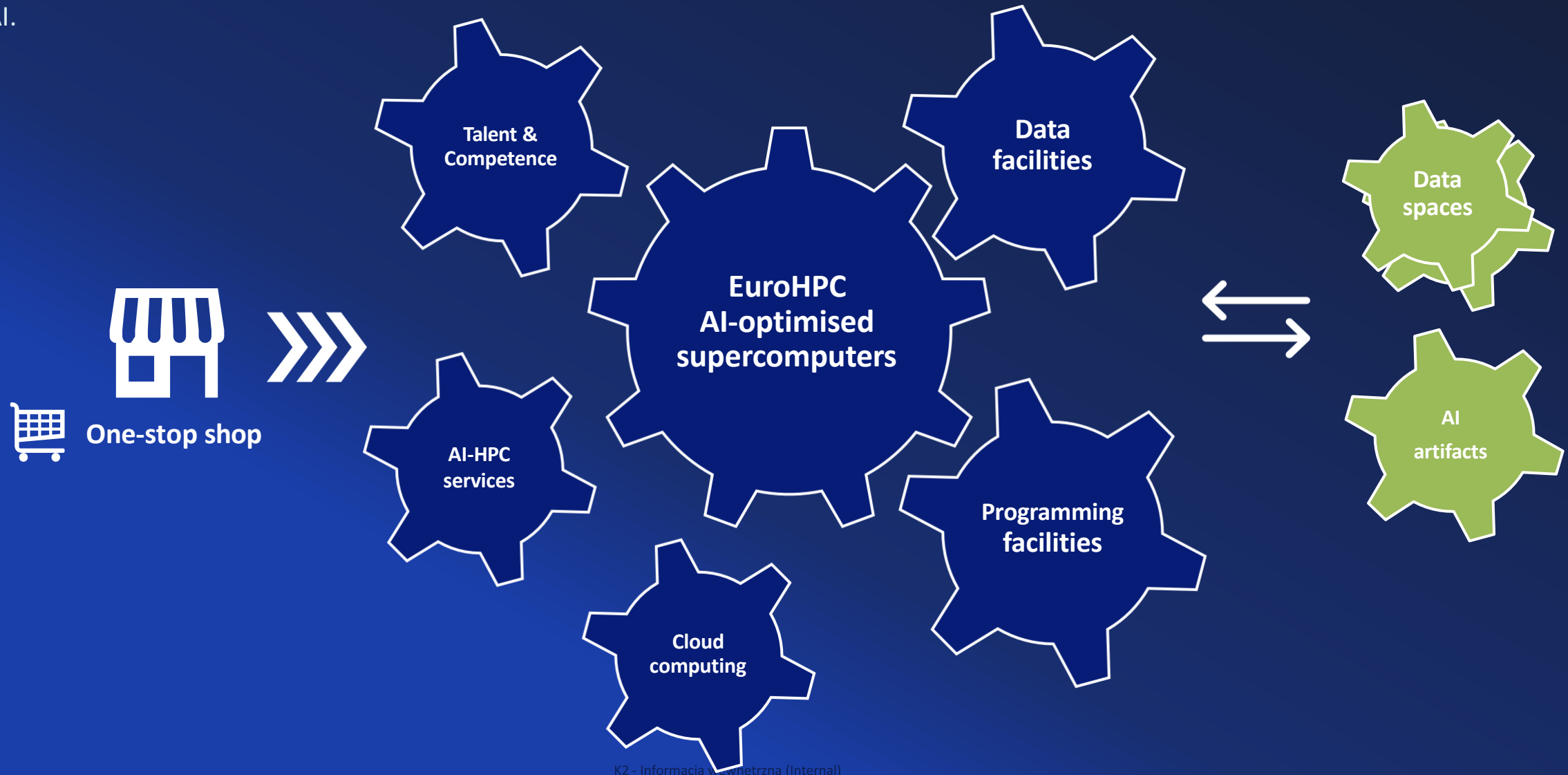
Daedalus (GR)

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).

AI Factories

AI Factories are dynamic ecosystems build around AI-optimised supercomputers, offering computing resources and support services to the European industry, as well as to the European scientific users for the development of large AI models to take advantage of AI technology capabilities in the European Union, and for the development of skills and knowledge in the domain of AI.



Other AI Factories key ingredients

Data Labs

- Access to **high-quality** data
- Wide availability of **open public AI-ready** data
- Access to **Common European Data Spaces**
- **Trusted/secured** access to and reuse of **industrial data**

Skills and talent

- Development and retention of **talent in Europe**
- Comprehensive **AIF's skills plan**, including tailored activities and educational initiatives (workshops, MOOCs, hands-on training, training sandboxes, etc.)

Cloud

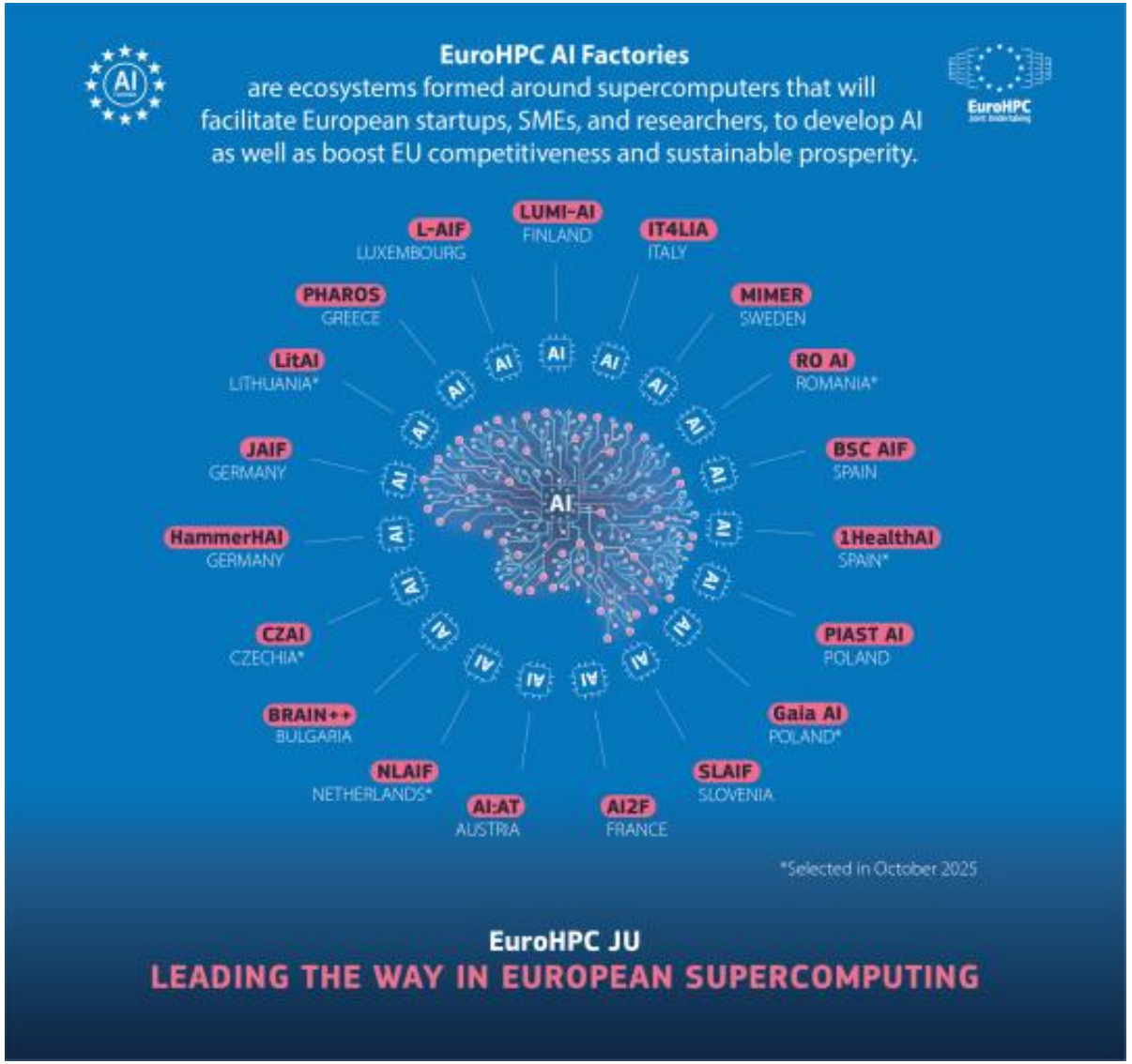
- Access to **sovereign cloud capabilities**
- Crucial for **further model development (AI inference), finetuning, and deployment, application development and for scaling up**

Networking

- Collaboration and networking **among AIF Factories** (knowledge sharing, resource optimisation, domain specialization, etc.)
- Links to **EU and National (AI) initiatives**

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

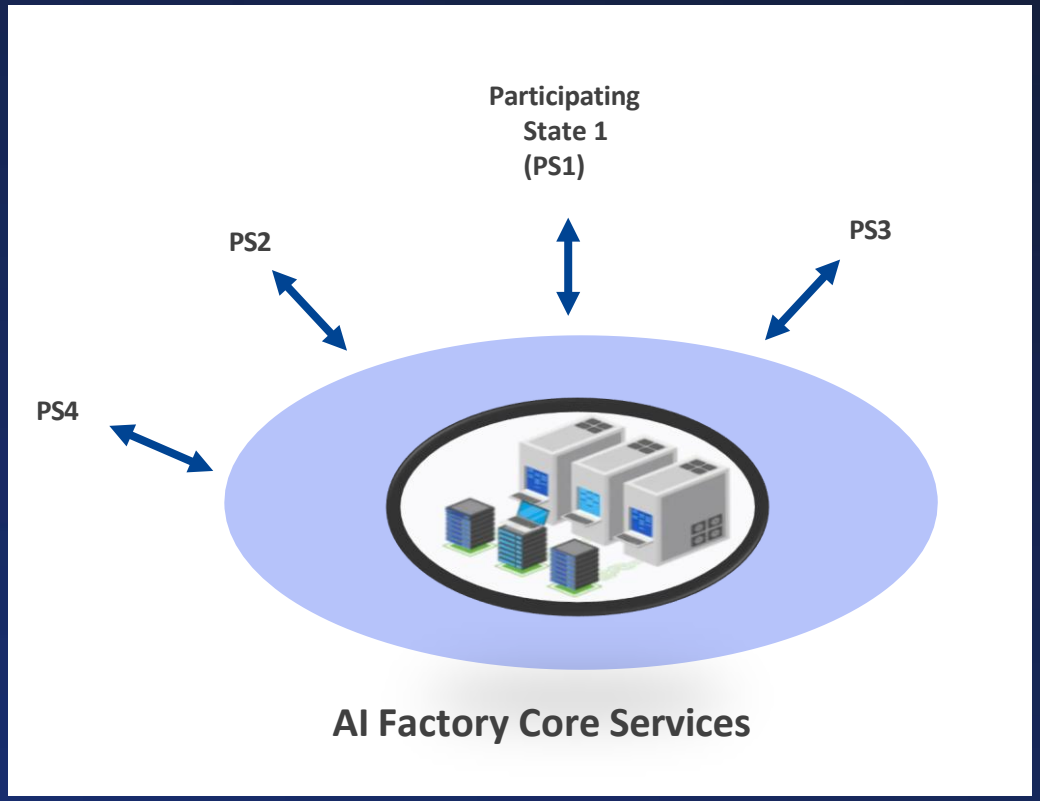
New AI-optimized EuroHPC supercomputers in:

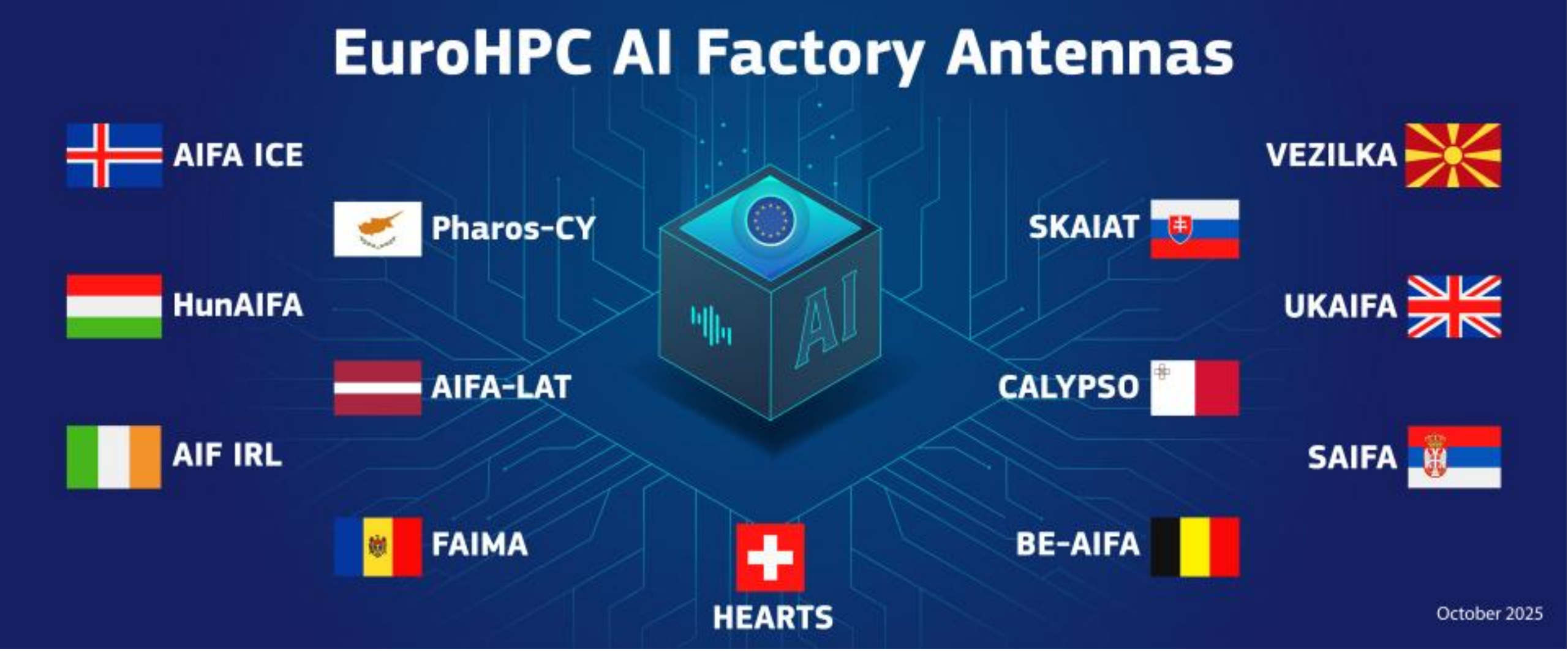
- Finland **LUMI-AIF**
- Germany **HammerHAI**
- Italy **IT4ALIA**
- Luxembourg **L-AIF**
- Sweden **MIMER**
- Bulgaria **BRAIN++**
- Slovenia **SLAIF**
- Austria **AI:AT**
- Poland **PIAST AIF | GAIA AI**
- Spain **1HealthAI**
- Romania **ROAI**
- Czechia **CZAI**
- Lithuania **LitAI**
- Netherlands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

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

AI 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)





- **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.**

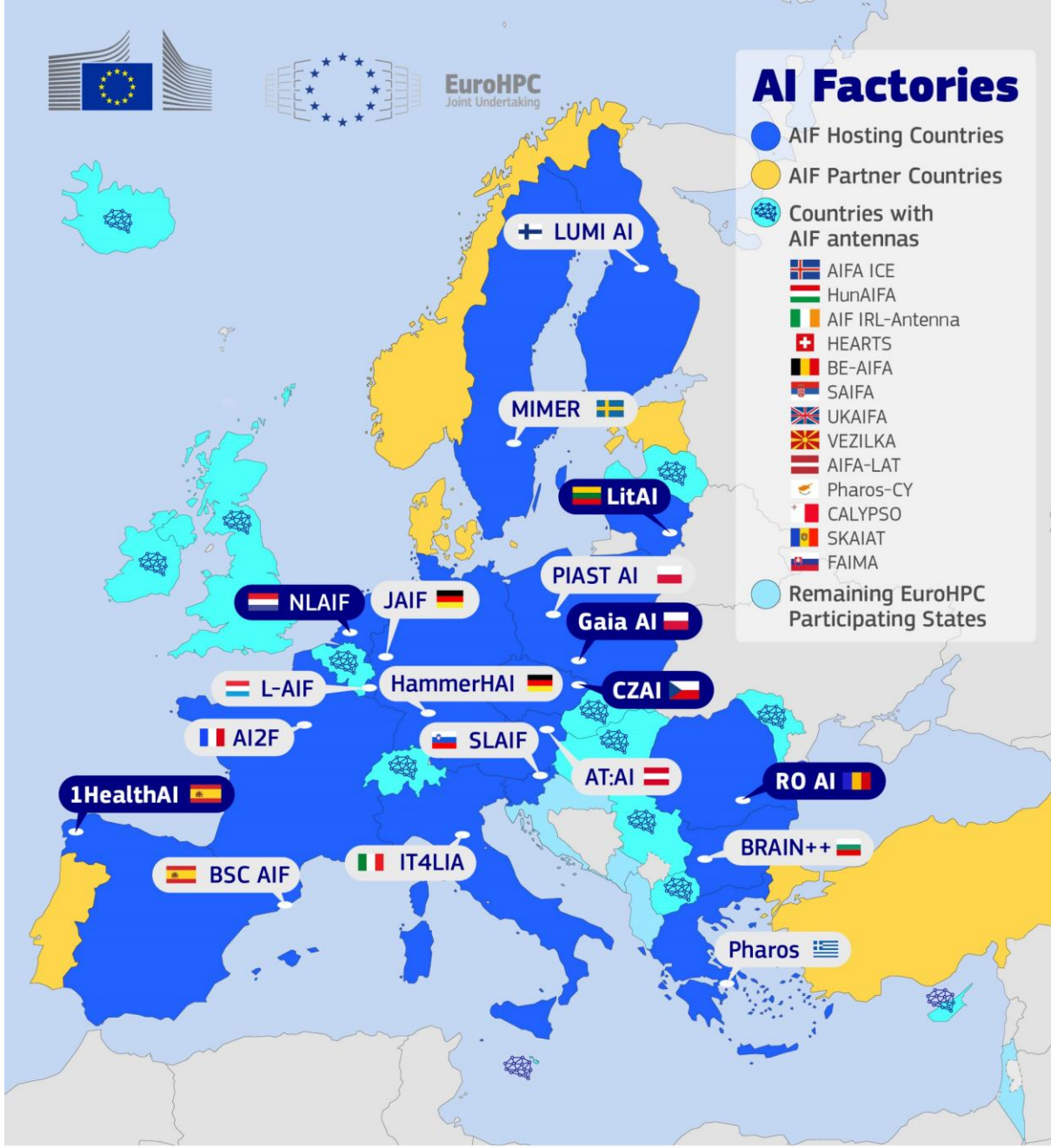
AI Systems offered/planned

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

https://eurohpc-ju.europa.eu/ai-factories/ai-factories-systems_en



EuroHPC Joint Undertaking

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

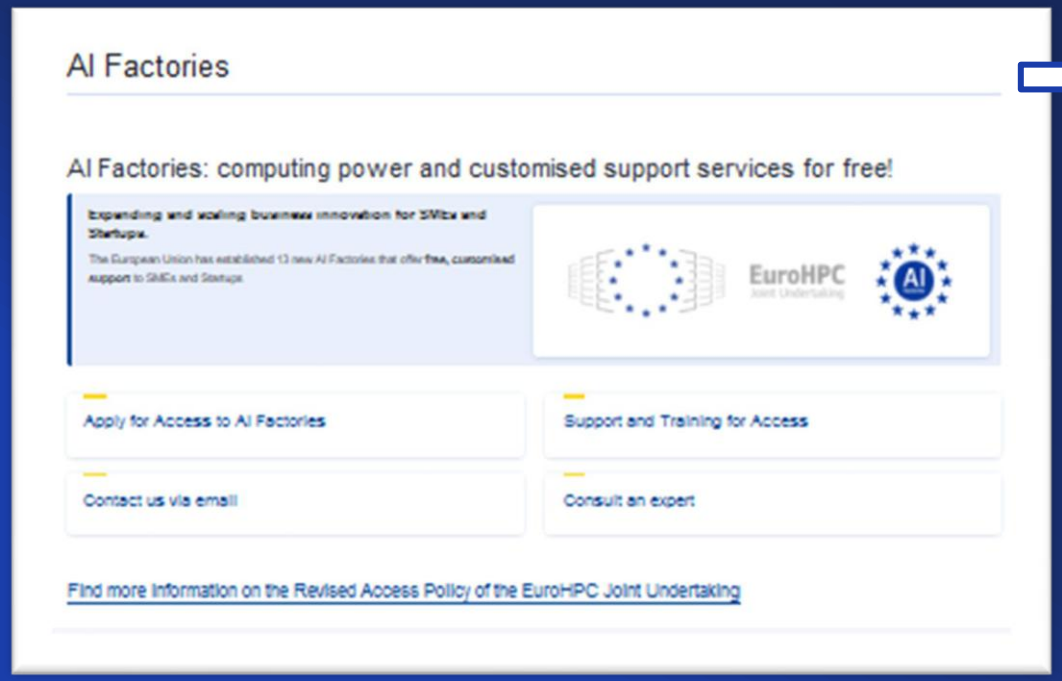
- AI FOR SCIENCE & COLLABORATIVE EU PROJECTS ACCESS

INDUSTRIAL INNOVATION

- LARGE SCALE ACCESS
- PLAYGROUND ACCESS
- FAST LANE ACCESS

Single gateway to AI Factories

https://www.eurohpc-ju.europa.eu/ai-factories_en



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.

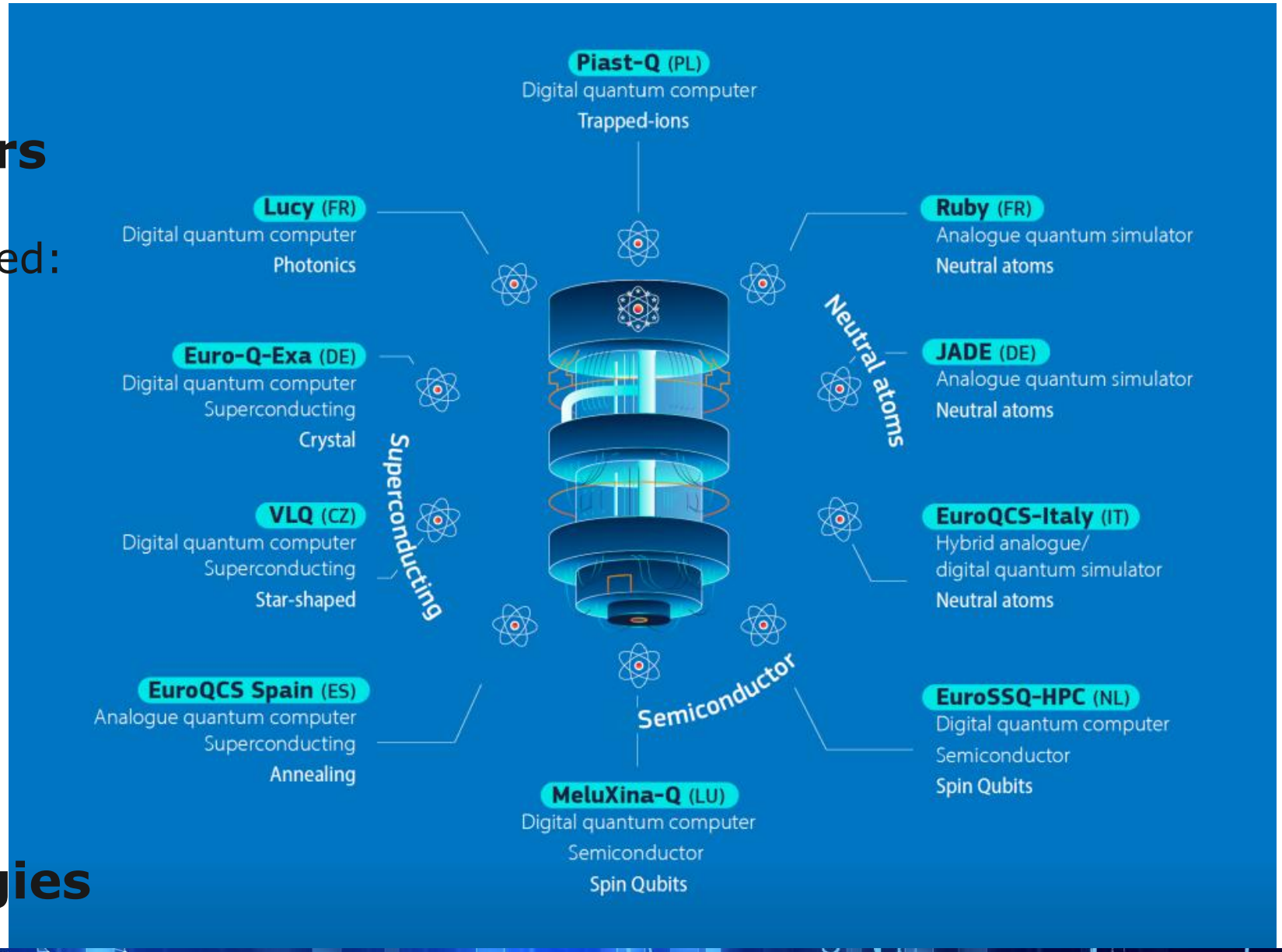
Thank you !

QUANTUM

10 Quantum Computers

2 systems recently inaugurated:
- Piast-Q (PSNC, Poznan)
- VLQ (IT4I, Ostrava)

6 Different technologies



DIVERSITY IN QUANTUM TECHNOLOGIES

EuroQCS-France	**Euro-Q-Exa** (Germany)	**EuroQCS-Italy**	**Lumi-Q** (Czechia)	**EuroQCS-Poland**	**EuroQCS-Spain**
Photonic quantum computer	Superconducting qubits	Neutral atoms	Superconducting qubits with a star-shaped topology	Trapped ions	Quantum annealer