Towards a federated European HPC ecosystem

DANIEL OPALKA

THE EUROHPC JU POOLS THE RESOURCES OF ITS MEMBERS TO:

Develop, deploy, extend & maintain in Europe a **world-leading supercomputing, quantum computing, service** & **data infrastructure** ecosystem;

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 support the development of **key HPC skills** for European science and industry.

OUR MEMBERS

- 32 participating countries
  (Serbia joined recently)
- The European Union
  (represented by the European Commission)
- Private partners
  (represented by industry associations)

EuroHPC Joint Undertaking

BDV BIG DATA VALUE ASSOCIATION

QIC European Quantum Industry Consortium

ETP 4 HPC EUROPEAN TECHNOLOGY PLATFORM FOR HIGH PERFORMANCE COMPUTING

FUNDING AND OPERATING BUDGET

Digital Europe
1.98 B€
- Infrastructure
- Federation of HPC services
- Widening usage and skills

Horizon Europe
900 M€
- Technology
- Applications
- International cooperation

Connecting Europe Facility
200 M€
- Hyperconnectivity
- Data connectivity

Total budget
1.5 B€ in 2019-2020
7 B€ in 2021-2027

900 M€ in-kind contributions from Private Members

3 B€ from Participating States

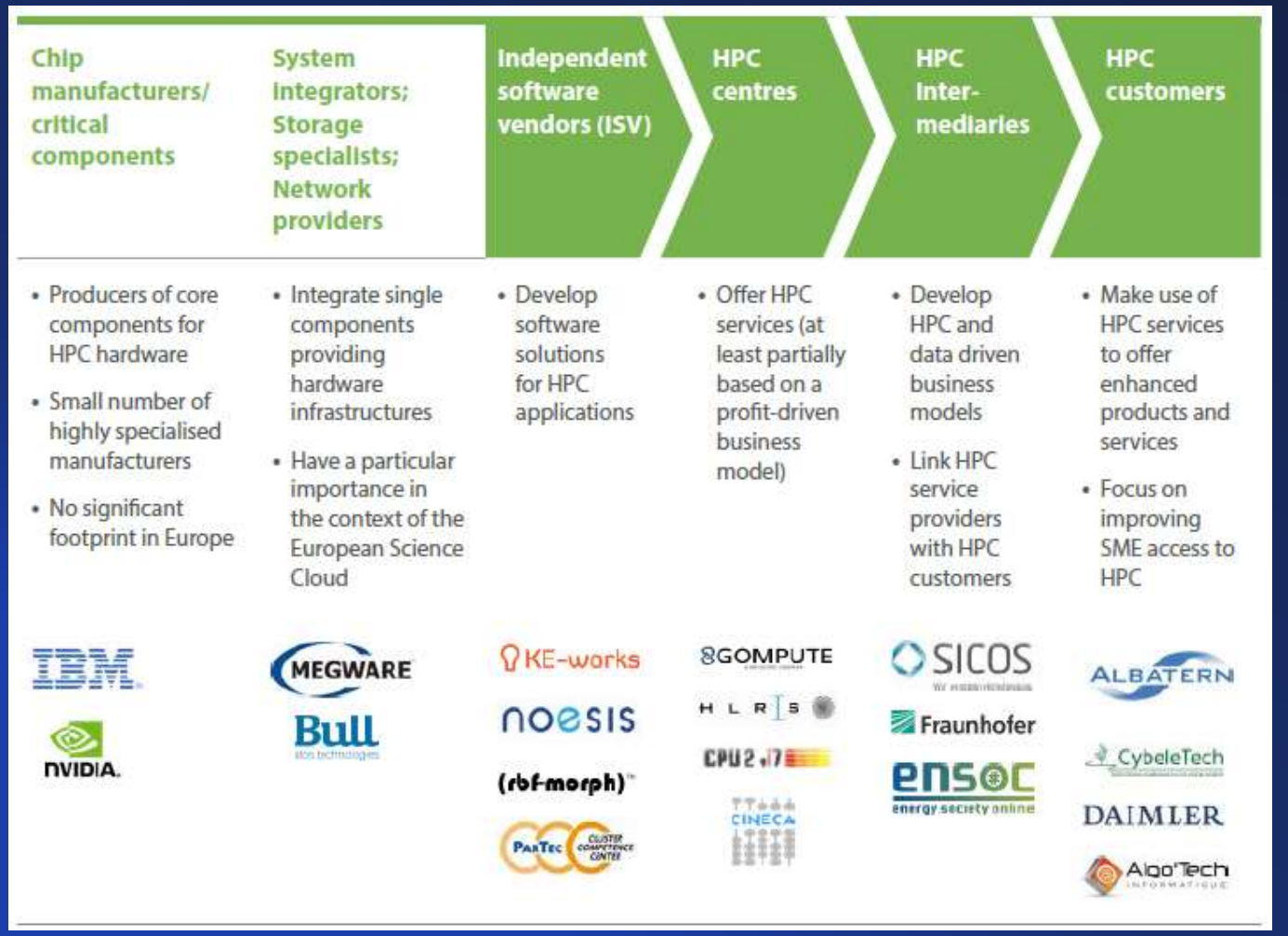
THE EUROHPC JU TEAM

We are currently a small team of 16 employees and in the process of recruiting around 30 additional employees throughout 2022.

New team members from 1 July 2022

- Linda Gesenhues (Programme Officer)
- Athanasia Evangelinou (Programme Officer)

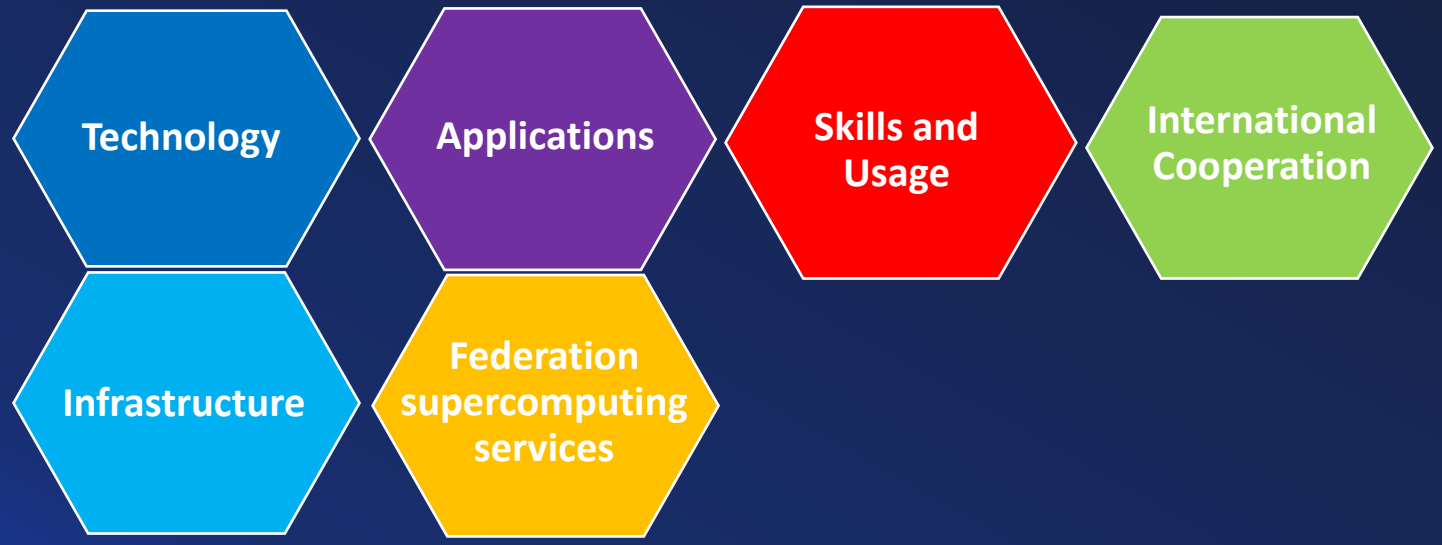
THE HPC VALUE CHAIN



"Financing the future of supercomputing" EIB Advisory Services, 2018

FINANCIAL INSTRUMENTS

- **Grants**
  - Calls for Proposals
  - Synergy grants
- **Procurements**
  - Calls for Tender
  - Co-financing through ESIF, RRF

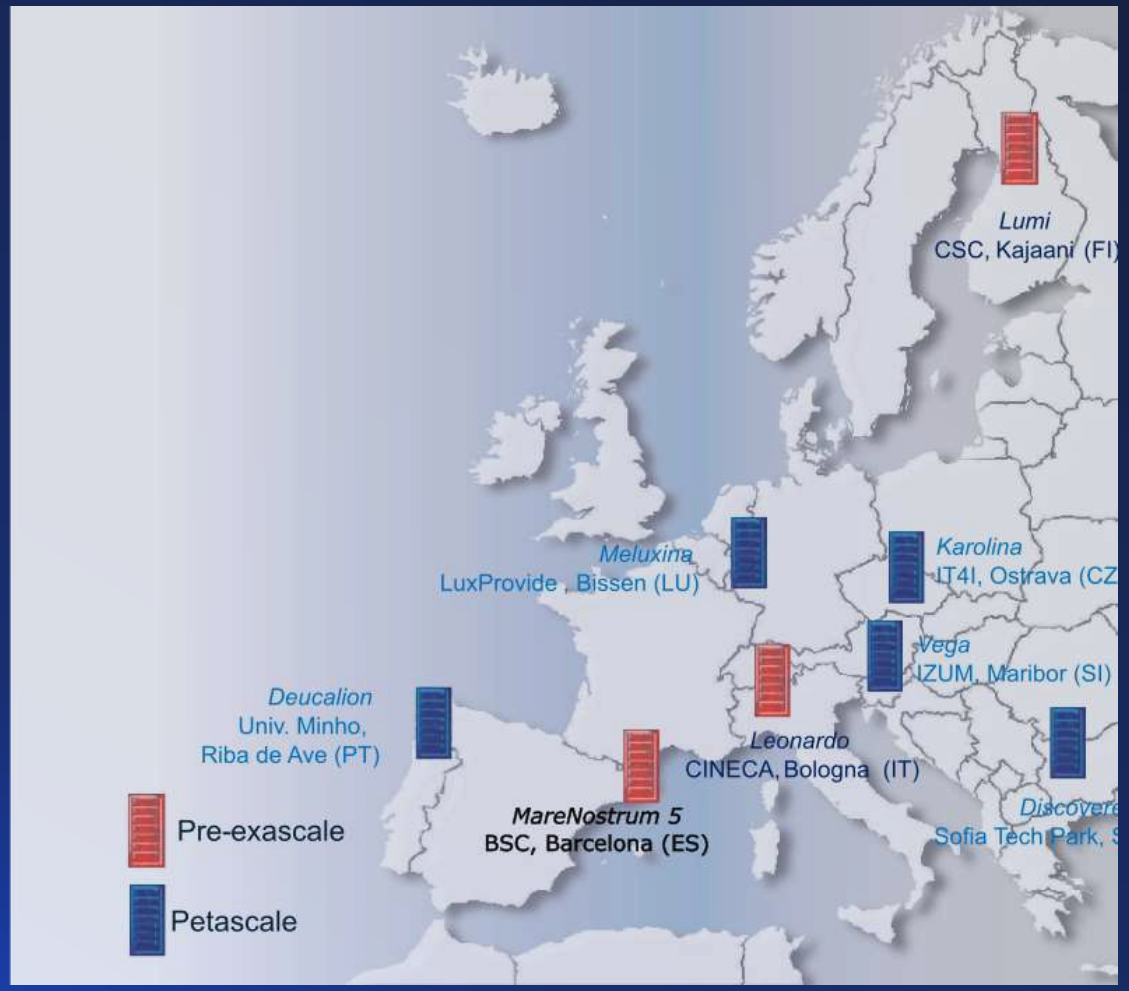


- **Equity & debt financing**
  - Not provided by the JU but could be used in combination with grants and procurements
  - The European Innovation Council offers equity, also blended with grants (SMEs)
  - The European Investment Bank offers loans

CURRENT EUROHPC INFRASTRUCTURE

Available / under construction (Q2 2022)

- 3 pre-exascale supercomputers
  - MareNostrum 5, ES
  - Leonardo, IT
  - LUMI, FI (Rank 3 on Top500 and Green500 lists)
- 5 peta-scale supercomputers
  - Deucalion, PT
  - Discoverer, BG
  - Karolina, CZ
  - Meluxina, LU
  - Vega, SI
- 360M€ total EU investment



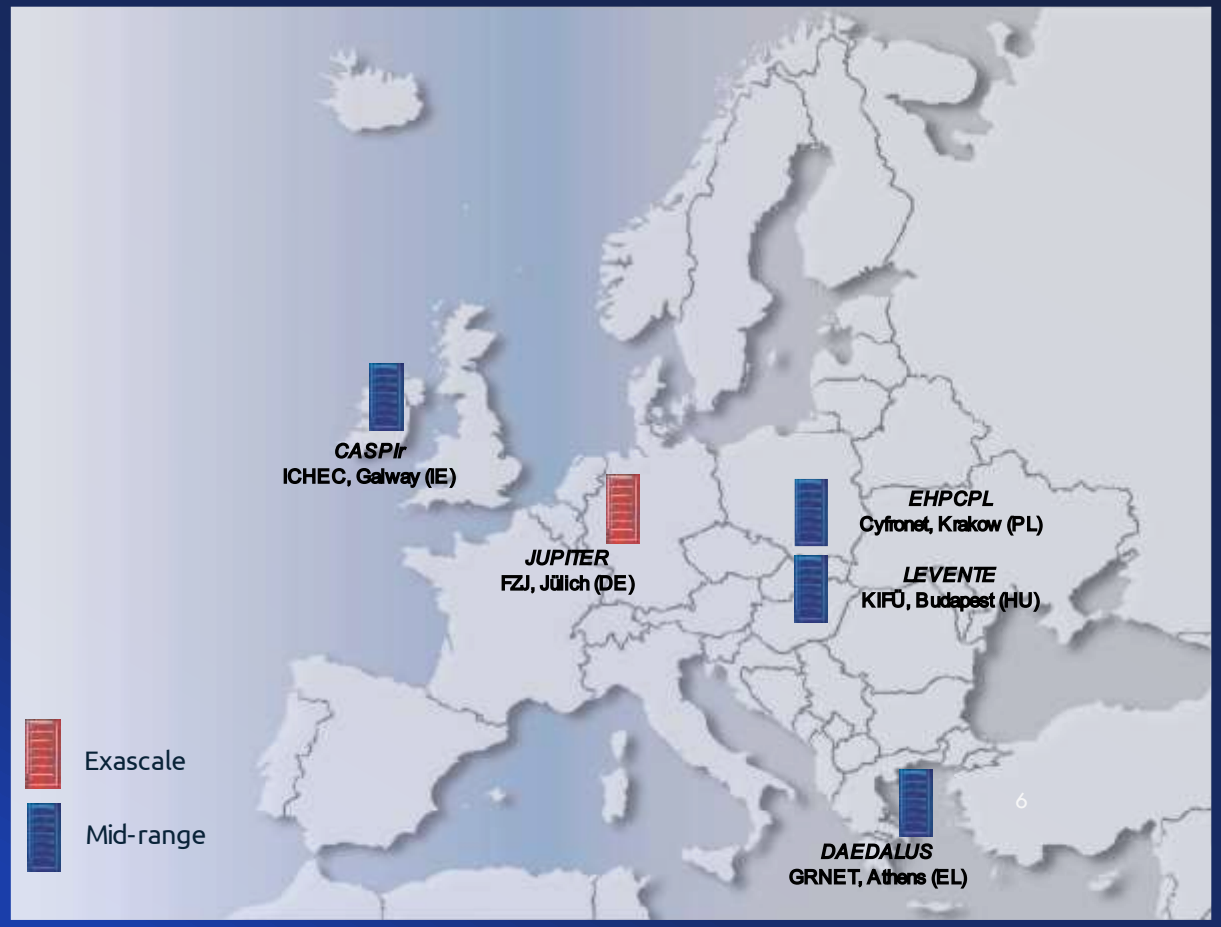
WORLD-CLASS GREEN PETASCALE SUPERCOMPUTERS

The operational petascale EuroHPC systems all rank among the world's most powerful supercomputers:

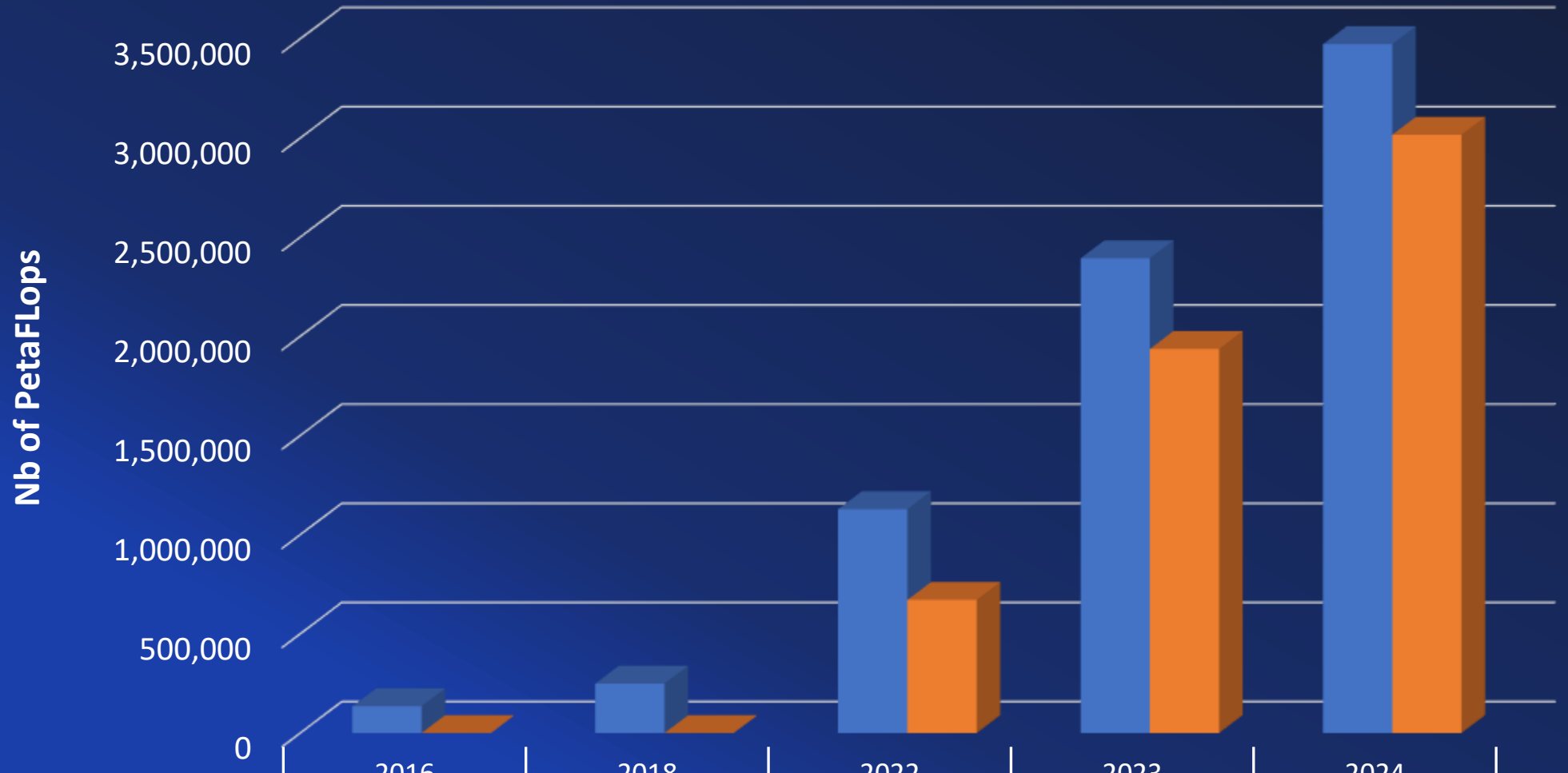
	TOP500	Green500
MELUXINA	48	15
KAROLINA	79	14
DISCOVERER	113	241
VEGA	131	247

NEXT GENERATION OF EUROHPC SUPERCOMPUTERS

- 1 exascale supercomputer
  - JUPITER, DE
- 4 mid-range supercomputers
  - DAEDALUS, EL
  - LEVENTE, HU
  - CASPIr, IR
  - EHPCPL, PL
- Up to 357M€ total EU investment



EVOLUTION OF THE COMPUTING POWER AVAILABLE IN EUROPE



	2016	2018	2022	2023	2024
European computing power (PFLops)	135,360	249,580	1,128,551	2,393,551	3,473,551
EuroHPC computing power (PFLops)	0	0	671,158	1,936,158	3,016,158

NEXT GENERATION OF EUROHPC SUPERCOMPUTERS

- Calls for Expression of Interest to host a EuroHPC supercomputer on regular basis
- Quantum computer infrastructure integrated in HPC systems
- Procurement strategy under development
  - User-driven with focus on user needs and applications
  - Diversity of technology and user communities (industry, academia)
  - Increased share of European technology
  - Improved Energy efficiency (data centre, HPC system)

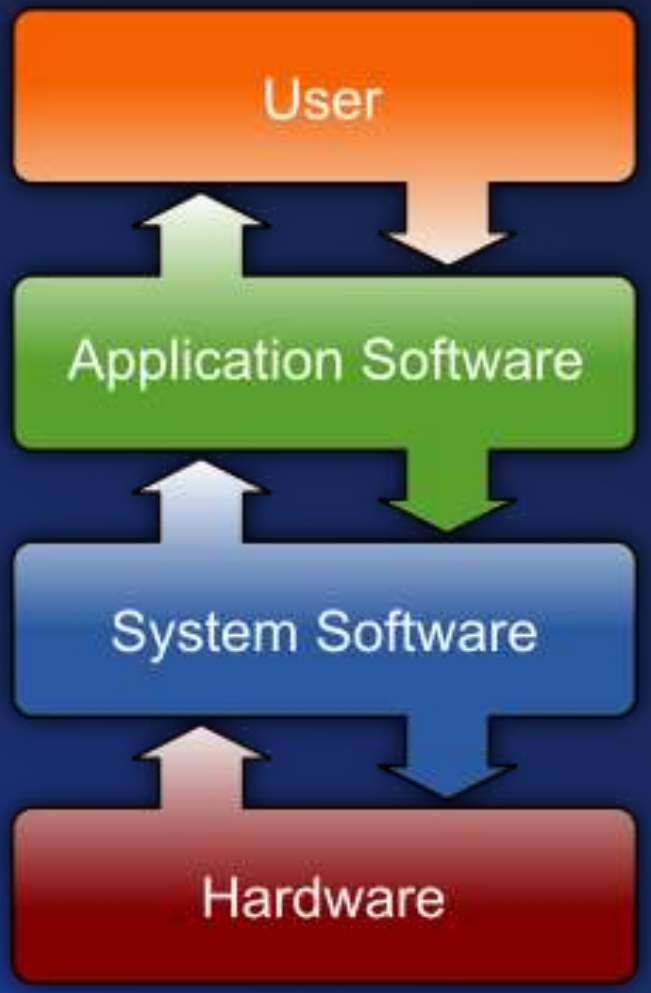
STRATEGIC R&I – INTERVENTION AREAS

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

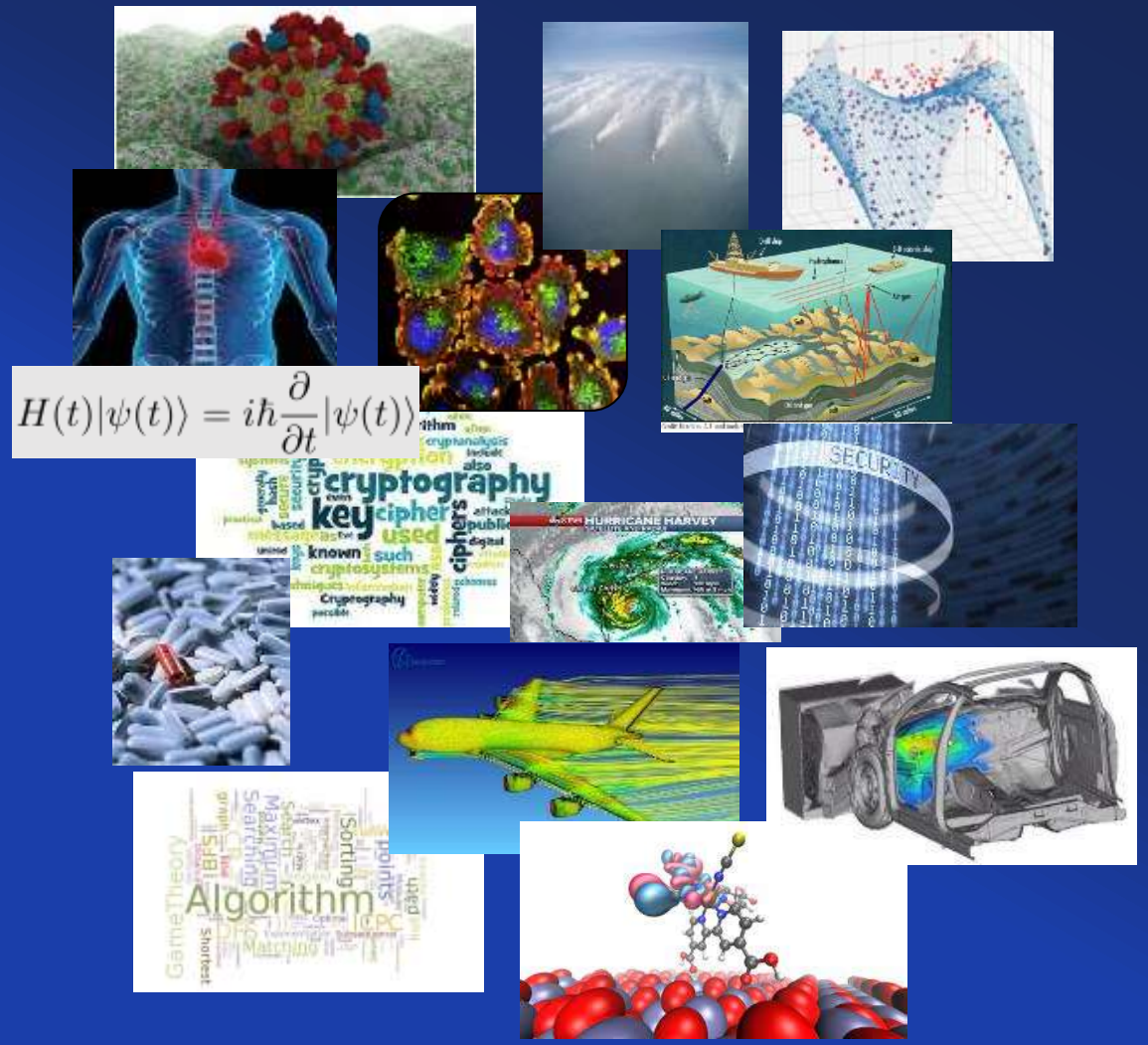


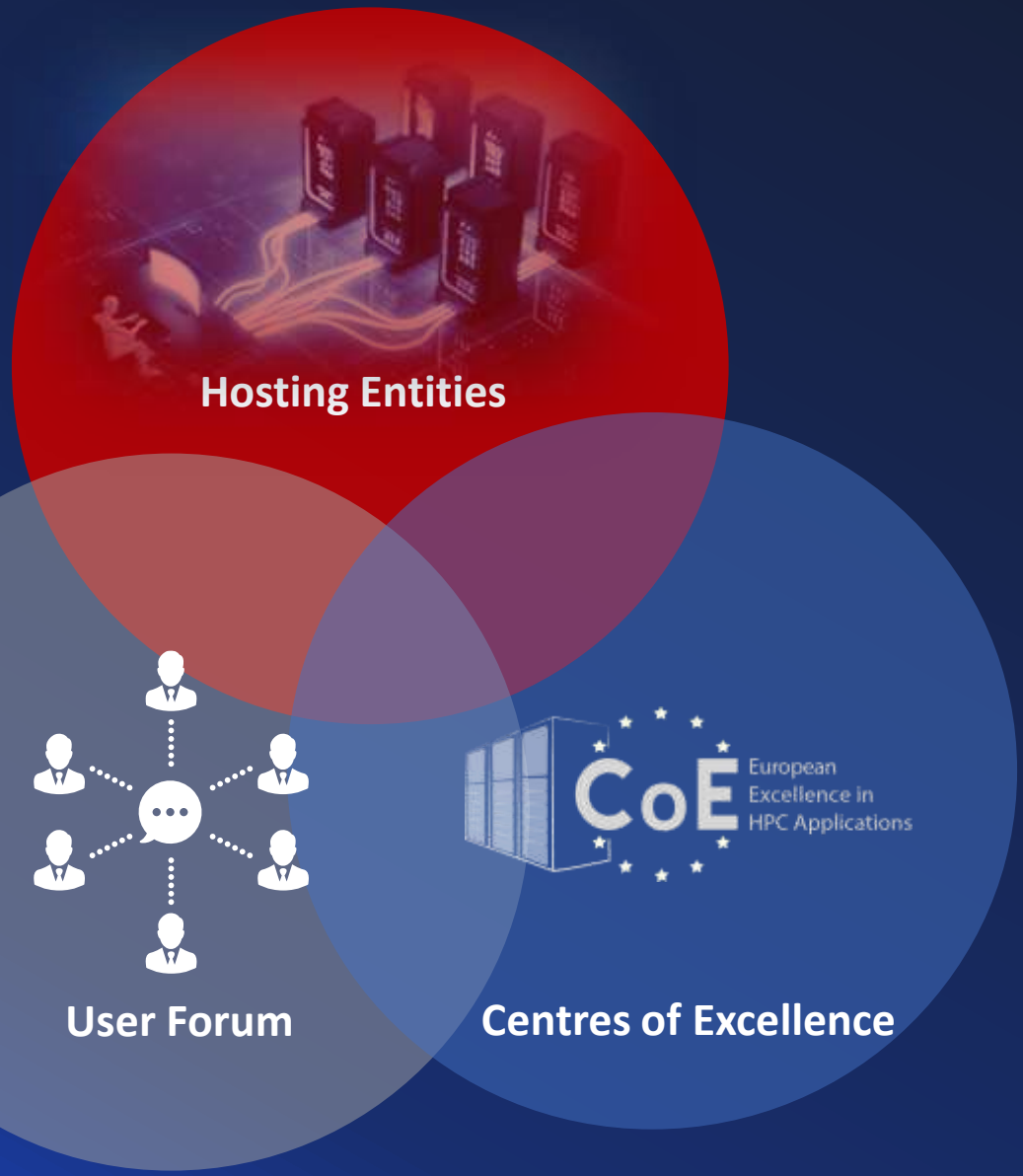
OUTREACH & FEEDBACK TO POLICY
USER FORUM INITIATIVE

- 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
- Connect stakeholders from HPC user communities with policy makers and funding authorities, beyond academia and traditional HPC technology providers and operators
- Include new and underrepresented user communities to address their requirements and support HPC uptake

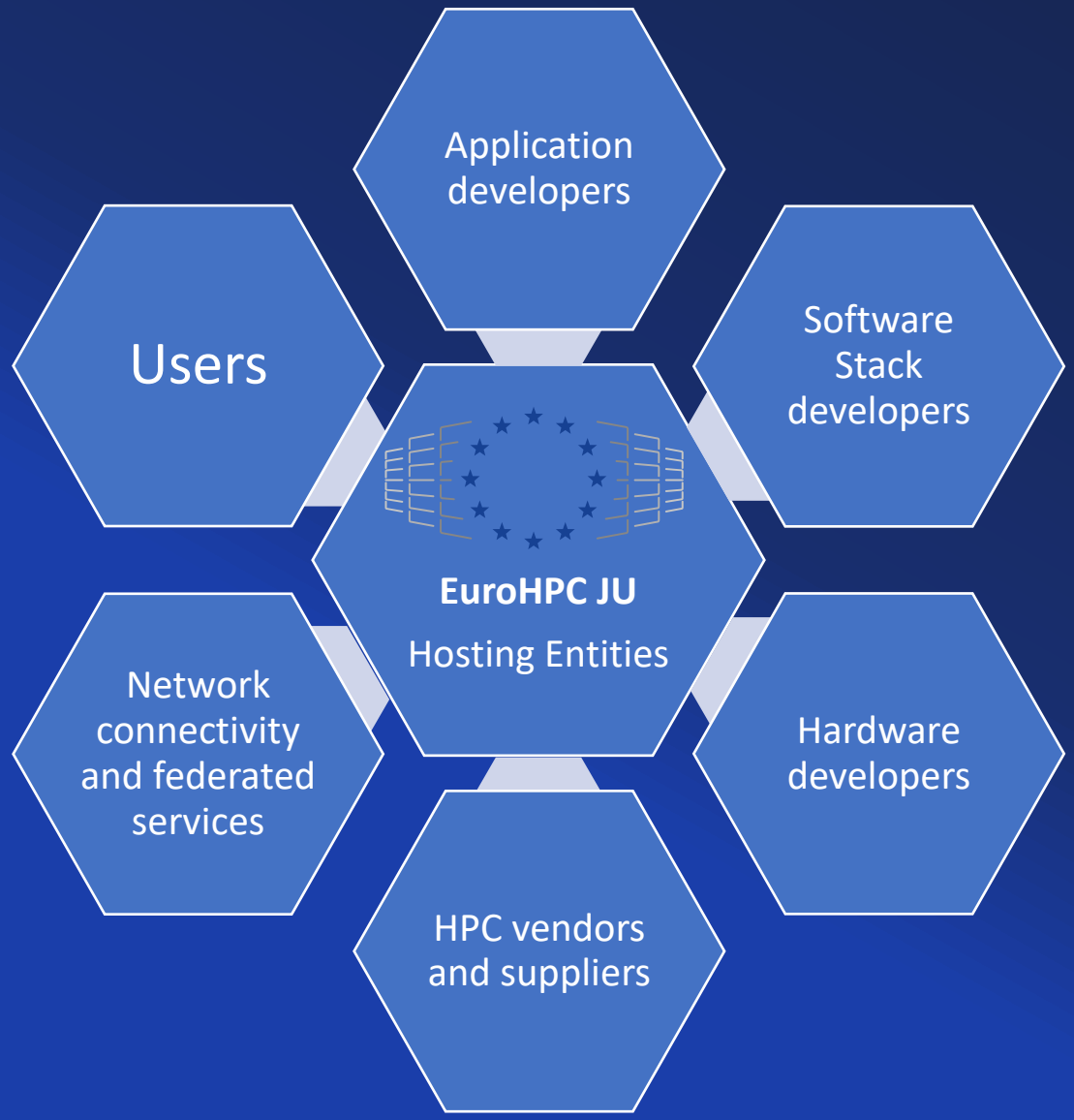
Process for the establishment of the User Forum is in a very early stage, but contributions and suggestions are welcome.

EUROHPC ADVANCED USER ECOSYSTEM





TOWARDS A FEDERATED EUROPEAN HPC ECOSYSTEM



- JU owns unique pool of HPC resources
- Central role of EuroHPC Hosting Entities as focal points of HPC expertise
- Partnership of JU and HEs
  - Ambitious and creative to identify and exploit synergies beyond state of the art
  - Inclusive, share knowledge and support mobility of expert staff
  - Not only physical connectivity is important: enhance personal networks and collaboration across Europe

EuroHPC
Joint Undertaking

Thank you