



**Barcelona
Supercomputing
Center**

Centro Nacional de Supercomputación





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The Barcelona Supercomputing Center

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Operations Director

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EuroHPC
Joint Undertaking

MareNostrum 5. A European pre-exascale supercomputer

- **200 Petaflops** peak performance (200×10^{15})*
- **Experimental platform** to create supercomputing technologies “made in Europe”
- **217 M€** of investment



Hosting Consortium:

Spain Portugal Turkey Croatia



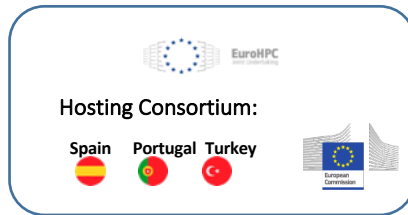
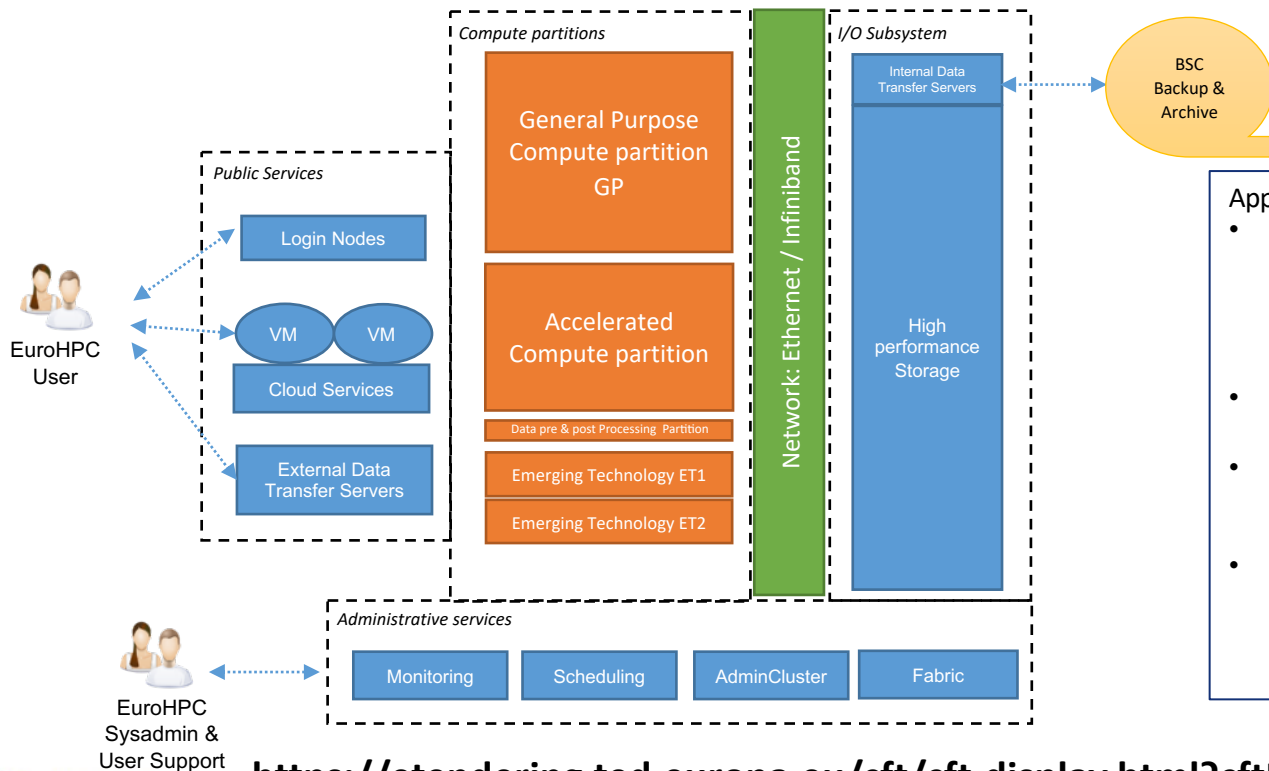
* At the time of call for HE, peak performance expected of 200 Petaflops
* At the time of tender publications, minimum aggregated sustained HPL of 205 Petaflops



The acquisition and operation of the EuroHPC supercomputer is funded jointly by the EuroHPC Joint Undertaking, through the European Union's Connecting Europe Facility and the Horizon 2020 research and innovation programme, as well as the Participating States Spain, Portugal, Croatia, and Turkey



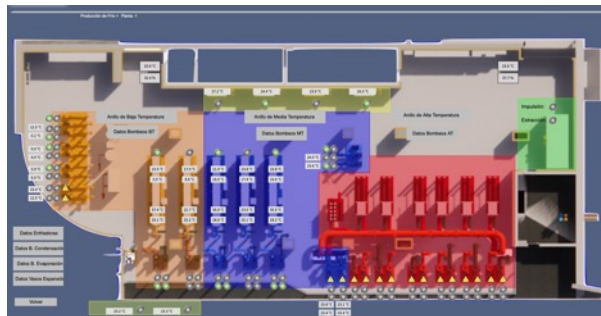
MareNostrum5 concept



Applications:

- General purpose partition, open to all researchers with MPI, OpenMP codes, standard HPC codes. Scalable machine to run codes with high scalability, thousands of nodes.
- Accelerated partition: Any GPU application ready to scale to thousands of GPUs
- Emerging technologies: prepare workloads to exascale era, exascale technology assessment
- Any domain with workflows mixing General Purpose and GPU, e.g. Earth science, Life science, Engineering, AI and AI driven executions.

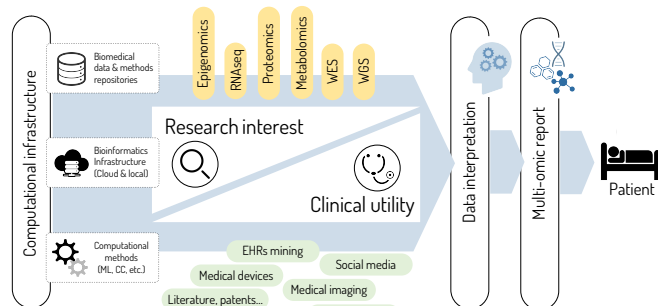
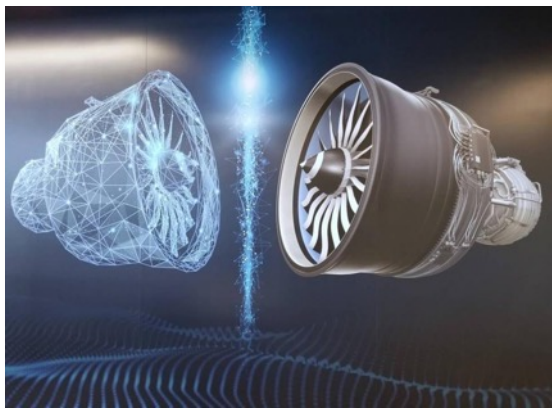
<https://etendering.ted.europa.eu/cft/cft-display.html?cftId=9758>



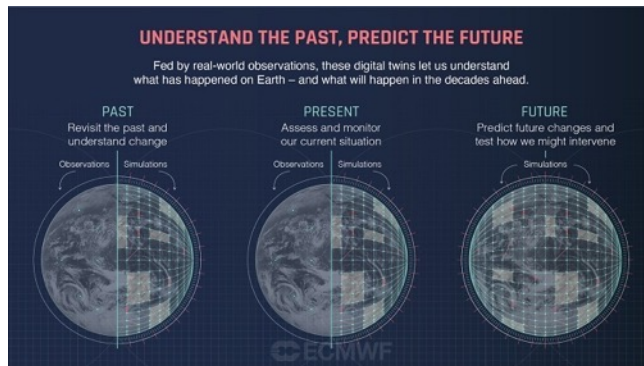
MareNostrum 5 facility is waiting for the system

Expected PUE <1,08, total power >12MVA, 85% on DLC/inmersion, >900 m²

Applications, Centers of Excellence and Spanish Competence Center



SERVICE CATALOGUE			
HARDWARE <ul style="list-style-type: none"> Computational platform <ul style="list-style-type: none"> HPC HTC/Cloud Big Data GPU Virtualization Massive storage <ul style="list-style-type: none"> High performance High capacity disk Tape 	SOFTWARE <ul style="list-style-type: none"> Applications <ul style="list-style-type: none"> In house Commercial Open App access (see catalogue) App installation 	TECHNICAL SUPPORT <ul style="list-style-type: none"> Basic Advanced <ul style="list-style-type: none"> Algorithms, program and architecture development Code porting and program optimization User software development 	CONSULTANCY <ul style="list-style-type: none"> Consultancy HPC/ HPA/ AI/BD Basic / Advanced <ul style="list-style-type: none"> Search and selection of algorithms, programs and architectures Analysis and design of user-friendly and productive work environments Design and development of R&D projects Initial consultancy on business development Training <ul style="list-style-type: none"> general / technical on-site / online standard / tailored



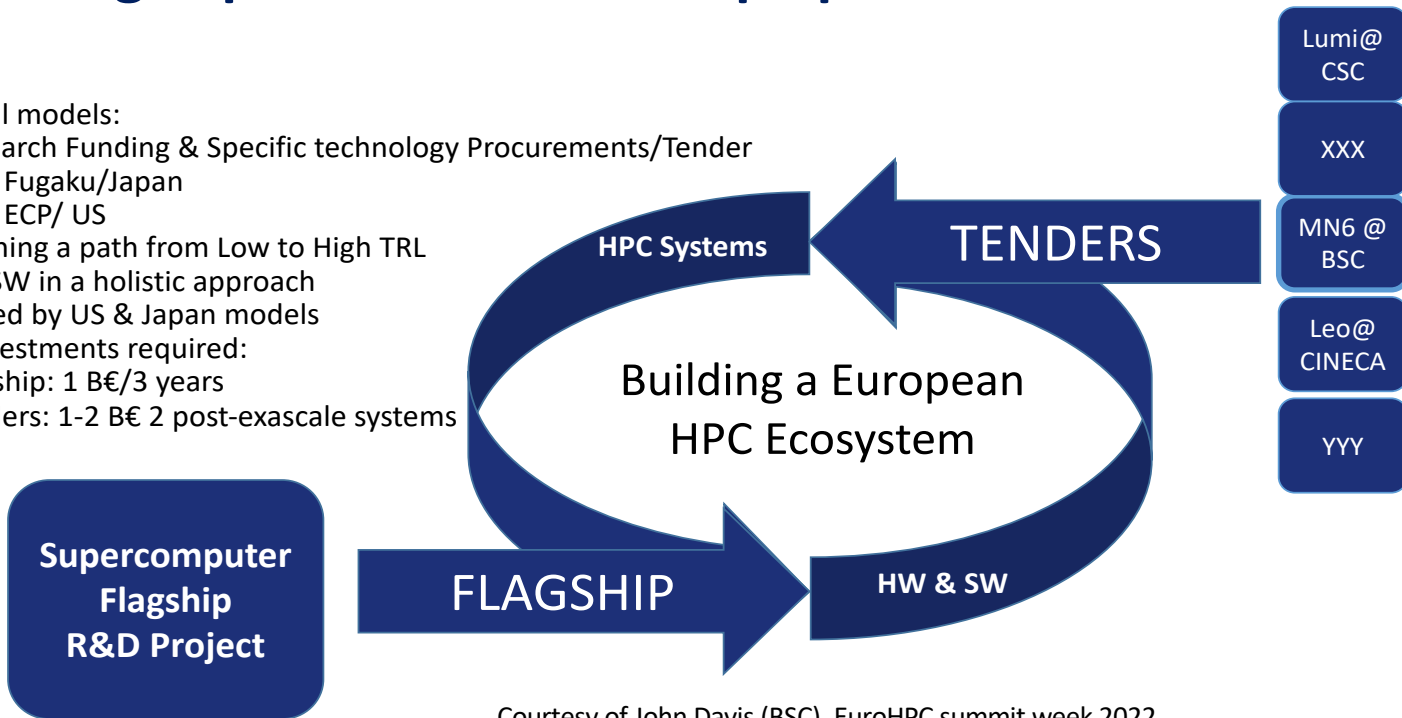
Centers of excellence in HPC applications

BSC leads  Centre of Excellence in Solid Earth  Centre of Excellence in Oceanography  Centre of Excellence in Personalized Medicine  Performance Optimization and Productivity
BSC participates  AISEE: AI and Simulation-based Engineering of Extreme Research  bioXcell: Centre of Excellence for Biomedical Research  Eukalix: Centre of Excellence on Computational Biomaterials  E.C.E.: Energy efficient Centre of Excellence  ESVW/ENCCO: Excellence in Simulation of Weather and Climate in Europe  ATELERA: European Centre of Excellence for Engineering Applications  MAX: Materials design at the Maxima  Material Discovery: Novel Materials Discovery  e.cam: A path to extreme-scale computing for industry and academia  H2ALGO: HPC and Big Data Technologies for Global Systems  TREC: Targeting Real chemical accuracy at the Exascale

MareNostrum path to post-exascale

A flagship initiative for Europe post-exascale

- Successful models:
 - Research Funding & Specific technology Procurements/Tender
 - Fugaku/Japan
 - ECP/ US
 - Defining a path from Low to High TRL
- HW and SW in a holistic approach
- EU inspired by US & Japan models
- Major investments required:
 - Flagship: 1 B€/3 years
 - Tenders: 1-2 B€ 2 post-exascale systems



**Supercomputer
Flagship
R&D Project**

Thank you