



**Barcelona
Supercomputing
Center**

Centro Nacional de Supercomputación

www.bsc.es



EXCELENCIA
SEVERO
OCHOA

HPC Resources & Training in the BSC, the RES and PRACE

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RES technical and training coordinator

What is offered by BSC, RES and PRACE?

Scientific cooperation

HPC resources

Support (technical.. and even moral if you wish)

Scalability tests and code portability

Data storage and transfer

Performance evaluation of applications

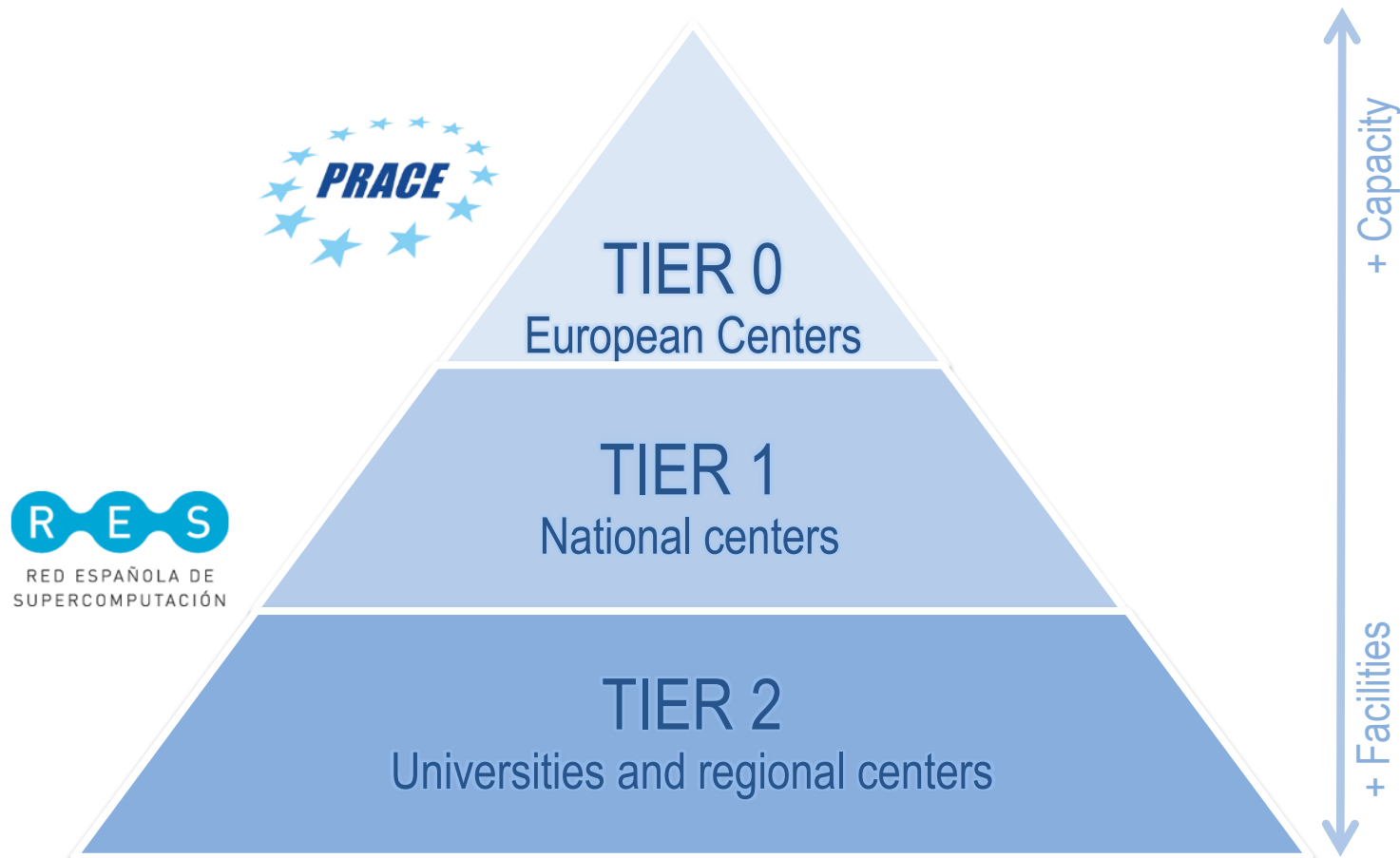
Training as RES coordinator

Training as PRACE Advanced Training Center

Scientific dissemination

How fit together the BSC, the RES and PRACE?

HPC Services in Europe





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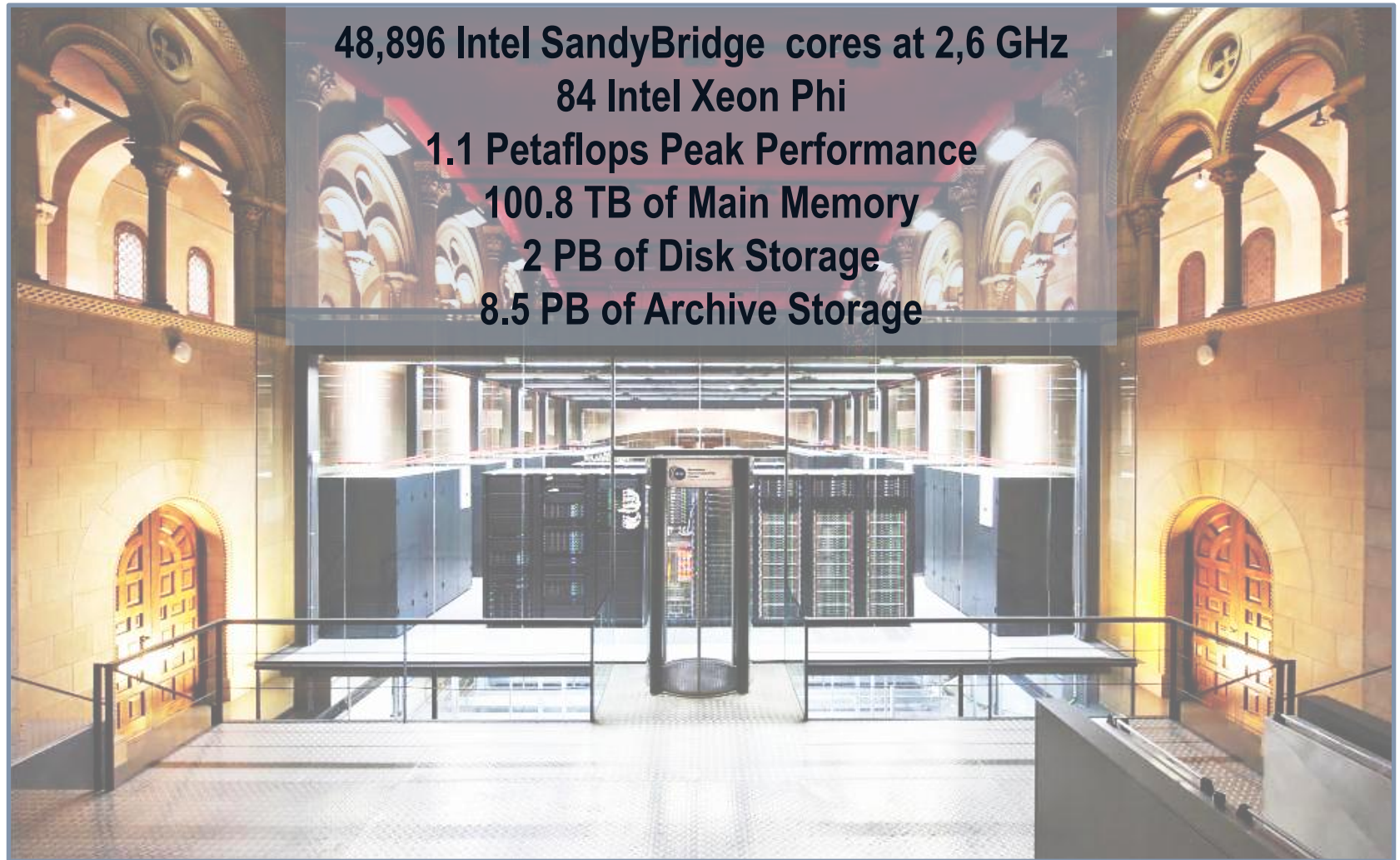
The objective of BSC as National Supercomputing Center is to **research, develop and manage technology to enhance scientific progress.**



BSC-CNS: At-a-glance



BSC-CNS: MareNostrum3



9th Supercomputer in Europe, 29th in the World (TOP500, June 2013)





RED ESPAÑOLA DE
SUPERCOMPUTACIÓN

SPANISH SUPERCOMPUTING NETWORK

RES: A national alliance

The **RES** is a distributed virtual infrastructure.

An interconnection of **supercomputers** that manage their computing capacity and **provide service to researchers.**



Application, access protocol and publication of awarded activities every 4 months in

www.bsc.es/RES

Information in the application form:

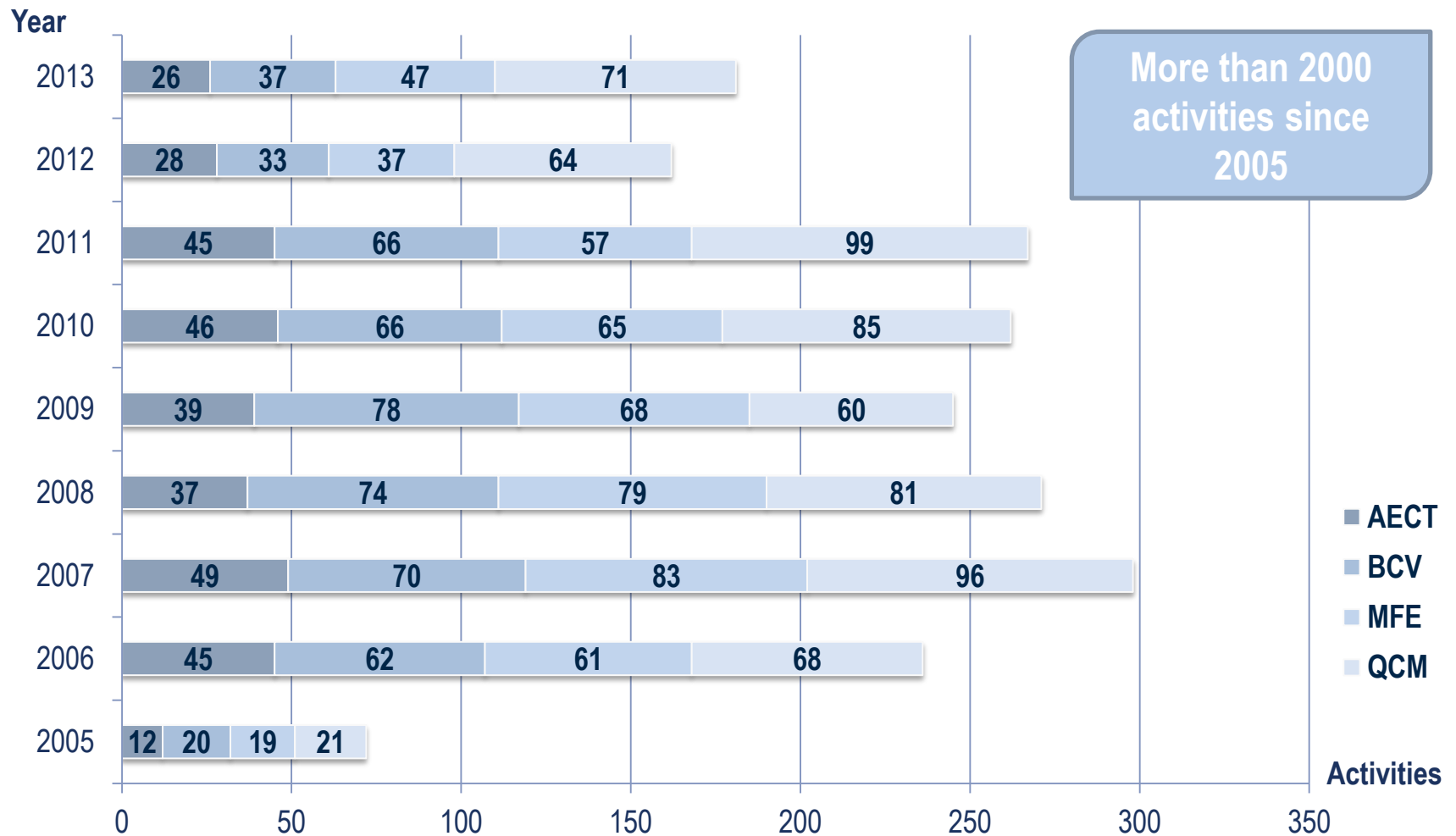
Project description and main objective

Numerical libraries and software required

Research team description

Computation hours, memory and storage needed

RES: Activity volume

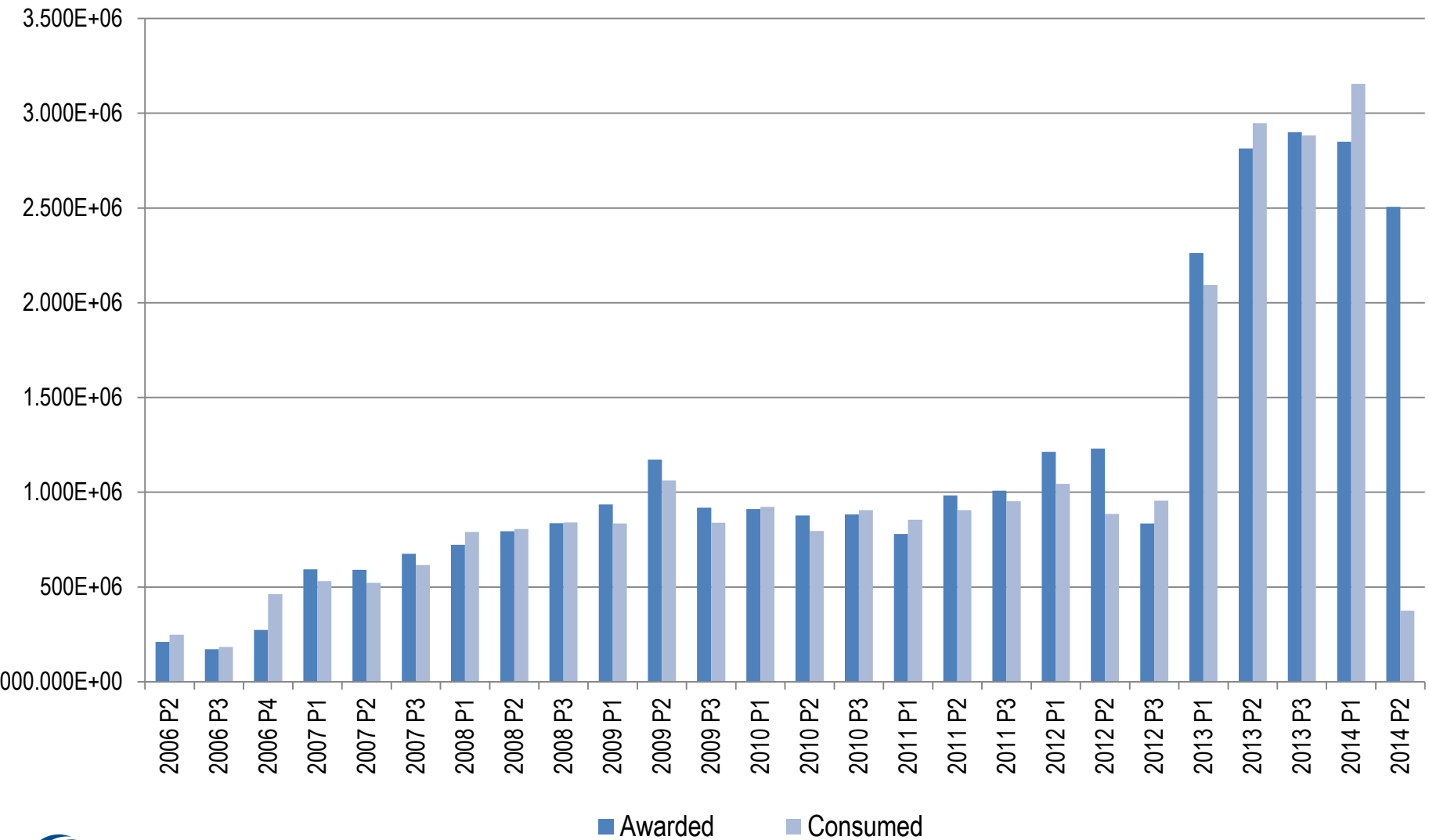


* In 2005 RES provided service only during 3 months.

** In 2012 MN did not provide service for 3 months due to its upgrade process.

*** The accounting of activities in 2013 is till September.

RES: Evolution of awarded and consumed FLOPS



2014 P2 is not fully accounted regarding consumed hours (It finishes the 31st October)



**PARTNERSHIP FOR
ADVANCED COMPUTING IN EUROPE**

PRACE AISBL

- Established in 2010, with seat in Brussels.
- 25 members, representing European Union Member States and Associated Countries
- Hosting members of HPC Tier-0 RI: France, Germany, Italy and Spain.
- 6 supercomputers providing nearly 15 Pflops/s.



PRACE: Call types

Preparatory Access

Test to check suitability before asking Regular Access
Only technically reviewed
Permanently open with quarterly cut-off dates
Allocation from 2 to 6 months
350.000 CPU hours offered

Regular Access

Develop a project during 1, 2 or 3 year(s) allocation
Technically and scientifically reviewed
2 calls per year
Allocation of 12 months
“On demand” resources (usually above 5 Mio CPU hours per application)

PRACE: Current Calls

Preparatory Access

Continually open to requests that are evaluated periodically and cut-off dates every 3 months.

Regular Access

The PRACE 10th Call for Project Access is open from 10 September 2014, 12:00 (noon) CEST, until 22 October 2014, 12.00 (noon) CEST.

Application website:

<https://prace-peer-review.cines.fr>

PRACE: Systems



MareNostrum
IBM IDPX
at BSC, >48 000 cores



JUQUEEN
IBM BlueGene/Q
at GCS partner FZJ,
>458 000 cores



CURIE
Bull Bullx
at GENCI, partner CEA
>90 000 cores.



SuperMUC
IBM IDPX
at GCS, partner LRZ
>155 000 cores

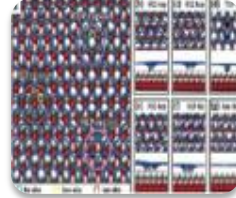
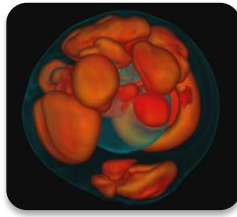
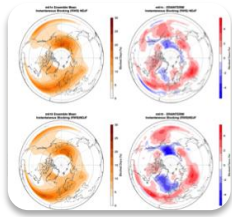


FERMI
IBM BlueGene/Q
at CINECA, >163 000 cores

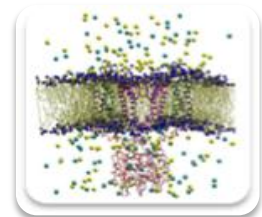
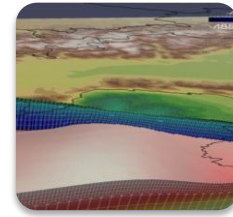
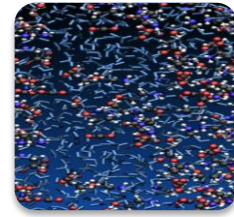


HERMIT
Cray
at GCS partner HLRS,
>113 000 cores

PRACE: Examples of Academic and Industrial competitiveness



 GRAPHENE FLAGSHIP



 HBP
The Human Brain Project

Earth System Sciences

88 Mio core hours on MareNostrum (SP) for Spanish research

Develop **new climate models** for preparing the 6th IPCC campaign in relation with ENES.

Astrophysics

98 Mio core hours on CURIE (FR) & 49 Mio core hours on SuperMUC (DE) for Germany

Understand the **explosion of massive stars into supernovae** and the origin of the heaviest of the chemical elements.

Materials

10 Mio core hours on CURIE (FR) for Finland

Study using DFT simulations the effects of **irradiation on Graphene nanostructures**, especially vacancies and their coalescence into holes/defects.

Chemistry

59,8 Mio core hours on JUQUEEN (DE) for Switzerland

Catch CO₂ in a solvent before it is released into the air, making the exhausts from e.g. power plants significantly cleaner

Seismology

53.4 Mio core hrs on SuperMUC (DE) for Italy

Explore the non-linearity involved in the dependence of **local ground shaking on geological structure**.

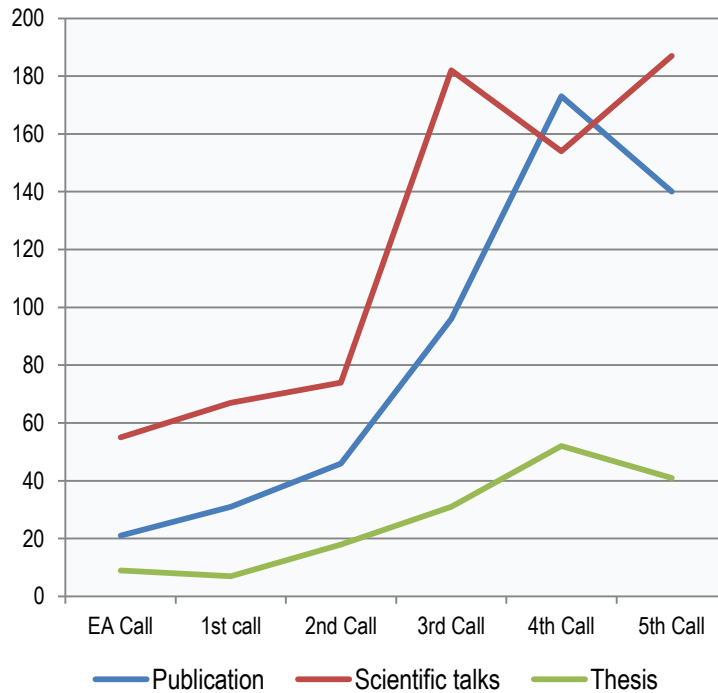
Life Sciences

56 Mio core hours on CURIE (FR) & 82 Mio core hours on SuperMUC for France

Understand how a **nervous impulse is transported with neurons**, and especially the function of the ion channels, to contribute to the design of drugs that will modulate their activity.
This allocation is 30 times larger than a typical allocation.

PRACE: Impact on scientific production and know-how

Scientific production with PRACE

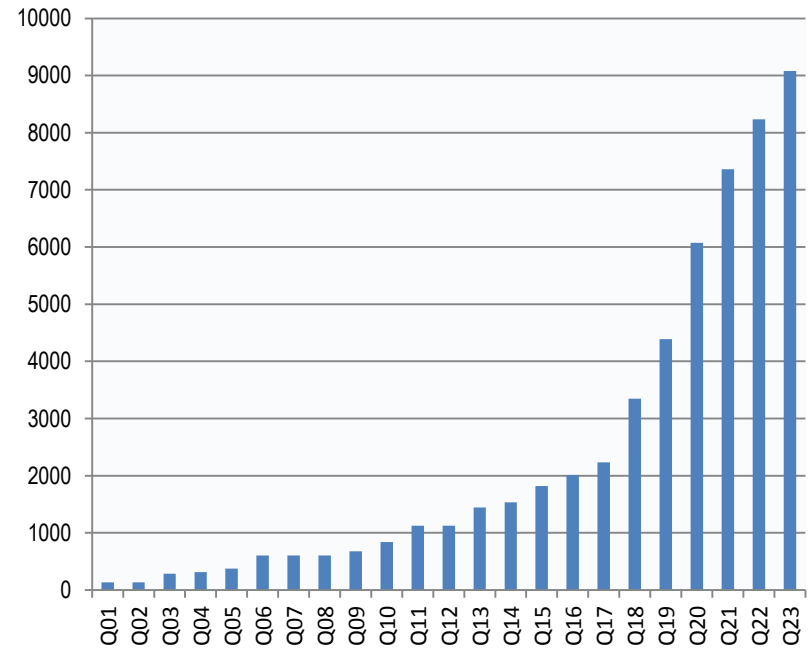


Until call n°5 PRACE has supported:

- ✓ 158 PhD Thesis
- ✓ 507 publications
- ✓ 719 scientific talks
- ✓ 2 patents



Accumulated trained person-day by PRACE



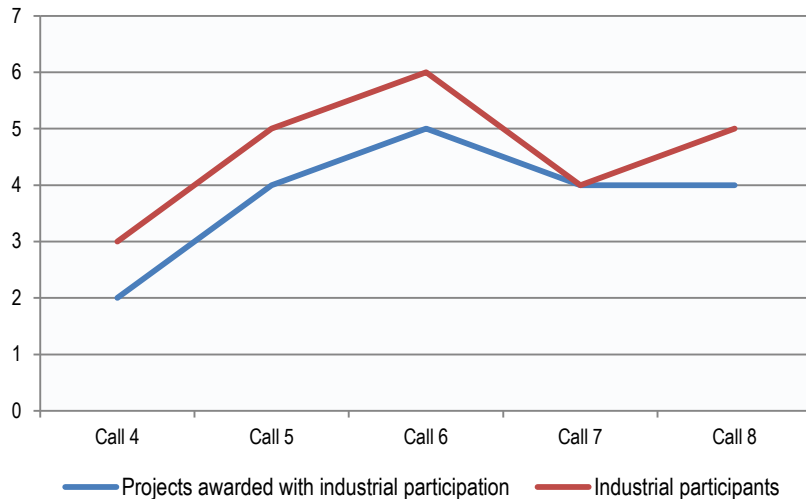
PRACE provided 9079 training person-days in 5 years.

PRACE has increased the European HPC know-how of 2874 people.

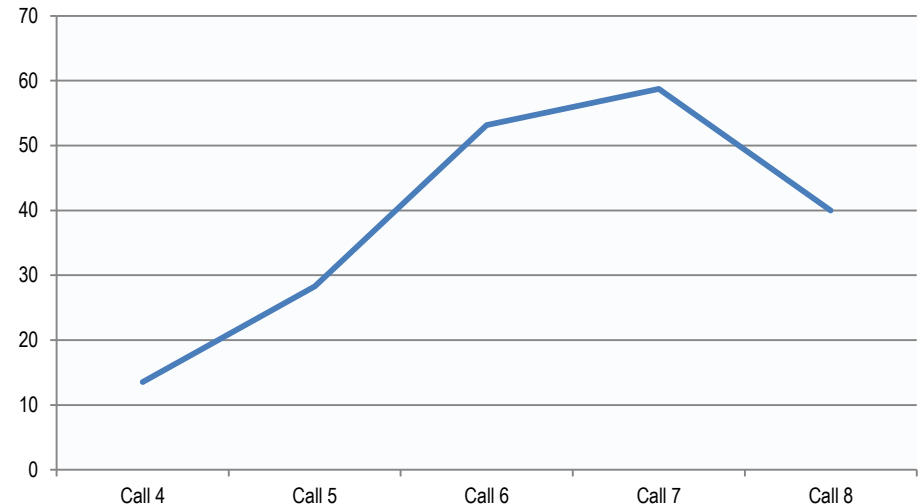


PRACE: Impact on the industrial sector

Industry participation in PRACE allocations



Amount of CPU million hours allocated to industry



- ✓ **Increasing trend both in: participation and amount of awarded resources.**
- ✓ **SHAPE (SME HPC Adoption Programme in Europe) pilot provided 10 success cases of SMEs from 6 different countries benefitting from PRACE resources and the know-how of the PRACE centers.**

RES and PRACE offer Tier-1 and Tier-0 resources ready to use for scientific and industrial research.

RES and PRACE provide training.

So, you can request them or cooperate with us.



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Thanks a lot for your attention!

Contact for access request or trainings:
applications@bsc.es or patc@bsc.es