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FOR ADVANCED COMPUTING
IN EUROPE**

PRACE

Europe's Supercomputing Research Infrastructure

Axel Berg (SARA) – RAMIRI June 15, 2011



HPC on ESFRI Roadmap 2006



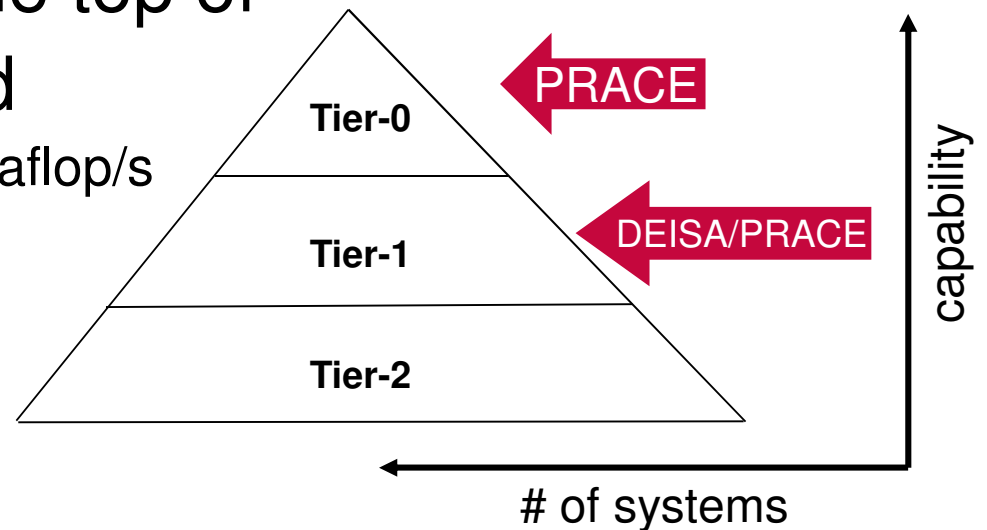
First comprehensive definition of
RIs at European level

RIs are major pillars of the
European Research Area

- A European HPC service
- strategic competitiveness
 - attractiveness for researchers
 - access based on excellence
 - supporting industrial development

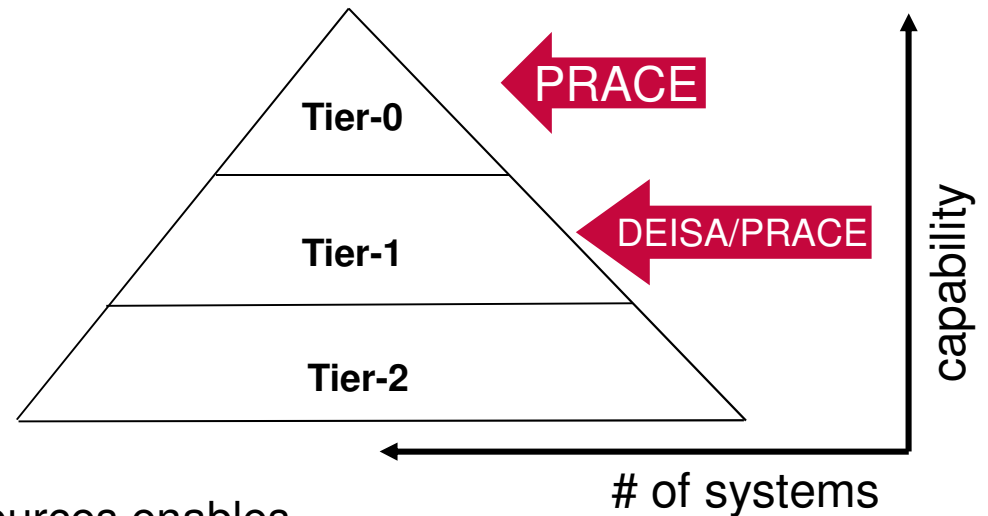
The ESFRI Vision for a European HPC service

- European HPC-facilities at the top of an HPC provisioning pyramid
 - Tier-0: 3-6 European Centres for Petaflop/s
 - Tier-1: National Centres
 - Tier-2: Regional/University Centres
- Creation of a European HPC ecosystem
 - Scientific and industrial user communities
 - HPC service providers on all tiers
 - Grid Infrastructures
 - The European HPC hard- and software industry

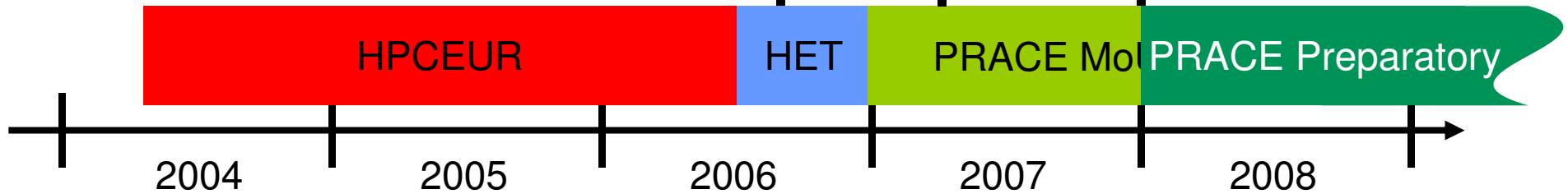


Ecosystem Integration

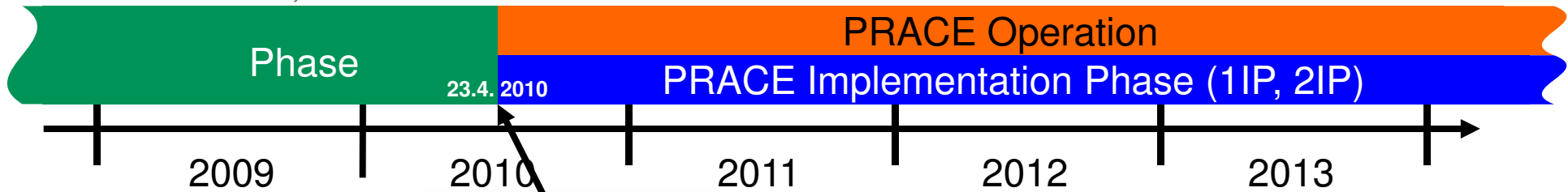
- Ensure the right level of integration in/with the tiers
- Tier-0 – full integration
 - Creation of new high-end resources
 - Single access route
 - Single operational model
- Tier-1
 - Integration of existing national resources enables non hosting countries to contribute
 - Different funding / governance requires adapted approach
 - Leverage DEISA successes, like network, DECI
- Tier-2 / Grids
 - Different funding and usage models, overlapping user groups
 - Cooperate and inter-operate for the benefit of users



PRACE Timeline



EU-Grant: INFSO-RI-211528, 10 Mio. €



PRACE (AISBL), a legal entity
with (current) seat location in Brussels



First Milestone

- Memorandum of Understanding signed by 15 States in Berlin, on April 16, 2007
- France, Germany, Spain, The Netherlands, UK and Italy committed funding for a European HPC Research Infrastructure



Second Milestone: The PRACE Project

EU approved the PRACE Preparatory Phase Project
(Grant: **INFSO-RI-211528**)

- 16 Partners from 14 countries
- Project duration:
January 2008 –June 2010
- Project budget: 20 M € ,
EC funding: 10 M €
- Kickoff: Jülich, January 29-30,
2008



Third Milestone: PRACE RI created

- The PRACE Research Infrastructure was created on April 23, 2010 in Brussels



Fourth Milestone: PRACE Research Infrastructure Inaugurated

- Establishment of the legal framework
 - PRACE AISBL created with seat in Brussels in April (Association Internationale Sans But Lucratif)
 - 20 members representing 20 European countries
 - Inauguration in Barcelona on June 9



- Funding secured for 2010 - 2015
 - 400 Million € from France, Germany, Italy, Spain
Provided as Tier-0 services on TCO basis
 - 70+ Million € from EC FP7 for preparatory and implementation
Grants INFSO-RI-211528 and 261557
Complemented by ~ 60 Million € from PRACE members



PRACE Preparatory Phase Project Achievements in a Nutshell

- Prepared the Creation of the permanent pan-European Research Infrastructure as a legal entity
- Established the PRACE brand
- Provided extensive HPC Training
- Deployed and evaluated promising Architectures
- Ported and petascaled applications

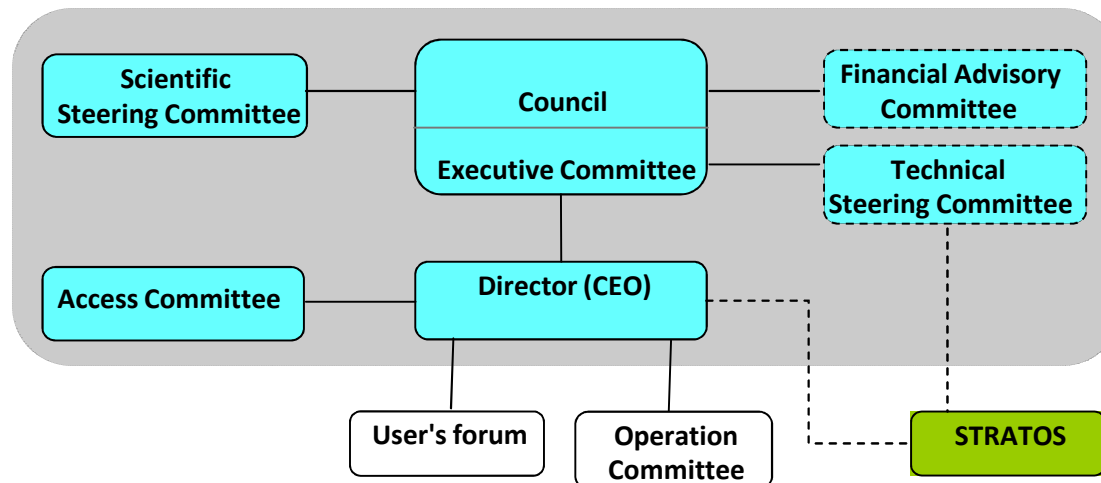
PRACE Tier-0 Systems

- 1st Tier-0 System provides cycles since August 1
 - Jugene: BlueGene/P in GCS@Juelich
 - 72 Racks, 1 PFlop/s Peak
 - 35% of capacity provided to PRACE
- 2nd Tier-0 System announced by GENCI on October 5
 - Curie: Bull Cluster with Intel CPUs operated by CEA
 - 1.6 PFlop/s peak in Oct. 2011 (1st step in 2010)
 - Largest fraction of capacity provided to PRACE
- Next Procurements (in alphabetical order)
 - BSC, CINECA, GCS@HLRS, GCS@LRZ
 - Procurement plan based on analysis of user requirements and market



Governance of the Association

- Modelled after successful examples of existing RIs
 - Council as main decision making body
 - Director with strong managing mandate – in progress
 - Independent Scientific Steering Committee and Access Committee to give scientific advice and to steer the Peer Review process – formally established on October 5
 - Further committees will be instantiated by the Council as needed



Scientific Steering Committee

Scope defined in the Statutes of the AISBL

- The SSC is responsible for giving opinions on all matters of scientific and technical nature
- 21 members
- Members appointed by Council based on a list of candidates prepared by the SSC
- Two year term (renewable twice)
- Propose the members of the Access Committee

Access Committee (Article 25-26)

- Advice on scientific use of Tier-0 Infrastructure
- Recommendations on the allocation of computational resources based on the Peer Review process
- Proposed by the SSC based on competence in the areas of science
- Appointed by the Council, minimum of 5 members
- Two years term (renewable once)
- The Access Committee will define its iworking rules



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ACCESS AND PEER REVIEW

PRACE Regular Calls: Reviews

- **1st Regular Call**
 - Analogous to Early Acces Call
 - New extended Priorization Panel (composed by bootstrap group, BoD approval)
 - Start of provision 1.12.2010
- **2nd Regular Call**
 - Council approves SSC on October 5
 - SSC proposes Access Committee
 - Council aproves AC
 - AC establishes Priorization Panel
 - Provision starts on 1.5.2011

Accessing the PRACE RI

Access Model

- Based on peer-review: “the best systems for the best science”
- Three types of resource allocations
 - Test / evaluation access
 - Project access – for a specific project, grant period ~ 1 year
 - Programme access – resources managed by a community
- Free-of-charge

Funding

- Mainly national funding through partner countries
- European contribution
- Access model has to respect national interests (ROI)

PRINCIPLES for PEER REVIEW

- Transparency
- Expert assessment
- Confidentiality
- Right to reply
- Prioritisation
- Managing interests
- No parallel assessment
- Ensure fairness to the science proposed

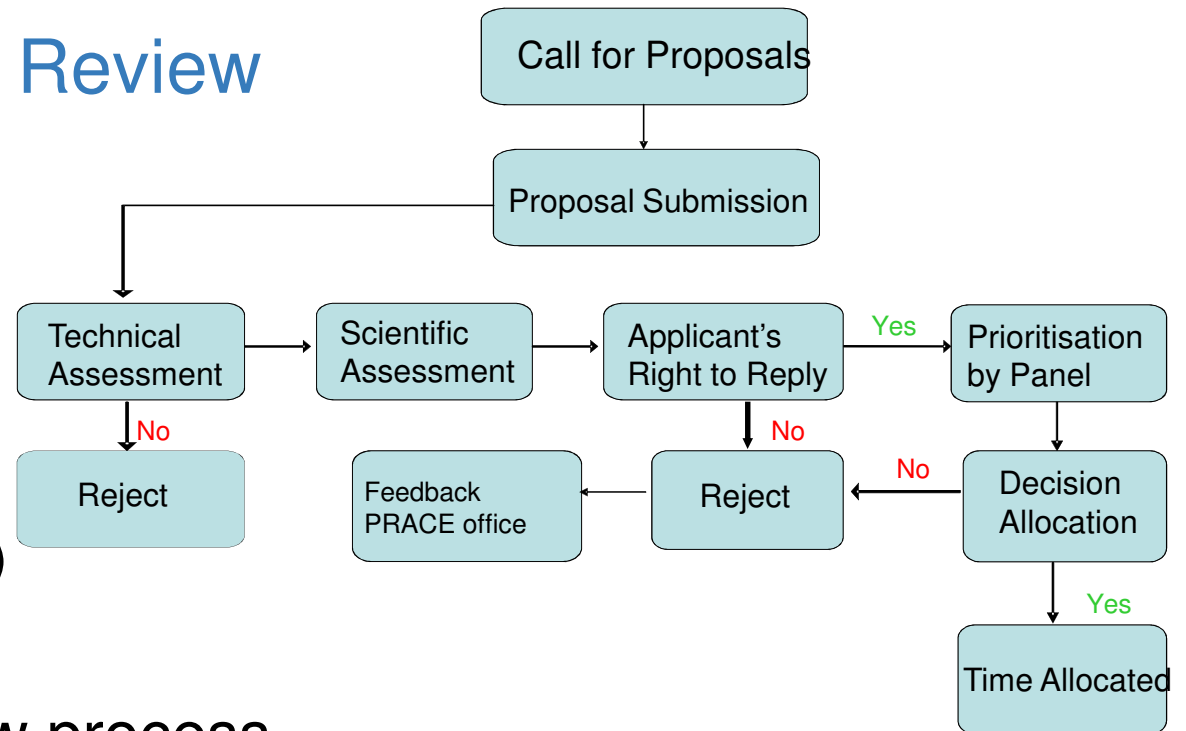
Types of Access

- Preparatory access
 - only technical peer review
- Project access
 - both technical and scientific peer review
- Programme access
 - both technical and scientific peer review

Tier-0 Access: Peer Review

- Access Modes

- Preparatory
- Project
(1 year, main route)
- Programme
(2-3 years, for communities)



- Independent Peer Review process

- Governed by Scientific Steering Committee
- Allocation decisions purely based on scientific criteria
- Eligibility: European/PRACE members; readiness and need for Tier-0

The First Implementation Phase Project

- First Implementation Phase Project started
 - Budget: 28.5 Mio € (20 Mio € EC funding)
 - Duration: July 2010 – June 2012
- Consortium: all 20 Partners of the AISBL
- 2 more Implementation Phase Projects envisaged
 - 20 Mio € EC funding each
 - Major Challenges:
Tier-1, Industry involvement, Application scaling with communities
- Total EC funding for PRACE
 - up to 70 Mio € in FP7 for preparation and implementation
 - 25 Mio € in open calls for Exascale projects
 - Co-funding of the Infrastructure in FP8 would further strengthen the European integration

Grant: INFSO-RI-261557

PRACE Implementation Phase Work Packages

- WP1 Management
- WP2 Evolution of the Research Infrastructure
- WP3 Dissemination and training
- WP4 HPC Ecosystem Relations
- WP5 Industrial User Relations
- WP6 Technical Operation and Evolution of the Distributed Infrastructure
- WP7 Enabling Petascale Applications: Efficient Use of Tier-0 Systems
- WP8 Support for the procurement and commissioning of HPC services
- WP9 Future Technologies

First Implementation Phase Project

- User & Community support through application enabling
 - > 40% of the total workforce in the project is here!
 - Support can be requested along with proposals for Preparatory Access to the Tier-0 systems
- Deployment and operation of the Technical Infrastructure
- Collaboration with Communities and other Research Infrastructures
- Development of a model for cross-national Tier-1 access
 - This activity will be extended in the future implementation phase projects
- Cooperation with vendors for future HPC technologies
 - ~20% of the total workforce + 5 Million € for prototypes (50% EC-funded)
- Further development of the legal, organisational and financial framework
- Continuation and further extension of the very successful training programme started in the Preparatory Phase project

The growing PRACE family

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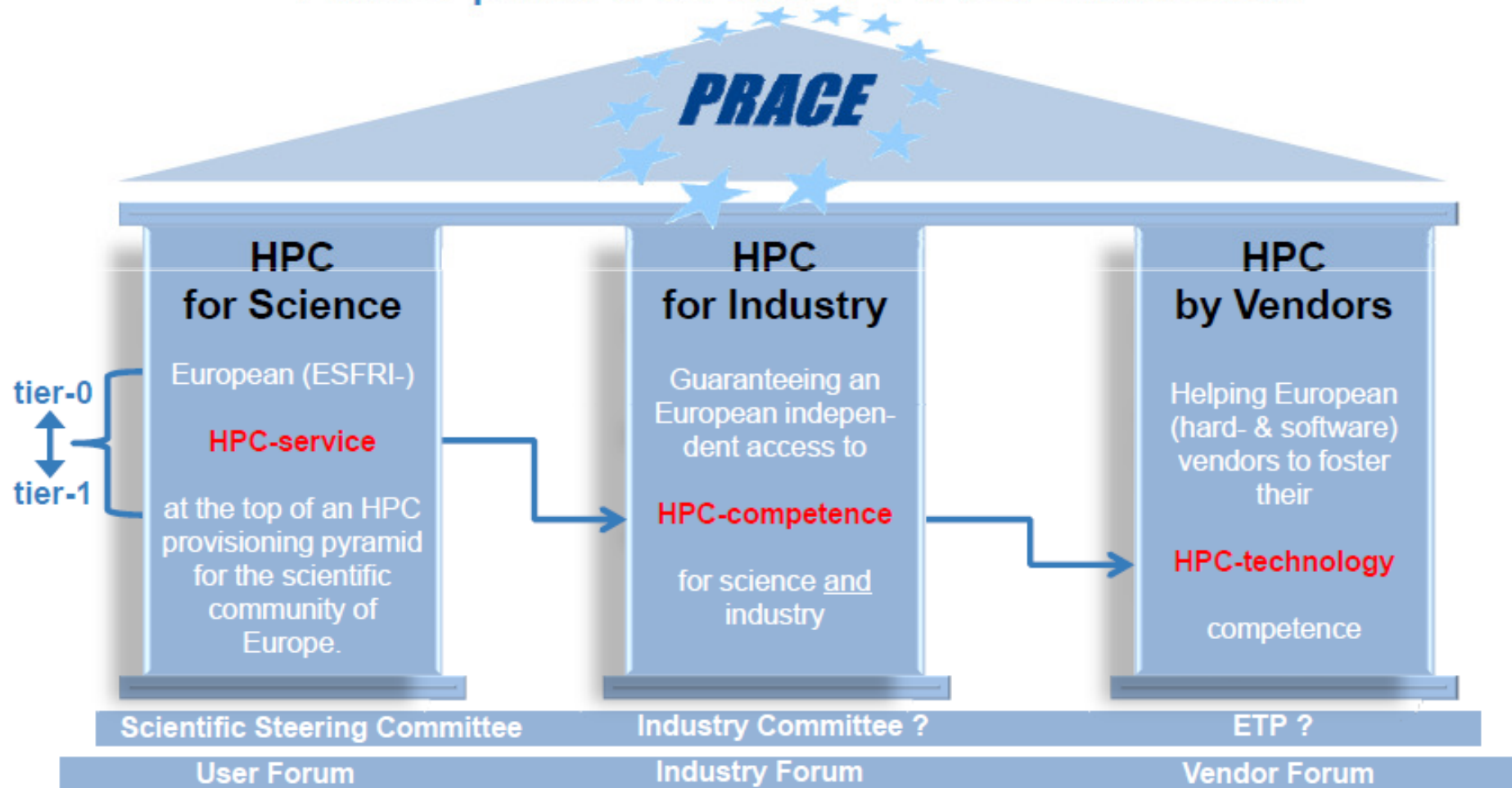
PRACE-1IP Kick-off meeting in Garching

Creating a European Research Infrastructure: (some) Challenges

- Agree on a common vision and roadmap
- Secure sustainable funding – national and European
- Establish a robust legal and administrative framework
- Ensure to involve all stakeholders in the ecosystem at the right level (HPC service providers, HPC vendors, scientific user community, industrial users, governments and funding bodies, EC, applications code owners, technology providers, etc.)
- Ensure that the services provided meet the requirements of the scientific and industrial user communities
- Gather and leverage the required scientific and technical expertise
- Setup European access and peer review
- Collaboration with other e-infrastructures
- Setup Training and Education program



Three pillars of the PRACE Mission



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Thank you

EXPONENTIAL GROWTH IS POSSIBLE
> CULTIVATE BIG DREAMS

TECHNOLOGY WILL NOT BE A
LIMITING FACTOR



IF YOU ARE NOT SCARED
YOUR DREAMS
ARE NOT BIG ENOUGH

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