PRACE in the European HPC landscape

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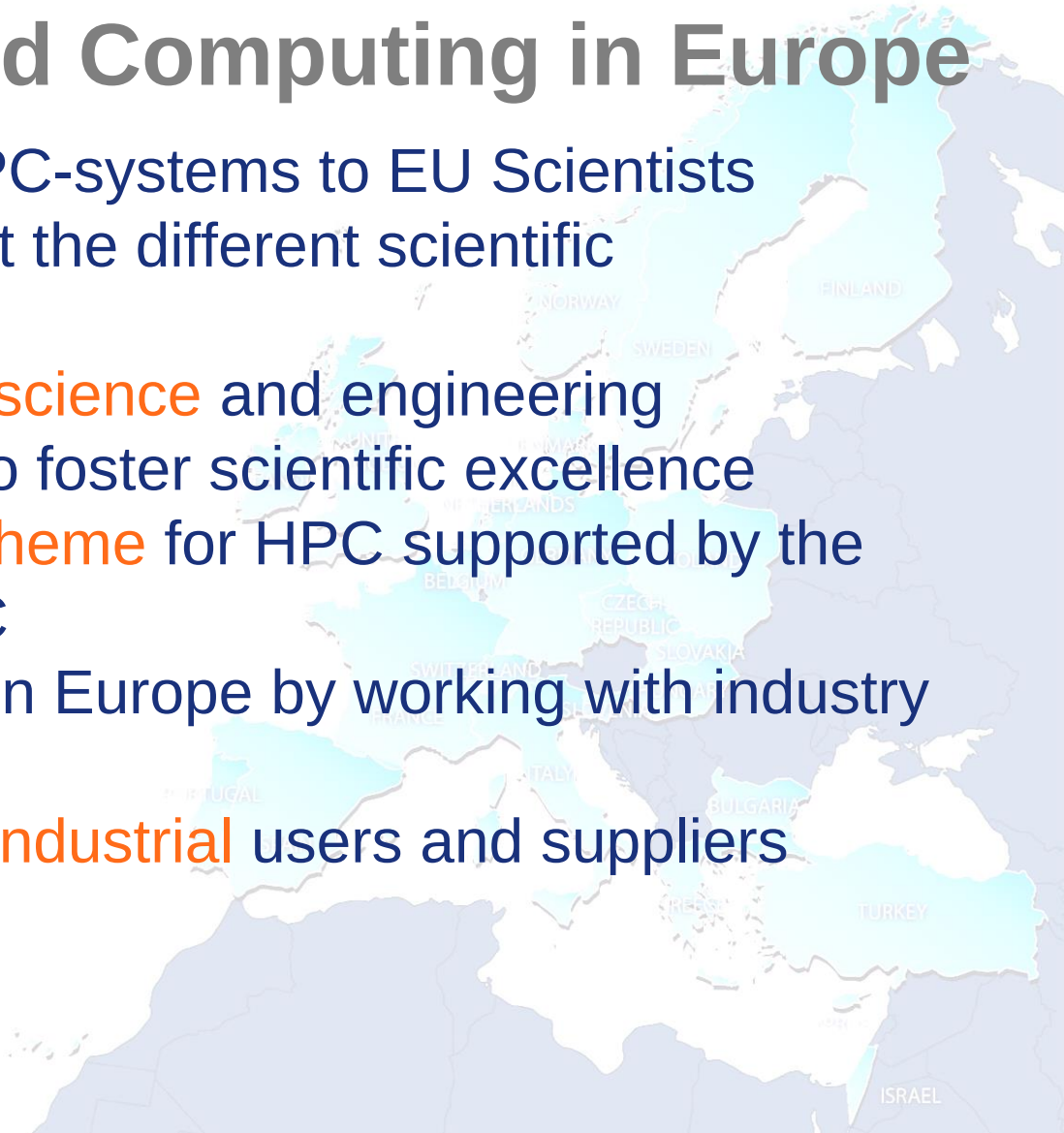
PRACE Managing Director

Content

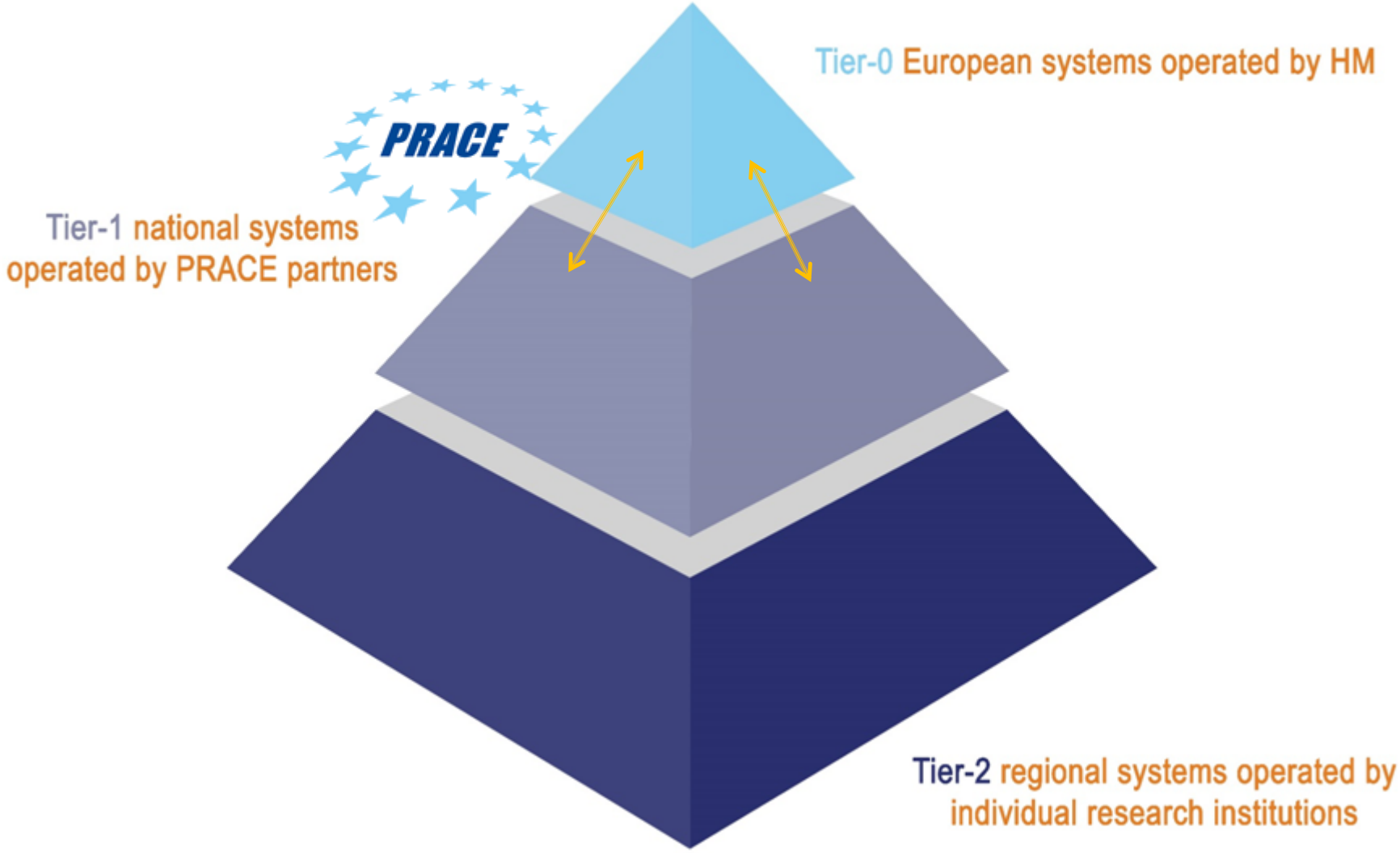
- PRACE mission and achievements
- Second phase just started
- Perspectives

Partnership for Advanced Computing in Europe

- Open access to best-of-breed HPC-systems to EU Scientists
- Variety of architectures to support the different scientific communities
- High standards in computational science and engineering
- Peer review on European scale to foster scientific excellence
- Robust and persistent funding scheme for HPC supported by the national governments and the EC
- Support the development of IPR in Europe by working with industry and public services
- Collaborate with European HPC industrial users and suppliers



HPC Pyramid


Tier-0 European systems operated by HM
PRACE
Tier-1 national systems
operated by PRACE partners
Tier-2 regional systems operated by
individual research institutions

PRACE Achievements to-date

- ✓ 524 scientific projects enabled
- ✓ 14 000 000 000 (thousand million) core hours awarded since 2010
- ✓ Of which 63% led by another PI nationality than the HM
- ✓ R&D access to industrial users with >50 companies supported
- ✓ >10 000 people trained by 6 PRACE Advanced Training Centers and others events
- ✓ >60 Petaflops of peak performance on 7 world-class systems
- ✓ 24 PRACE members, including 5 Hosting Members (France, Germany, Italy, Spain and Switzerland)

PRACE Tier 0 Systems

MareNostrum: IBM
BSC, Barcelona, Spain

#13 on Top500

NEW ENTRY 2016

Piz Daint: Cray XC 30
CSCS
Lugano, Switzerland

#3 on Top500

#21 on Top500

JUQUEEN: IBM
BlueGene/Q
GAUSS/FZJ
Jülich, Germany

SuperMUC: IBM
GAUSS/LRZ
Garching, Germany
#40 on Top500

Hazel Hen: Cray
GAUSS/HLRS,
Stuttgart, Germany
#17 on Top500

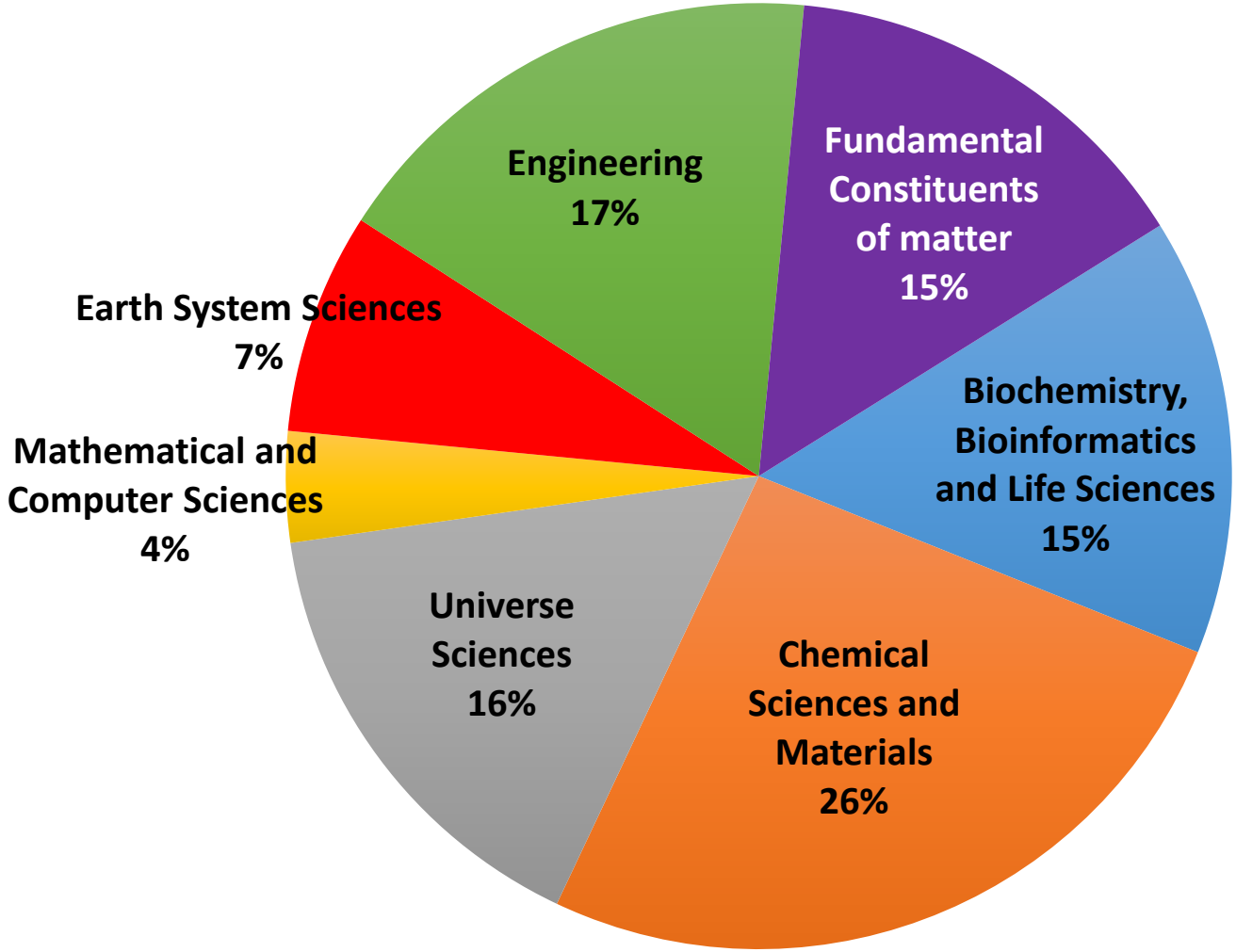
#85 on Top500

CURIE: Bull Bullx
GENCI/CEA
Bruyères-le-Châtel, France

MARCONI: Lenovo
CINECA
Bologna, Italy

#14 on Top500

Supporting many scientific domains



Criterion: Scientific Excellence

Research Domain Pie Chart up to and including Call 14, % of total core hours awarded

PRACE Training and Outreach activities

provide a sustained, high-quality training and education service for the European HPC community

- 6 PRACE Advanced **Training Centres**
  4 PRACE Training Centres
- PRACE **Training Events**: Seasonal Schools, International HPC Summer School, On-demand training events
- **Summer of HPC**
  (Programme for undergraduate and postgraduate students)
- PRACE Training and Events portal
- **Code Vault**
  Massive Open Online Courses (**MOOCs**)

Training topics

Different levels of training

- Basic, intermediate, advanced HPC
- Parallel programming
- Accelerators
- Performance optimization

Domain-specific topics

- Simulation software
- Visualization
- Data intensive computing

Open access to industry since January 2012

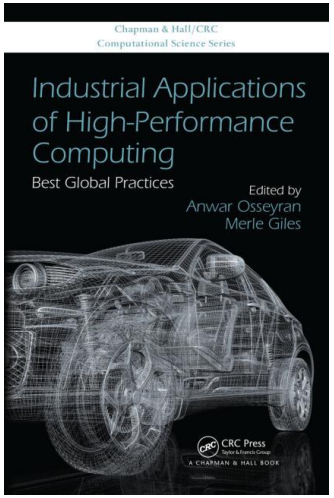
Access to leading-edge resources

- Calls open to industry twice a year
  - commitment to publish results
- Permanent Preparatory Access call
  - For scalability and porting

Access to high-value services

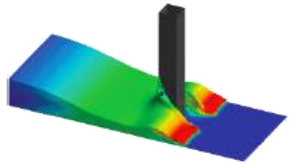
- HPC knowledge
- Training
- Code enabling
- Information, Promotion and Networking

Since 2012: >50 companies supported



Criterion: Scientific Excellence

PRACE SHAPE
SME HPC Adoption Programme in Europe



New phase – PRACE 2

- Build on the successes of the Initial Period
  - Development and use of HPC systems by science and industry in Europe
  - Provide access to the Tier-0 HPC systems and High Level Support Teams
  - Enable the best science by granting access through peer review process
- Make it robust and sustainable
  - Basic principle is *To compute, you must contribute*

→ PRACE 2 Programme

PRACE 2

Ratified on
3 March 2017

- From 2017 to 2020 with overlap with PRACE 1

PRACE (2) memberships

- Hosting Members (HMs): provide access to own Tier-0 systems as in-kind participation to the PRACE infrastructure
- General Partners (GPs): fund high-level support teams (HLST) providing tailored user support on those Tier-0 systems
- All 24 PRACE members contribute to high-value services including DECI, Implementation Projects, peer-review and communication

PRACE Members

Hosting Members
- France
- Germany
- Italy
- Spain
- Switzerland

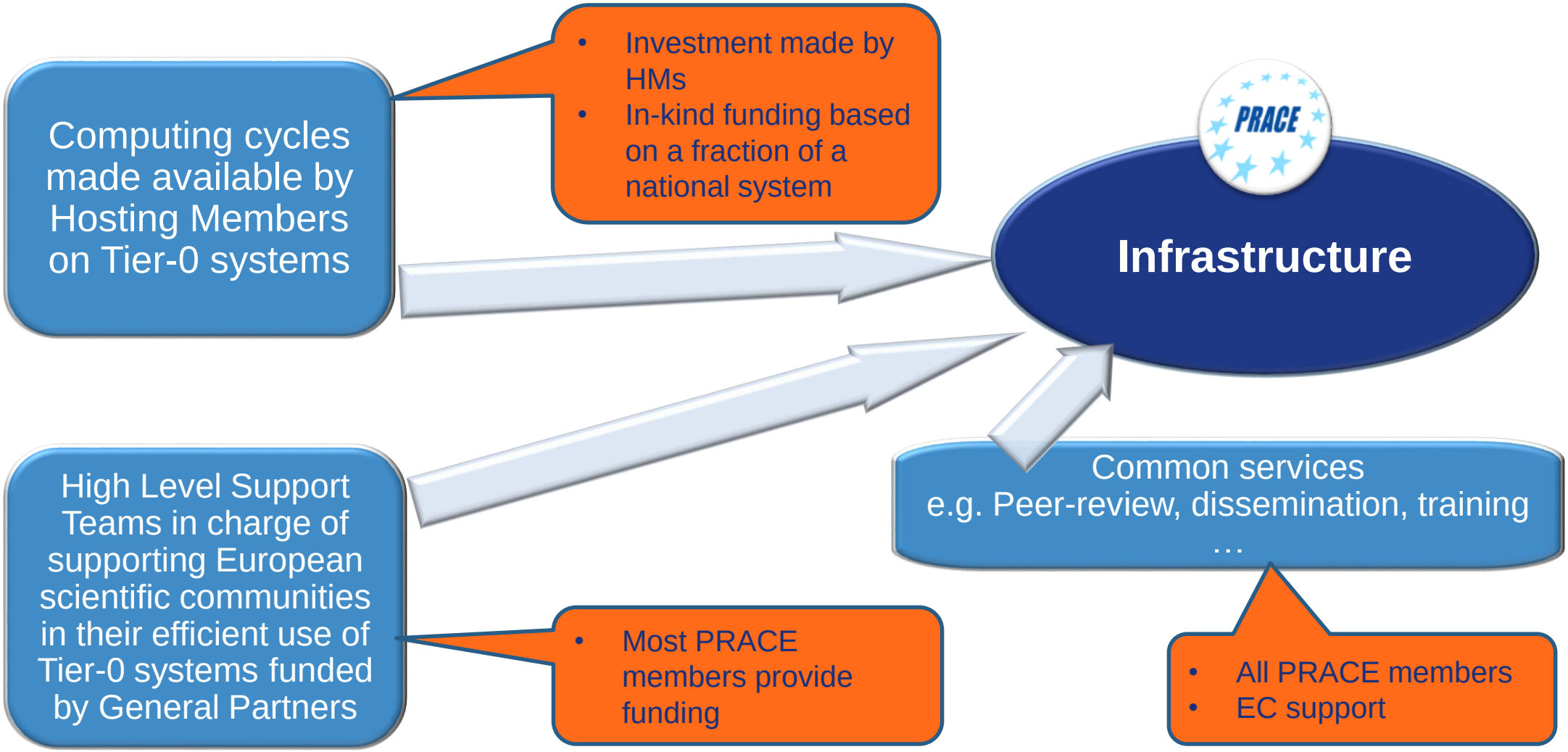
General Partners (PRACE 2)
- Belgium
- Bulgaria
- Cyprus
- Czech Republic
- Denmark
- Finland
- Greece
- Hungary
- Ireland
- Israel
- Netherlands
- Norway
- Poland
- Portugal
- Slovakia
- Slovenia
- Sweden
- Turkey
- United Kingdom

Under application
- Luxembourg

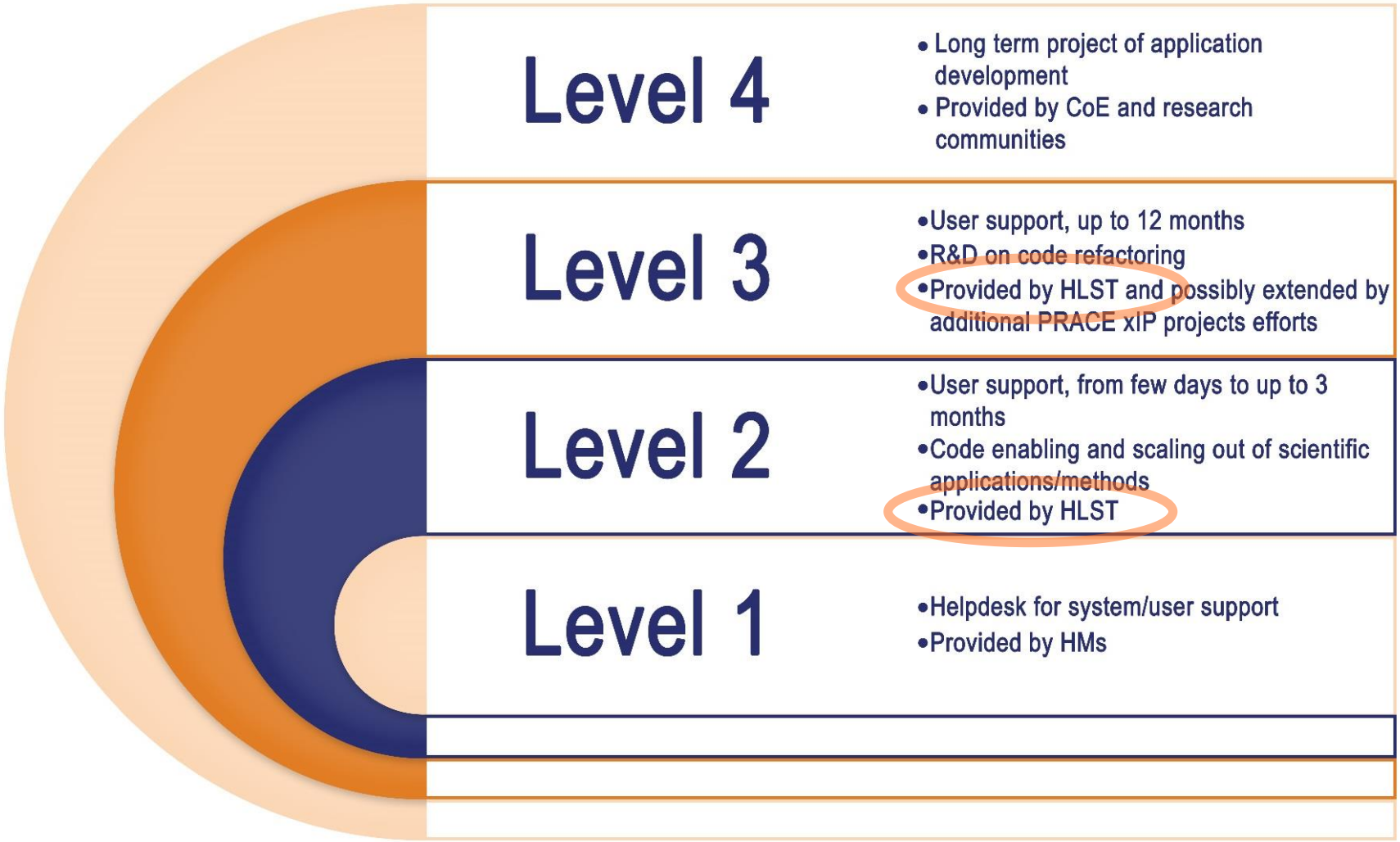
Former members
- Austria

Observers
- Croatia
- Romania

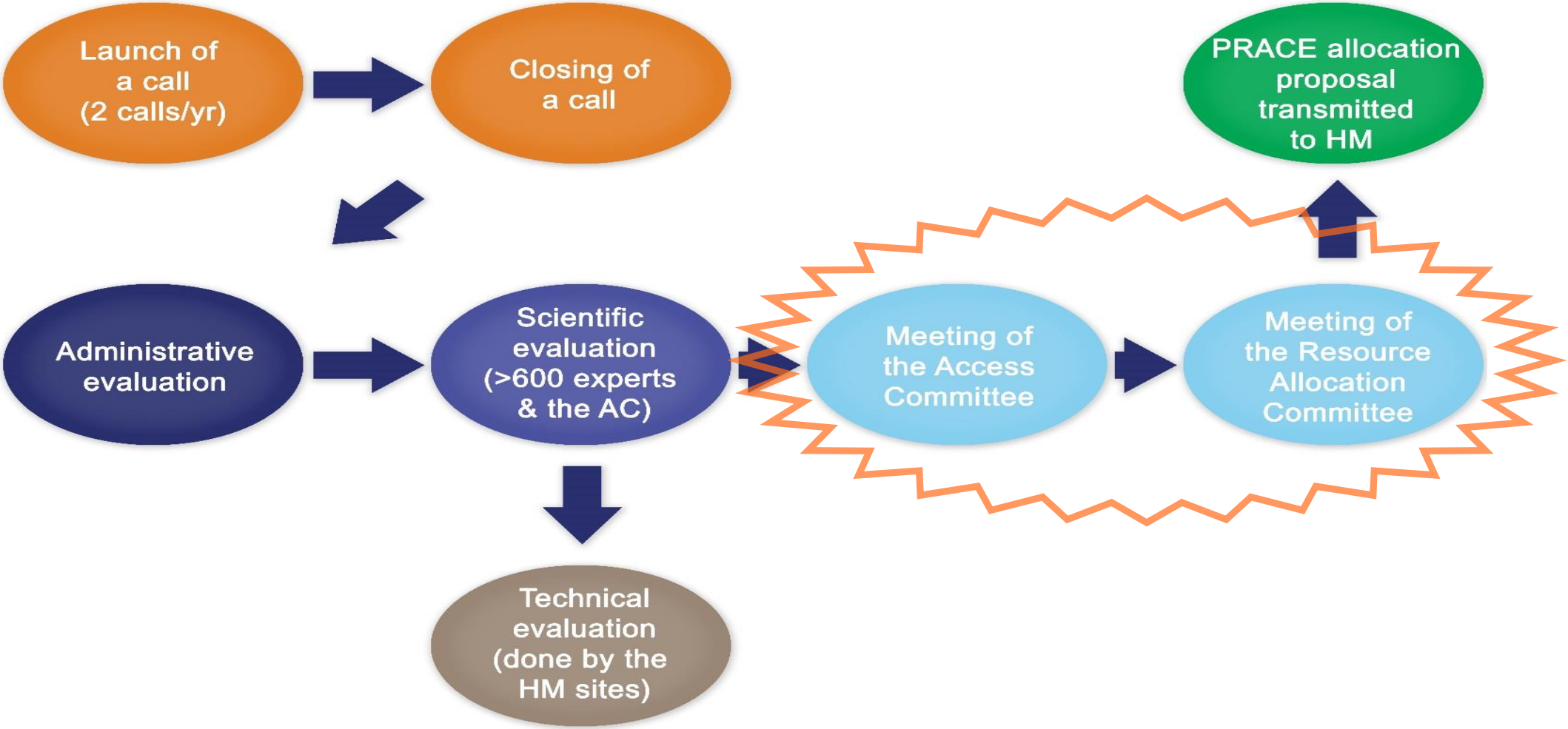
PRACE 2 key elements



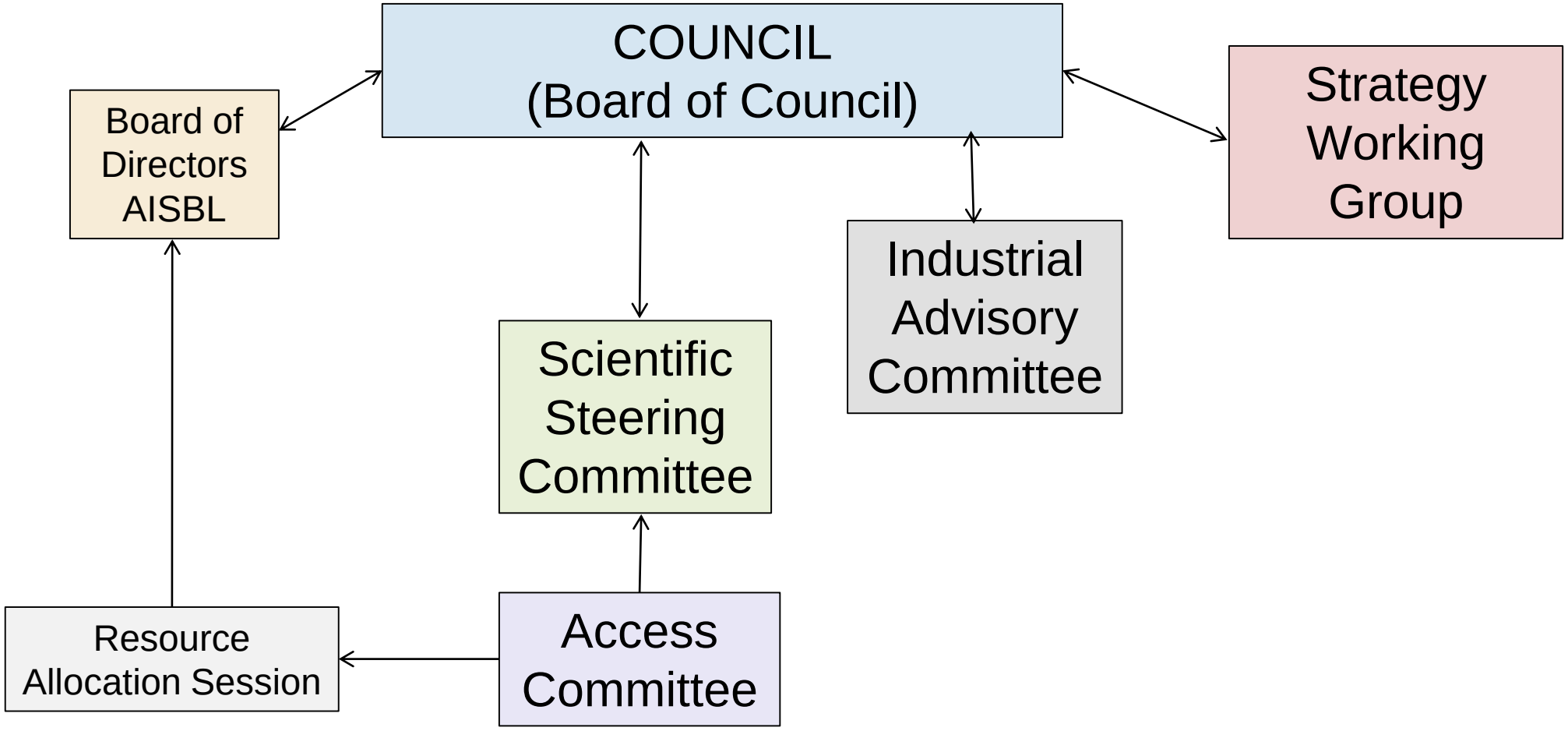
High-Level Support Teams



PRACE Peer Review Process



PRACE Governance



PRACE Current Services

Towards End-Users

Access

Tier-0 systems (open R&D)
- Project Access
  1-3 years
- Preparatory Access
  Type A, B, C, D

Tier-1 systems (open R&D)
- DECI Programme

Support

Application Enabling & Support
- Preparatory access Type C
- Preparatory access Type D
  - Tier-1 for Tier-0
- SHAPE
- HLST support

Training
- Training Portal
- PATC, PTC
- Seasonal Schools & on demand
- International HPC Summer School
- MOOC

- Code Vault
- Best Practice Guides
- White Papers

Communication, Dissemination, Outreach
- Website
- PR
- Scientific Communication
- Summer of HPC

Events
- PRACEdays
- SC, ISC, ICT, …

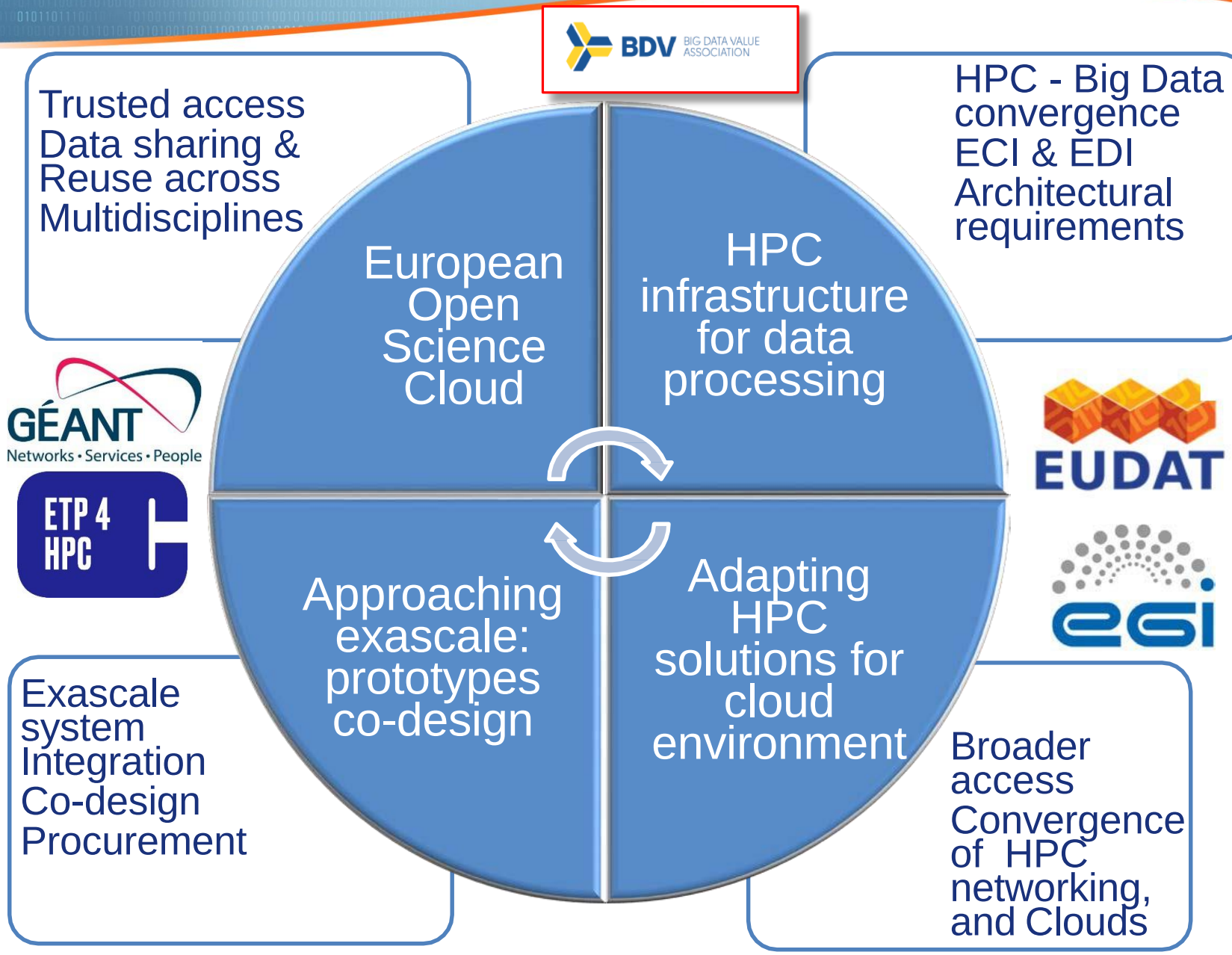
Operation & Coordination of the common PRACE Operational Services
- Service Catalogue
- PRACE MD-VPN network
- Security

HPC Commissioning & Prototyping
- Technology Watch, PCP activity
- Infrastructure WS
- Best Practices
- UEABS

Towards PRACE Partners

Looking ahead

e-Infrastructures in the Digital Single Market landscape



Some targets of EDI COM (2016) 178 final

« The European Data Infrastructure is the combination of **world-class supercomputing** (HPC) capability, **high-speed connectivity**, **leading-edge data storage** and **interfaces for cloud-based service** delivery. High-performance ICT infrastructures are needed to manage the current and expected scale of future data flows. European **science, industry and public services** need world-class infrastructures and cloud-based services to compete and thrive in the digital economy. The EDI will provide the **right support for the European Open Science Cloud** (EOSC) »

Finally, scientific data producers and users must be able to **re-use data** and to **use advanced analytics techniques**, …
« EDI will work in **combination** with the national and regional, scientific and public data centres »

« The European Data Infrastructure will contribute to the digitisation of industry, to **develop European platforms for new, strategic applications** (e.g. medical research, aerospace, energy) and to foster industrial innovation. It will **widen the user base of HPC**, providing easier access via the Cloud both to researchers in key scientific disciplines and to the long tail of science »

PRACE Perspectives in EDI

- Build up on PRACE success so far
- Update of the PRACE Scientific Case
- Extend services
  - Towards a data-centric approach
  - Enhance integration of the Tiers
  - Enhance services towards industry and extend to public sector
- Further federate efforts
  - European Commission & Member States
    - *Connects to EuroHPC*
  - Develop appropriate governance

PRACE Scientific Case Update

- We can't do it all
  - Which application domains to focus on?
  - Which technologies?
- Eternal struggle between the heavenly Science vs the mundane Economics
- Balance between traditional, disruptive and fundamental science

THANK YOU FOR YOUR ATTENTION

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