

**HPC User Forum –  
6 – 7 September 2023**

**Developments in the European Union – EuroHPC**

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- **New policy developments**
- The EuroHPC JU - update

# Digital – a critical element for the EU's future

## A Digital Decade strategy to digitally empower Europe by 2030

- Concrete digital goals to achieve: Skills, Government, Business, infrastructures (5G coverage, world semiconductor production, quantum... )
- HPC is a key element for a sustainable ecosystem of interoperable digital infrastructures

### ■ The EU Recovery and Resilience Facility €723,8 billion

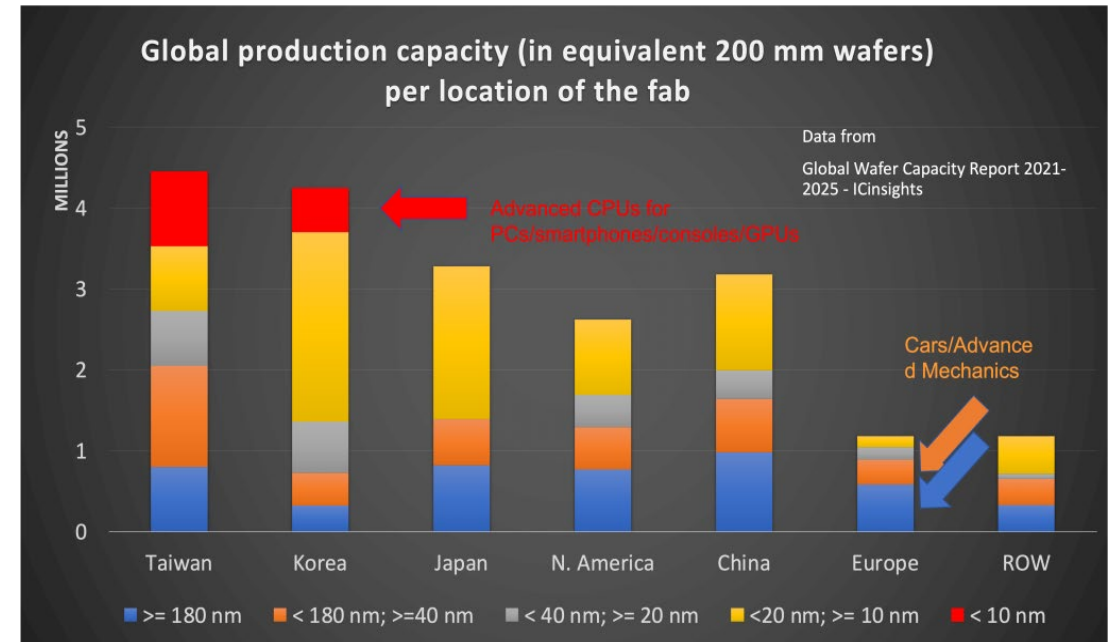
- 20% in each country for the digital transition

### ■ European Green Deal – Twin transition

### ■ Digital sovereignty – **European Chips Act**

# World semiconductors

- Global sales of \$574 billion in 2022
- By 2030 to exceed USD 1 – 1.3 Trillion
  - *CAGR > 7%*
- EU represents 20% of market but 10% of sales



**Chips Act Objective:** at least 20% of the world production of cutting-edge semiconductors including processors

- Increase share of sales and production in EU
- Develop capabilities in digital design and advanced node production

# The European Chips Act

- More than **€43 billion** of policy-driven investments until 2030 -broadly matched by private investments
- Approved on **25 July 2023**

## European Semiconductor Board (Governance)

### Pillar 1

#### Chips for Europe Initiative

- From lab to fab
- Infrastructure building in synergy with the EU's R&I programmes
- Competence centres
- Support to start-ups and SMEs - Chips Fund

### Pillar 2

#### Security of Supply

- First-of-a-kind semiconductor production facilities

### Pillar 3

#### Monitoring and Crisis Response

- Monitoring and alerting
- Crisis coordination mechanism with MS
- Strong Commission powers in crisis

- New policy developments
- **The EuroHPC JU - update**

# The EuroHPC Joint Undertaking 2021-2027

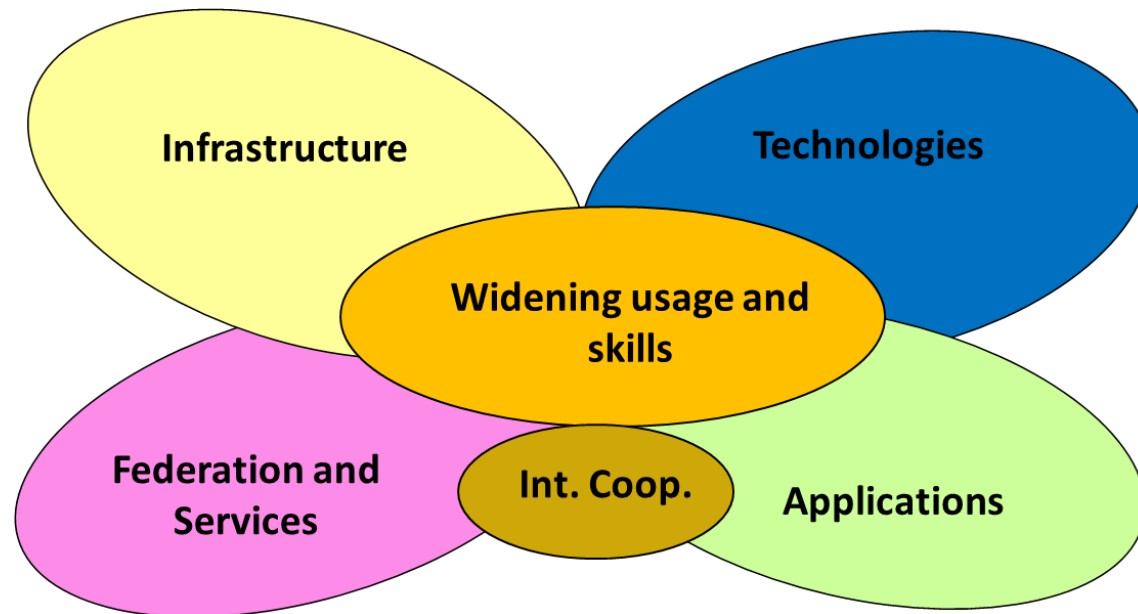


## Mission:

- World-leading HPC, QC, data infrastructure and services
- Technology supply chain
- Applications
- HPC use and skills
- INCO

A legal and funding agency (EUR 7 billion 2021-2027)

- 33 Participating States (All EU MS) + EU + 3 Private Members (ETP4HPC, BDVA & QuIC)





# HPC Infrastructure

	2019 - 2021	2022	2023	2024	2025	2026	2027
HPC Infrastructure	3 pre-exascale 5 peta-scale (TCO ~€900 M)	1 exascale 5 peta-scale (TCO > €800 M)		1 exascale 1 Industrial-grade systems	Pre-exascale, exascale and post-exascale HPC systems		



- LUMI (FI)
- Leonardo (IT)
- MareNostrum 5 (ES)



**JUPITER (DE)**



**(Jules Verne consortium) (FR)**

- Discoverer (BG)
- Karolina (CZ)
- Meluxina (LU)
- Vega (SI)
- Deucalion (PT)

- CASPIr (IE)
- Daedalus (GR)
- EHPCPL (PL)
- Levente (HU)
- Arrhenius (SE)





# Quantum Computing Infrastructure

	2019 & 2020	2021	2022	2023	2024	2025	2026	2027
<b>Quantum Infrastructure</b>	<b>1<sup>st</sup> round</b> <b>2 quantum simulators</b> interfacing with HPC systems (€12 M)	<b>2<sup>nd</sup> round</b> <b>6 quantum computers + quantum simulators</b> interfacing with HPC systems (17 participating states and € 100 M+ procurement budget)			<b>3<sup>rd</sup> round</b> new generation of <b>quantum computers + quantum simulators</b> most advanced platforms € 300 M)			








- *BSC (ES) – MareNostrum 5*
- *CINECA (IT) - Leonardo*
- *GENCI-CEA (FR) – Joliot-Curie/”JV”*
- *It4I (CZ) LUMI-Q – Karolina*
- *LRZ (DE) - SuperMUC-NG*
- *PSNC (PL) – Poznan HPC*

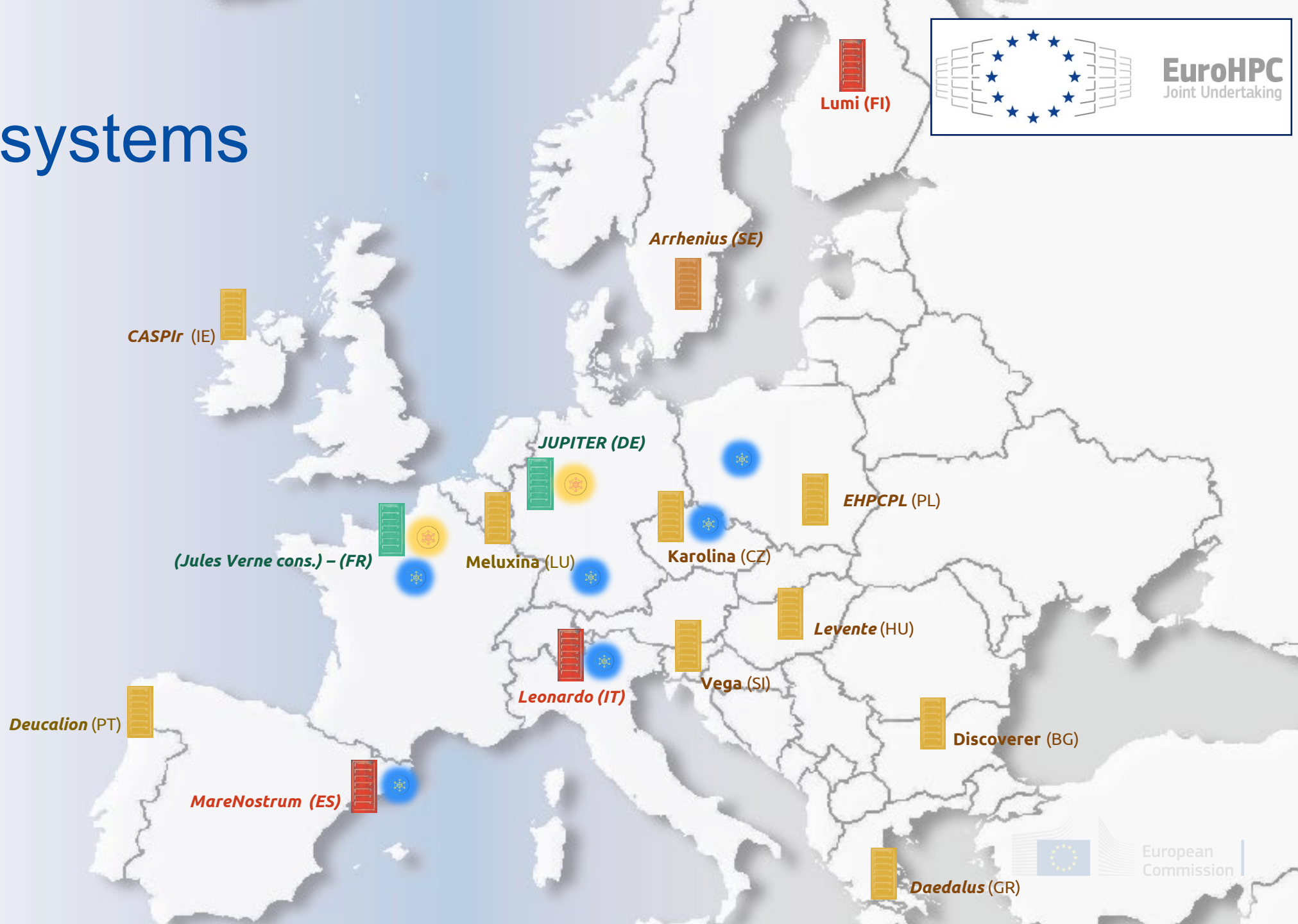
**Objectives**

- Build ecosystem, develop skills
- 2025 – Hybrid computing with a quantum accelerator
- 2030 – Cutting edge in quantum

# EuroHPC systems



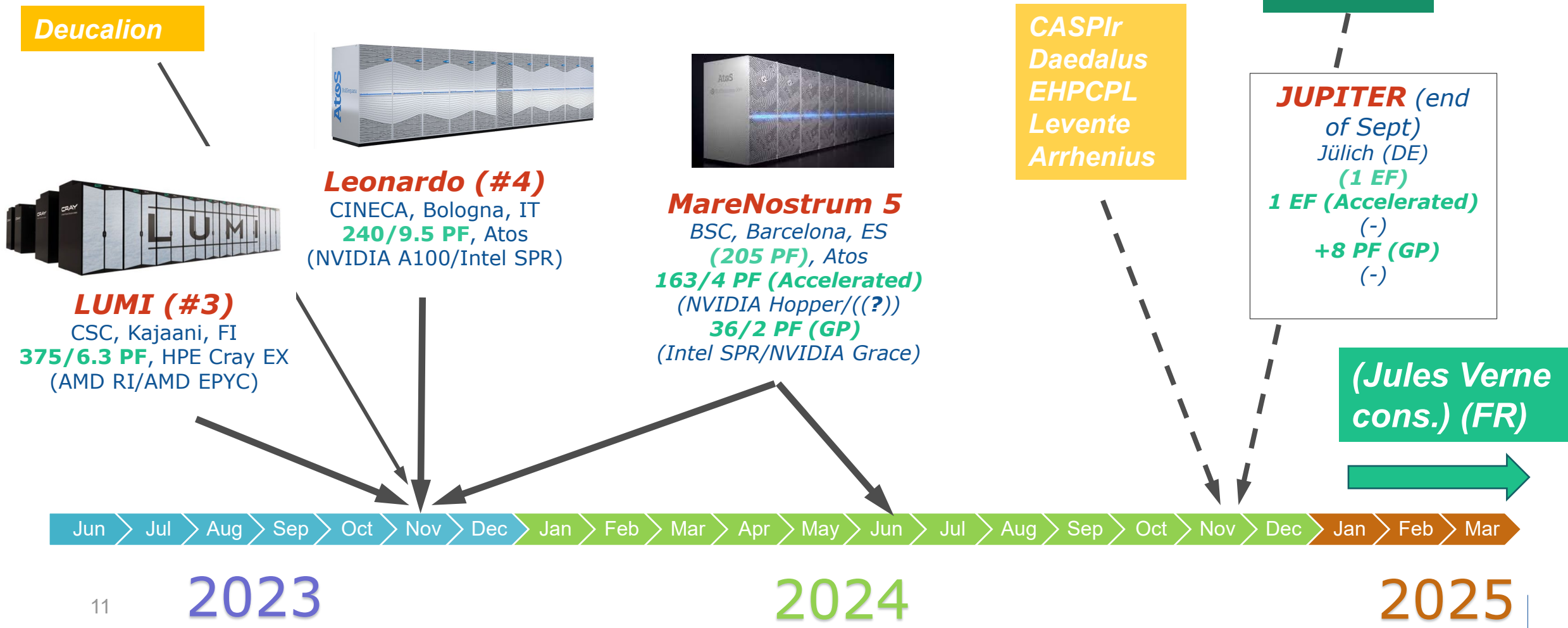
-  Exascale
-  Pre-exascale
-  Petascale
-  Qcomputer
-  Qsimulator



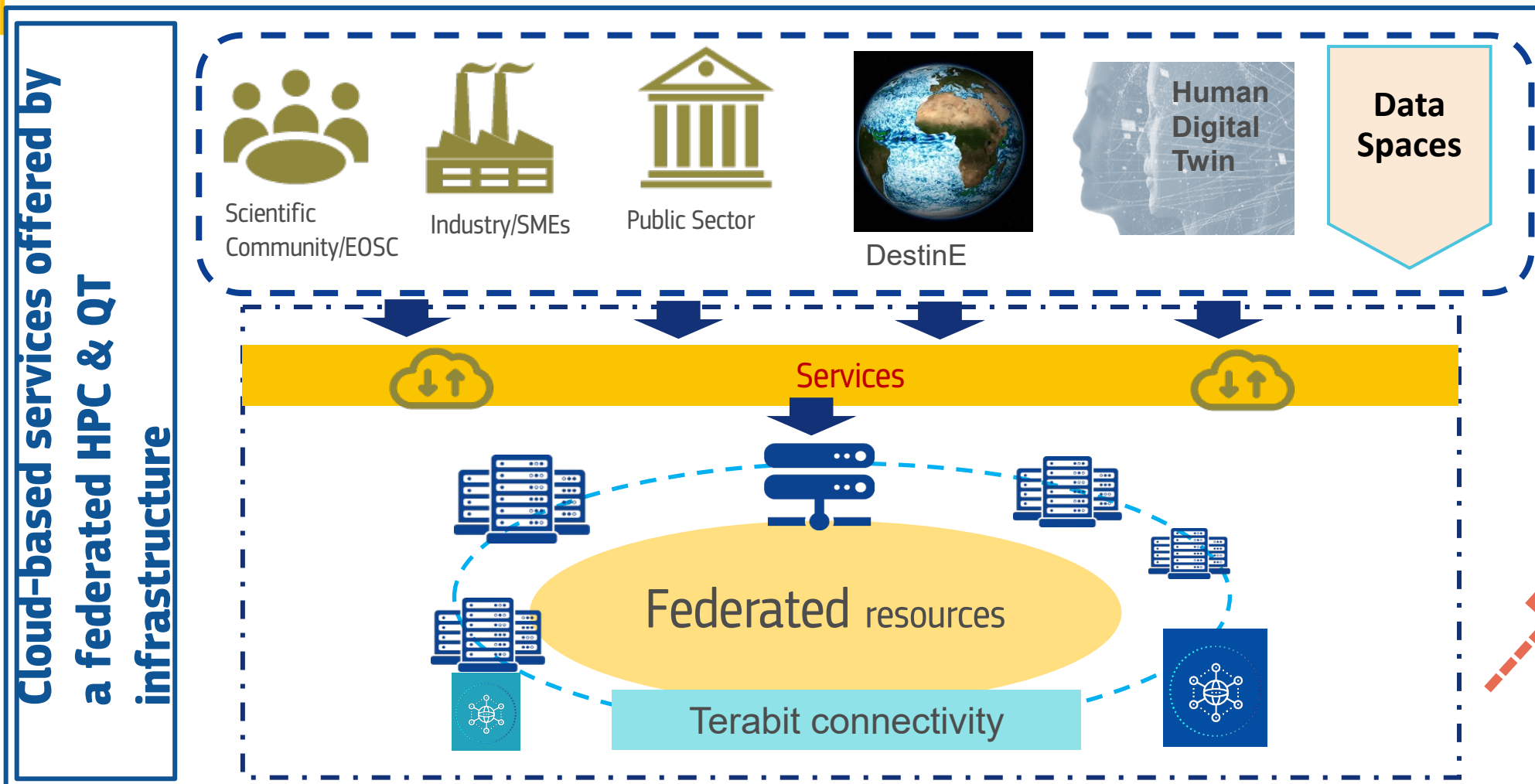
# EuroHPC systems – expected timeline



(ranking top500 – not installation)



# Hyper-connectivity & Federation



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# Strengthening the HPC Ecosystem



## Technologies for EU's strategic autonomy

- Low-power (EPI/ARM, RISC-V)
- System integration, energy-efficiency, interconnects
- SW technologies and algorithms for exascale
- Interconnection/integration with HPC systems (Quantum)

## Applications for Excellence & Leadership

- Centres of Excellence in HPC applications (+quantum)
- HPC codes & applications for extreme computing and data (AI, HPDA, cloud, etc.) – Digital twins
- Code Industrialisation and deployment

## Widening use and skills

- National Competence Centres
- Facilitating HPC adoption and use by AI community (LLM)
- Industrial access and use of HPC infrastructure
- Capabilities and skills in HPC/Quantum/Data
- EU industrial users in HPC

## International Cooperation

- Implementation of Digital Partnerships
  - Covering Applications&Access (*Japan*)

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**Thank you!**