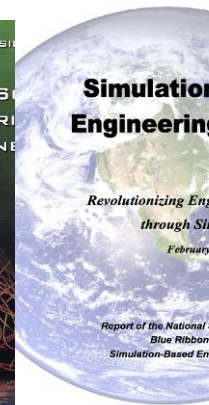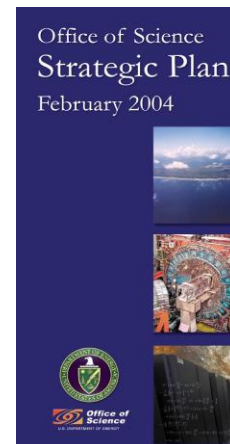# Partnership for Advanced Computing in Europe

E-IRG workshop.
PRACE current status & challenges

Francesc Subirada, Madrid, June 17, 2010

HPC is a "Key Technology"

- Supercomputers are the tool for solving most challenging problems through simulations

- Access to capability computers of leadership class is essential for international competiveness in science and engineering

- Providing competitive HPC services is a continuous endeavor

- This has been acknowledged by leading industry nations such as USA and Japan since the 1990'ies

Office of Science
Strategic Plan
February 2004

REPORT TO THE PRESI...
JUNE 2005
COMPUTATIONAL S...
ENSURING AMERI...
COMPETITIVEN...
PRESIDENT'S
INFORMATION TECHNOLOGY
ADVISORY COMMITTEE

Simulation
Engineering
Revolutionizing Eng...
through Sim...
February...
Report of the National S...
Blue Ribbon...
Simulation-Based Eng...

DRAFT --- DRAFT --- DRAFT
NSF'S CYBERINFRASTRUCTURE VISION FOR
21ST CENTURY DISCOVERY
NSF Cyberinfrastructure Council
NATIONAL SCIENCE FOUNDATION
National Science Foundation
July 20, 2006
Version 7.1

European Shortcomings

- Fragmentation
  - No sustained HPC service beyond the national scale
    - DEISA and HPC-Europa are projects that cluster national resources and provide a small fraction of their capacity to European users
  - No coordination of procurements
- Lack of a strong HPC industry
  - Dominance of US and Japanese companies
  - European companies mainly supply the European market (like Bull) or occupy market niches (like Numascale AS, Dolphin, ParTec)
  - Europe needs an independent access to this key technology

HPC infrastructure in Europe

The European Roadmap for Research Infrastructures was the first comprehensive definition at the European level
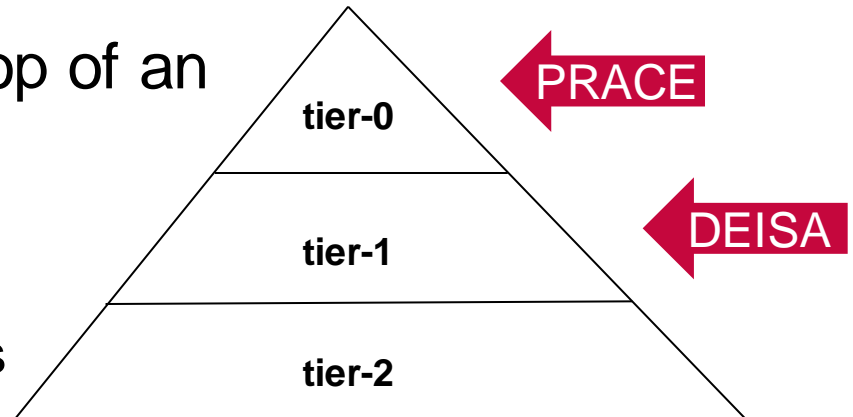
Research Infrastructures are one of the crucial pillars of the European Research Area
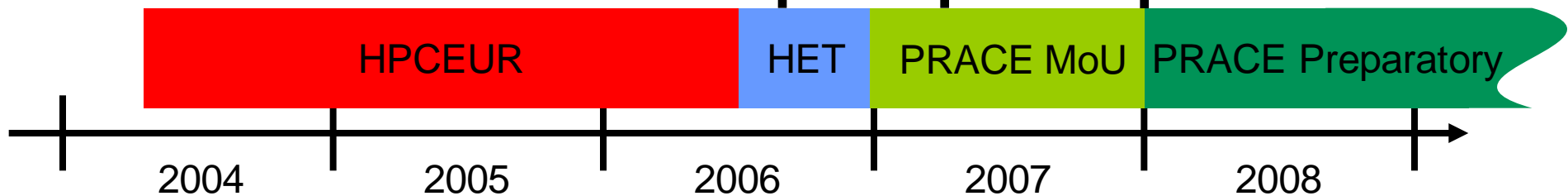
A European HPC service – impact foreseen:
- strategic competitiveness
- attractiveness for researchers
- supporting industrial development

4

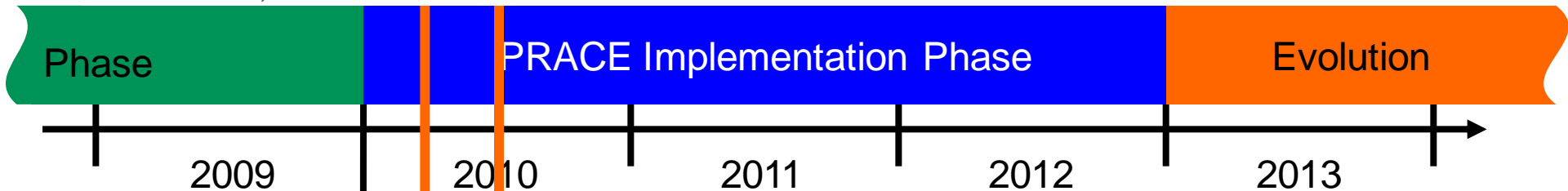# The ESFRI Vision for a European HPC service

- European HPC-facilities at the top of an HPC provisioning pyramid
  – Tier-0: 4-5 European Centres
  – Tier-1: National Centres
  – Tier-2: Regional/University Centres

- Shape the European HPC ecosystem involving all stakeholders
  – HPC service providers on all tiers
  – Grid Infrastructures
  – Scientific and industrial user communities
  – The European HPC hard- and software industry

tier-0 ← PRACE

tier-1 ← DEISA

tier-2

PRACE History and first steps

| HPCEUR | HET | PRACE MoU | PRACE Preparatory |

2004   2005   2006   2007   2008

EU-Grant: INFSO-RI-211528, 10 Mio. €

| Phase | PRACE Implementation Phase | Evolution |

2009   2010   2011   2012   2013

Signature of statutes

Official announcement. First Council

1IP Work Package Structure

Neworking Activities
- – WP1/JUELICH Management of the Contract
- – WP2/BSC   Evolution of the Research Infrastructure
- – WP3/CSC   Dissemination and Training
- – WP4/CINECA HPC Ecosystem Relations
- – WP5/GENCI   Industrial User Relations
- –

Service Activities
- – WP6/NCF   Technical Operation and Evolution of the Distributed Infrastructure
- – WP7/EPSRC Enabling Petascale Applications. Efficient Use of Tier-0 Systems
- – WP8/GENCI Support for the procurement and commissioning of HPC services

Joint Research Activities
- – WP9/GCS   Future Technologies   GCS

PRACE AISBL

- Belgium legal form: Association International Sans But Lucratif

- Deed signed in Brussels: 23rd April with 16 founding members

- Inaugural meeting: 9th June. Barcelona, Spain

PRACE AISBL

- Keynote address by political authorities
- Commitment to HPC technologies was confirmed
- First chair of the Council of PRACE selected: Achim Bachem

PRACE AISBL

- First Council meeting of the legal form.
- Three more countries formally adhered to the legal form: Sweeden, Cyprus and Czech Republic
- BoD was formally appointed.
- Chair of the BoD selected: Sergi Girona
- Operating budget approved

PRACE – Project Consortium

Hosting Partners

tier 1

tier 0

Non Hosting Partners

11

Proposed Infrastructure

- 4/5 Tier0 centres
  - Systems of different architectures needed to meet the user requirements:
    - candidates are MPPs, thin/fat node-clusters, hybrid systems, vector systems
  - Optimization of utilization, Synergies and Risk mitigation through a distributed infrastructure

- Now 1 Tier0 system and 6 prototypes installed

Prototypes installed

|	NCF	CSCS/CSC	BSC	FZJ	CEA/FZJ	HLRS
Dedicated system - makes possible unfriendly tests						
Shared large system - makes possible large runs and assessment under real production						
MPP						
Cluster with thin-nodes						
Cluster with fat nodes						
Advanced (Hybrid)						
Specific Hardware Technologies	Power6	AMD Barcelona and Shanghai	IBM Cell	Blue Gene	Intel NehalemEP	SX9
Specific Software technologies	PERCS Power7 simulator	MPI/OpenMP	Software stack Programming models			
Full featured system with storage and IO						
Connected to the DEISA network					CEA new DEISA associate partner	
Collaboration with vendors	Software technology (IBM)	System reliability, performance, functionality (CRAY)	System design (IBM)		System design (BULL)	System design (NEC)

13

First machine available

- JUGENE IBM BlueGene/P @ FZJ, Jülich, Germany

- Next machine available @GENCI, France Summer 2011

Peer Review Principles & Process

- Peer Review principles defined:
  - access based on scientific quality and the need to use tier-0
- Peer Review process defined
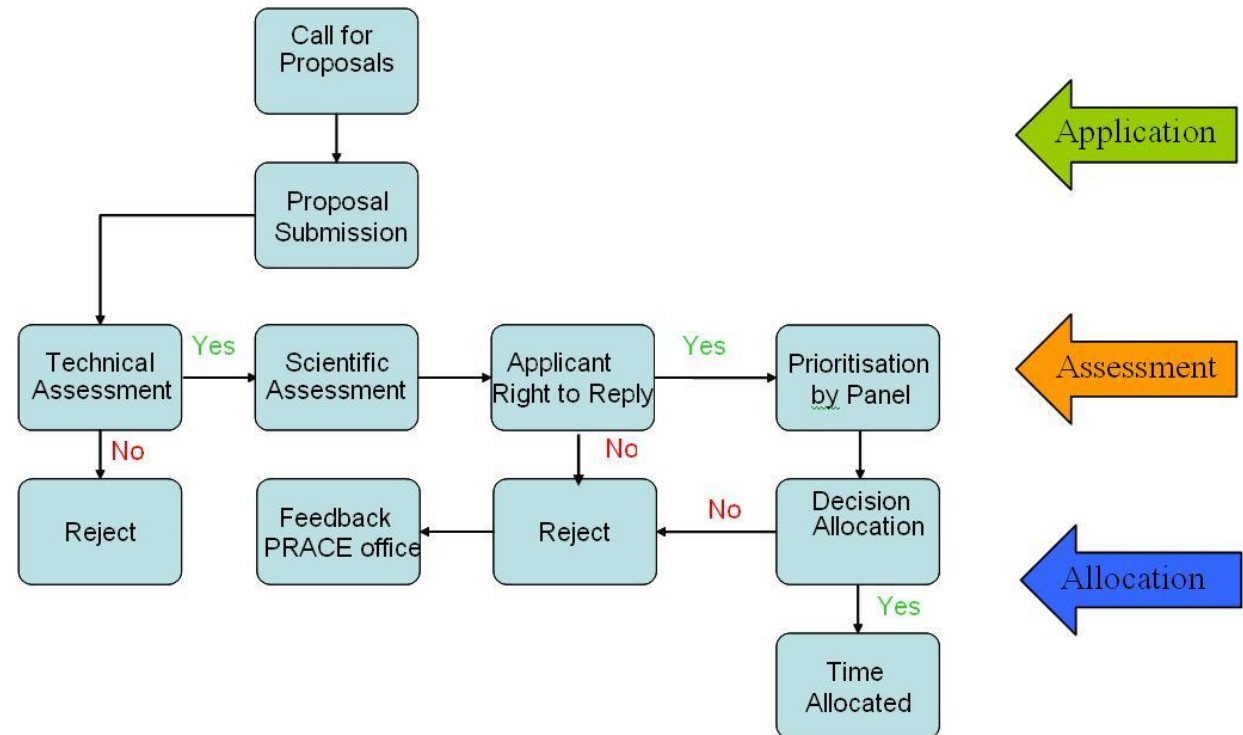
PRACE Early access call

- Initial call for a reduced number of large projects
- Highly relevant scientific projects, mature enough to be able to achieve publishable results in a short allocation period
- 1 call with two allocation periods of 4 months each
- Projects in second allocation period may request technical support (preparatory access) in the first allocation period
- Only proposals from academia and where the organization of the project leader is homed in a European Union or a PRACE initiative country are eligible

PRACE Early Access Call

- Opening date : 10th May 2010
- Closing date : 10th June 2010
- Start date : 1st August or 1st December 2010
- Allocation period : 4 months
- Type of access: Project (1 proposal) or Preparatory + Project (combined -2 linked proposals)
- Information: http://www.prace-project.eu/hpc-access

PRACE regular calls

- Preparatory access –code testing and optimisation, technical support if requested, continuous call, fast track assessment, maximum allocation of 6 months
- Project access –2 calls per year, 1 year allocation, allocation in November and May
- Programme access –large projects of a research group, 2 years allocation, calls coincide with the calls for project access, possible review at the end of the first year allocation
- Final report mandatory for all types of proposals

PRACE regular calls

- 1st PRACE regular call opened 15th June for allocation starting 1st November

- Only available machine at present is JUGENE

- All proposals will be subject to PRACE Peer Review, which will be handled on-line

- The Scientific Steering Committee will be responsible for advising on the scientific direction of PRACE

On-line application system (CINES – France)

- Fully operational, secure on-line application system
- Electronic submission
- Automatic rejection of post-deadline and incomplete applications
- On-line peer review (including reviewers' reports and applicant's reply)
- Track application status (PRACE staff and applicant)
- Electronic submission of reviewers' reports

Conclusion

- PRACE gives Europe the unique opportunity to set ambitious goals:

    - to provide unique tools to the European scientific community
    - to boost European competitiveness
    - to position itself strategically at a leading rather than follower role in HPC and its applications

- PRACE is open for new European members

PARTNERSHIP
FOR ADVANCED COMPUTING
IN EUROPE

E-IRG workshop.
Managing & funding PRACE
Francesc Subirada, Madrid, June 17, 2010

Governance structure
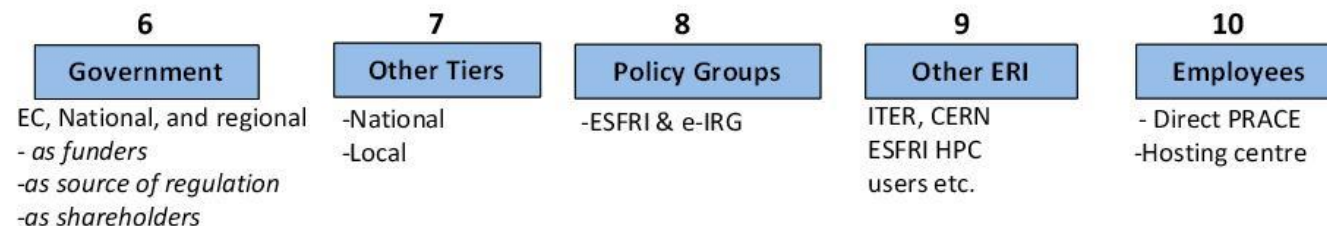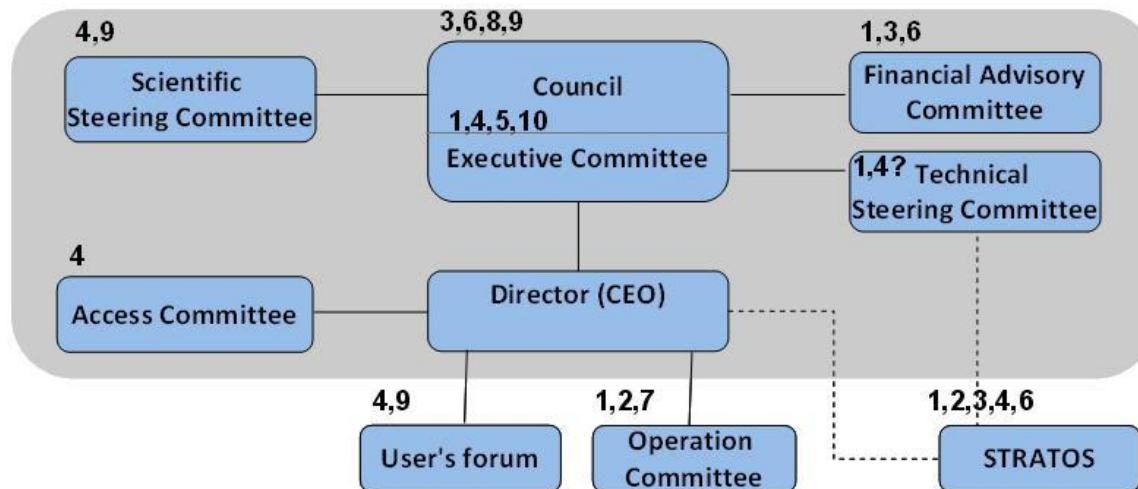
Funding and usage model for initial 5 year period

- Tier-0 provisioning as in-kind contribution
  - Coordinated national procurements of tier-0 systems
  - Tier-0 cycles distributed based on European Peer Review
  - Tier-0 cycles worth 20 M€ / year on average from every PP
  - Measures to ensure long-term balance of investment and return
- Cash contributions
  - Aprox 50 k€ / year from every Partner to fund HQ & related tasks
- Further in-kind contributions
  - Offered by partners, approved by Council

Finances

- Binding commitments for 400 M€ from France, Germany, Italy and Spain over 5 years.
- Waiting till June 30th for Netherlands 100 M€ confirmation
- 30 M€ already provided by CE
- Probably 40 M€ CE will provide additionally

Finances

- PRACE HQ funded by all members
- Includes
  - Director and staff salaries,
  - Peer review process,
  - Legal support,
  - Advertising,
  - Event and education support
- Total: 400K€ for 2010, 1000K€ for 2011
- Membership fee for 2010: 30K€ (50K€ for 2011?)

Usage

- Use of PRACE is free-of-charge for European scientific communities

- Use of PRACE is free-of-charges for companies that make public the results of the research project

- Access based on scientific quality and the need to use tier-0

Expected Structuring Effects

- Renewal of Tier-0 systems every 2-3 years required
- Investments of 500-600 M€ next 5 years will create a critical mass for strengthening the European HPC industry
  - Capability to provide independent access to this key technology
  - Access to world-class HPC systems as a competitive advantage for European science and industry
- A European HPC Service as part of the European Research Area
  - Access to world-class HPC systems for the best researchers from *all* European countries