

High Performance Computing from an EU perspective

DEISA PRACE Symposium 2010
Barcelona, 10 May 2010

Staying Competitive in Science

- Collaborations at global level
 - Policy and Science pull
 - Global virtual research communities
- Data-intensive science and innovation
 - Use and manage exponentially growing sets of data
- Experimentation *in silico*, simulation
 - **Use of high-performance computing**

⇒ ICT a fundamental enabler for research & innovation

European HPC Mandate

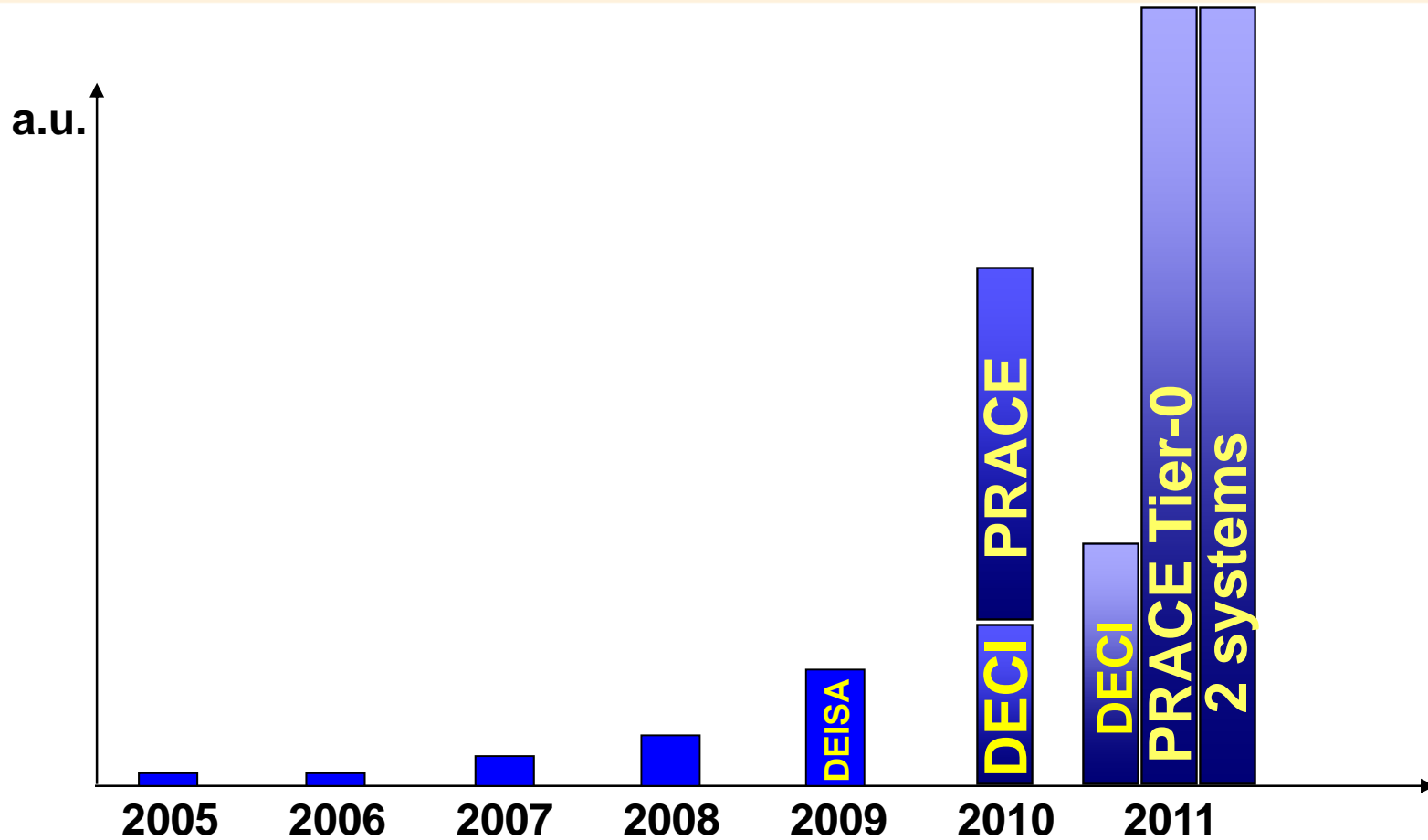
Com(2009) 108 asks:

- Building a new generation of supercomputing facilities
- Member States to scale up and pool investment in support of PRACE
- Commission to define and support an ambitious European strategic agenda for supercomputing
- + other HPC (grids), networking, data,...

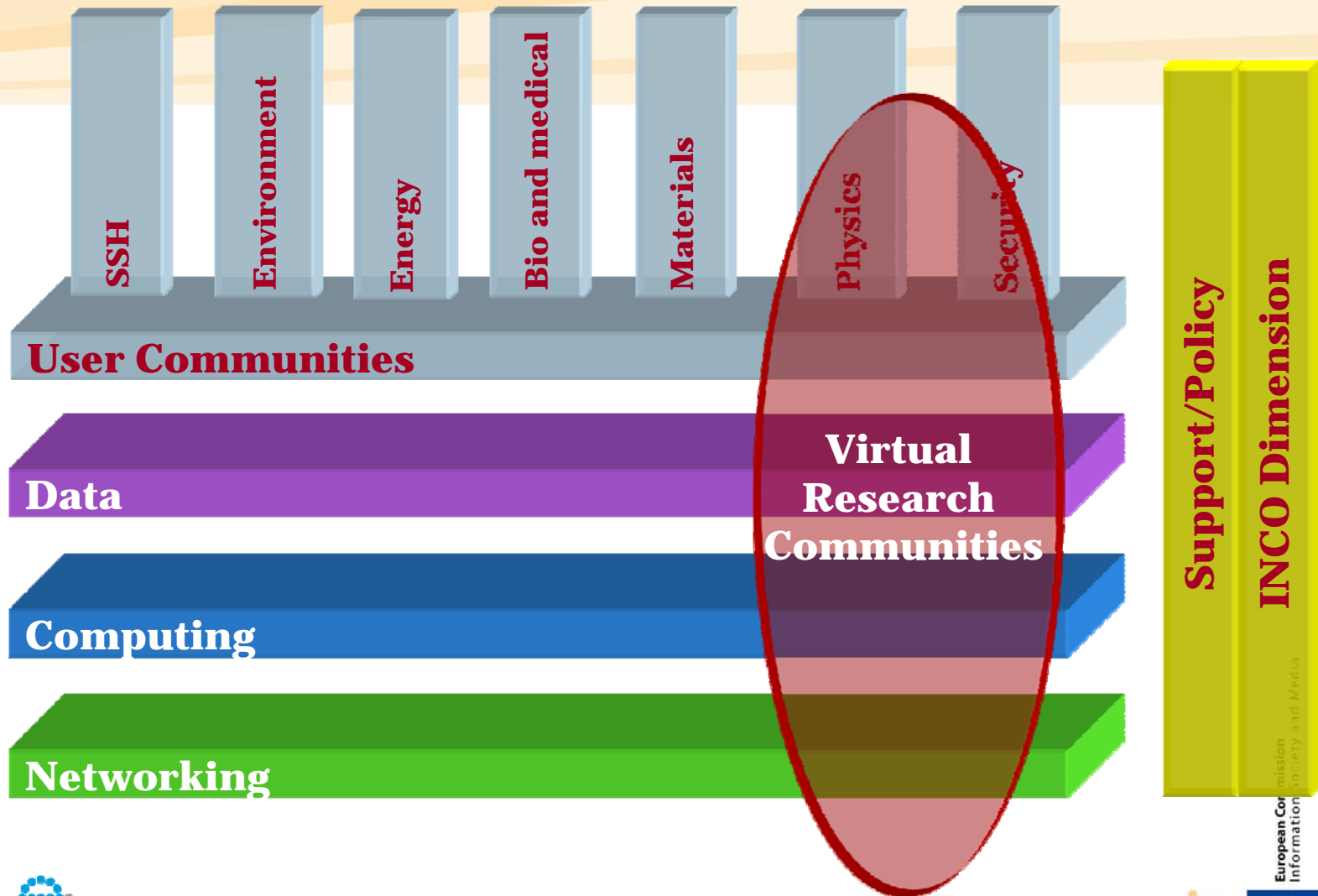
Conclusions of Competitiveness Council of 3 Dec 2009:

- Member States and the Commission to pool investments under PRACE, in order to strengthen the position of European industry and academia in the use, development and manufacturing of advanced computing products, services and technologies

European HPC Service

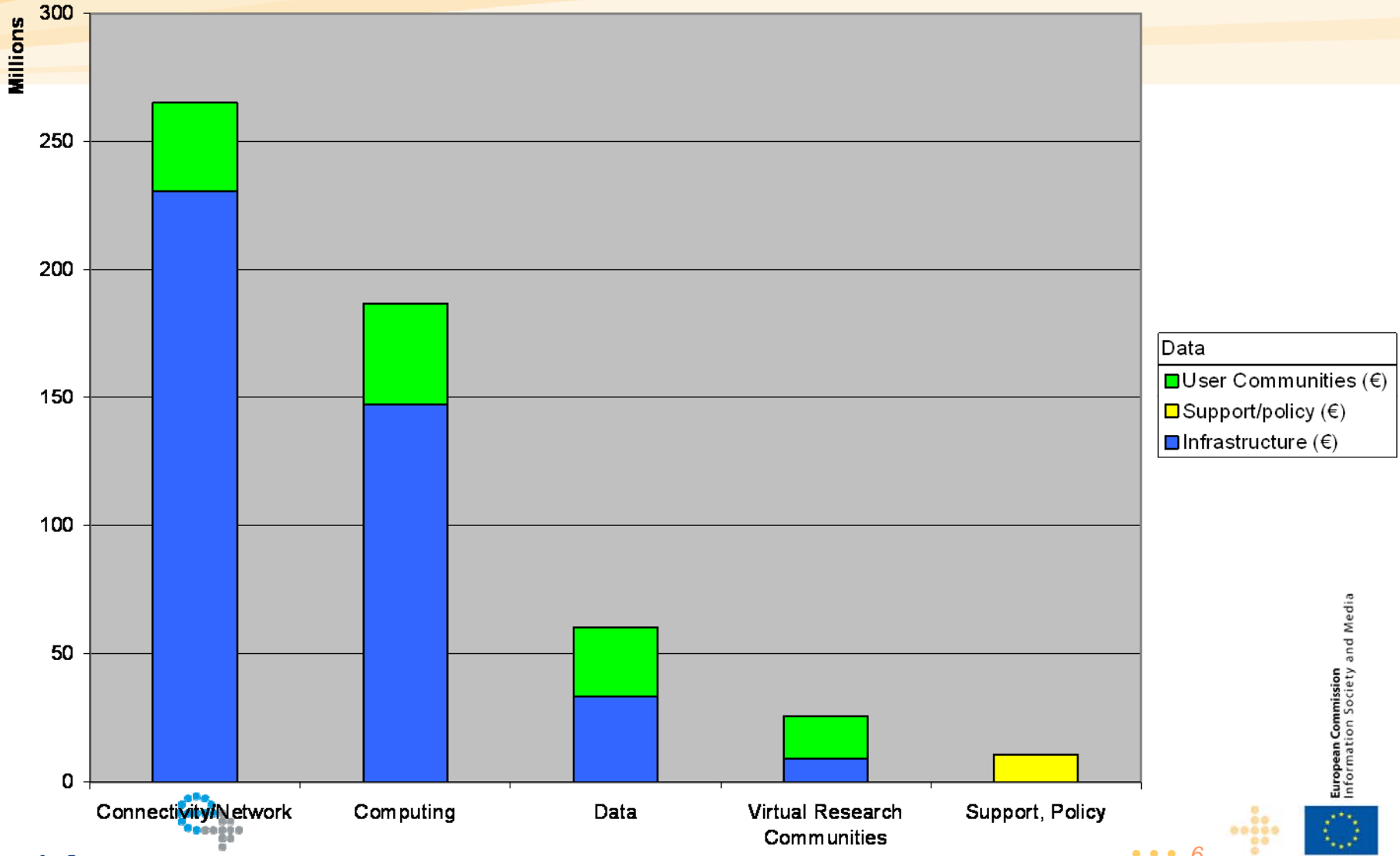


e-Infrastructures: areas of activity



Support to e-infrastructure layers

FP6 and FP7 (projects starting by end 2009)

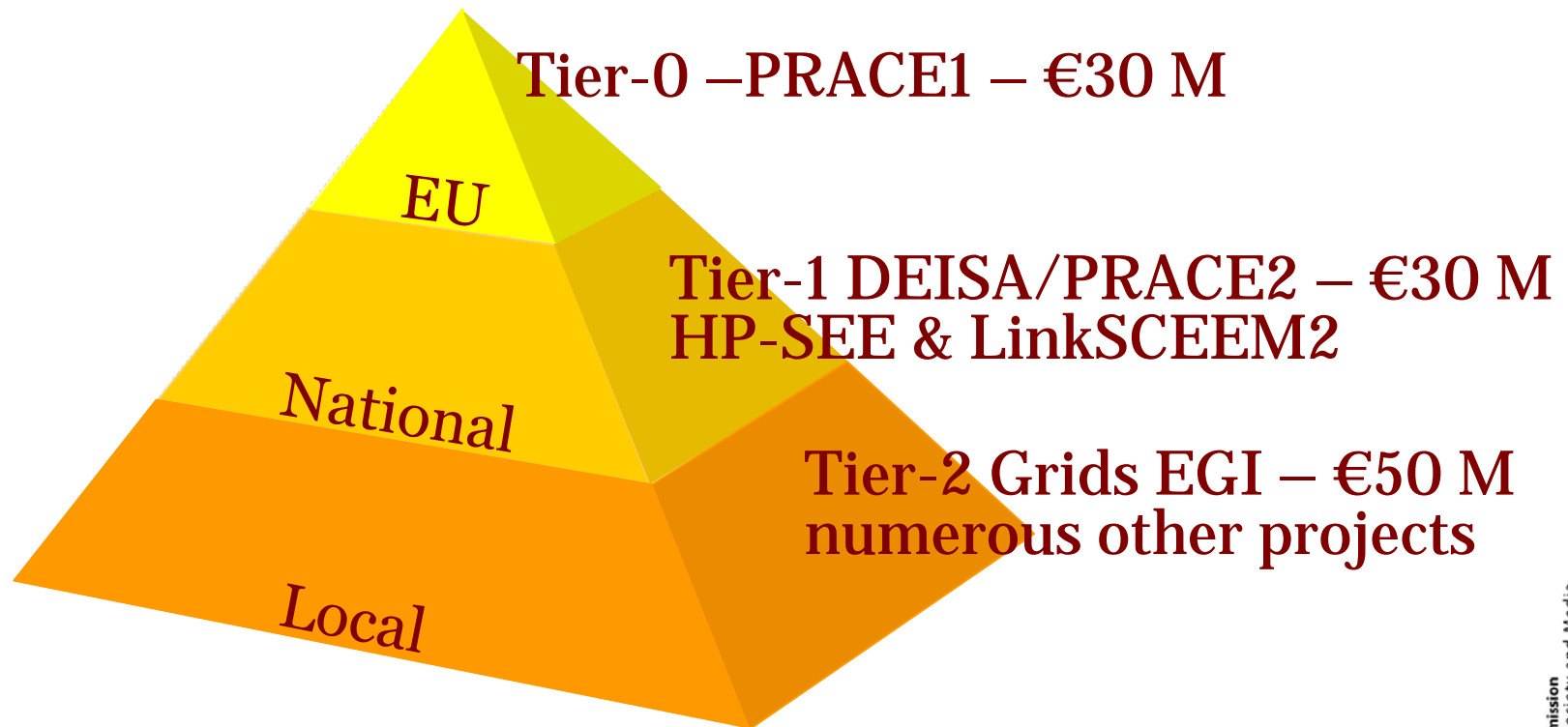


FP7-INFRA-2010-2 Call 7 overview

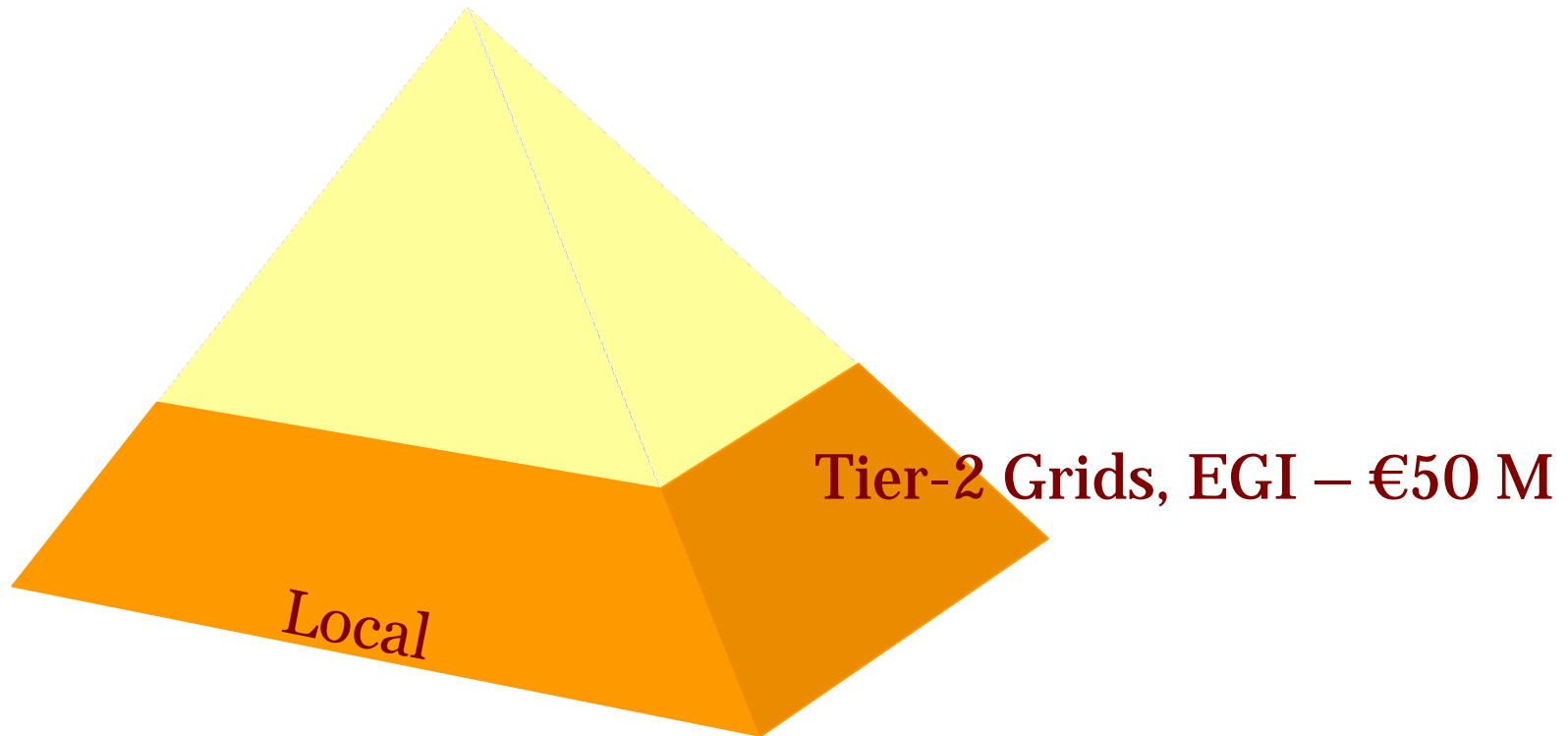
- **Opened: 30/07/2009**
- **Closed: 24/11/2009** **107 proposals received (106 eligible)**

Topics called	Budget M EUR	Retained Proposals
Distributed computing infrastructure (DCI)	48.3	6
High Performance Computing service PRACE	20	1
Simulation software and services	12.1	5
Virtual Research Communities	24.2	10
Coordination actions, conferences and studies supporting policy development	10.4	16

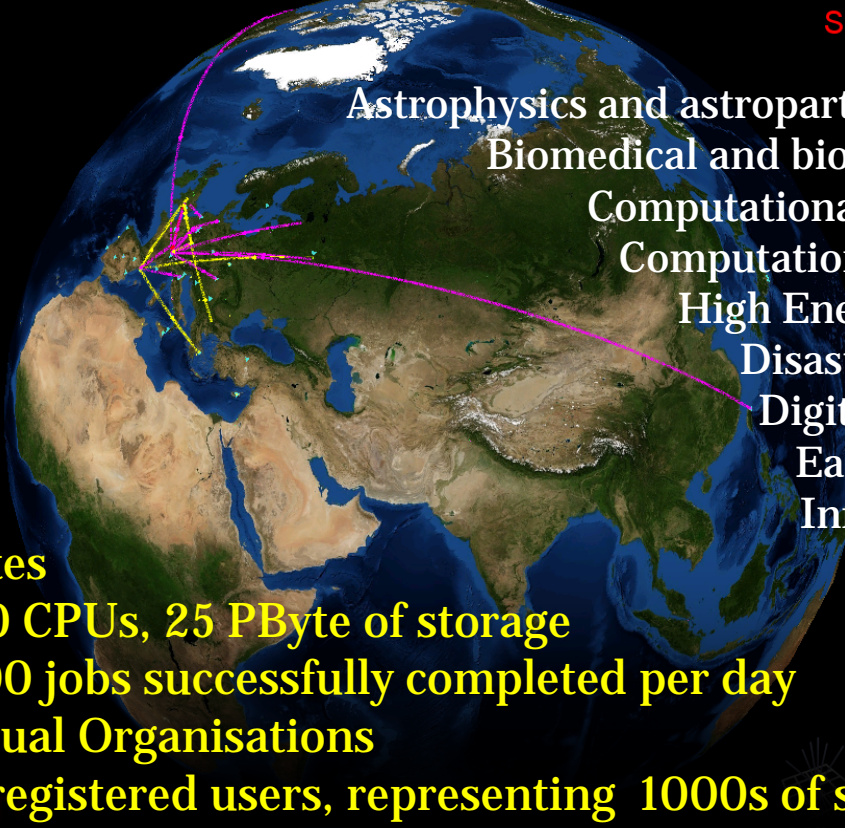

HPC Eco-System



HPC Eco-System: Grids



EGEE: Tackling Global Challenges



Scheduled = 17356
Running = 18359

Astrophysics and astroparticle physics
Biomedical and bioinformatics
Computational chemistry
Computational sciences
High Energy Physics
Disaster recovery
Digital Libraries
Earth sciences
Infrastructure
Geophysics
Finance
Fusion

- >340 sites
- >70 000 CPUs, 25 PByte of storage
- ~150 000 jobs successfully completed per day
- 270 Virtual Organisations
- >8000 registered users, representing 1000s of scientists

EGI-InSPIRE

- 4 year project, €25M EC contribution
- Project cost €69M
- Estimated Total European Grid Effort Cost
 - €335M from the NGIs involved in EGI-InSPIRE
- Project effort:
 - 8138PM
 - mixed NGI/EGI.eu model
 - 1100PM unfunded Asia Pacific Grid Initiative

EGI User Support & Services

Support User Communities

- Researchers in International Collaborations
- Scale up from the single VO to a community

Provide a federated Helpdesk linking:

- Discipline specific support (e.g. Bio Apps)
- National infrastructure support (e.g. NGS)
- Generic services (e.g. Training)

Provide core services to support users

- Manage VOs, Application DB, Training DB

EGI means Innovation

Deploy Technology Innovation

- Distributed Computing continues to evolve
 - Grids → Desktops → Virtualisation → Clouds →?

Enable Software Innovation

- Provide reliable persistent technology platform
 - Today: Tools built on gLite/UNICORE/ARC

Support Research Innovation

- Infrastructure for data driven research
 - Support for international research (e.g. ESFRI)

HPC Eco-System: Tier-1 Systems



DEISA: Virtual HPC Services

- Most powerful European supercomputers
- Dedicated high speed network (10 Gb/s)
- Single sign-on, common AAA
- Common production environment
- European teams of experts
- Extreme Computing Initiative
- Virtual Science Communities support
- Grand Challenge Projects on regular basis



HP-SEE & LinkSCEEM2

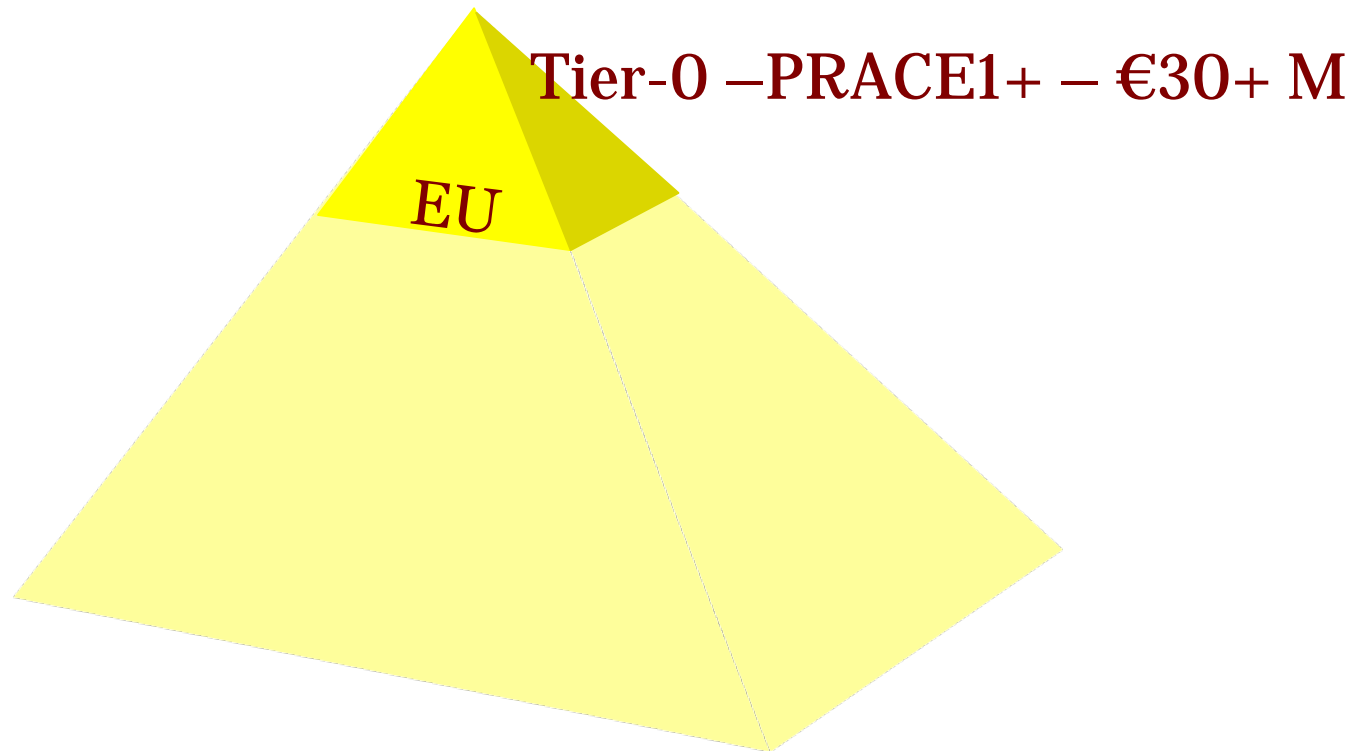
HP-SEE (€2.1 M)

- South-East European and Black Sea regional HPC interconnection
- Expected result: sustainable national HPC centers and collaboration with PRACE

LinkSCEEM2 (€2.5 M)

- Integrate resources by linking established HPC centers
- Focus on climate science, cultural heritage and synchrotron applications
- User support and training programs

HPC Eco-System



Vision

- Provide world-class HPC systems for world-class science, supporting European R&D leadership

Objectives – from an EU perspective

→ Create a leading persistent HPC infrastructure

- Deploy 3 – 6 systems of the highest performance level
- Ensure a diversity of architectures meeting needs of users
- Exploit benefits beyond pure Science
 - Demand: Societal grand challenge problems and industrial competitiveness
 - Supply: applications, software and systems
- Integrate services with other HPC layers
- Fair, efficient and effective governance with open access
- Provide support and training

PRACE – First Results

- ✓ France, Germany, Italy and Spain each have given binding commitments for 100 Mio € over 5 years.
- ✓ 20 Countries signed the PRACE MoU
- ✓ Free-of-charge service for European scientific communities based on peer review, in principle
- ✓ PRACE Tier-0 Infrastructure operational from 08/2010

JUGENE@Jülich

#4 worldwide, #1 in Europe



**1st PRACE
system**

IBM Blue Gene/P
72 racks, 294912 cores
1 Petaflop/s peak

**2nd PRACE
System**

to come end 2010

Priorities and investment plans

Short to medium term:

- Integrate DEISA and pan-European Tier-1 efforts into the next phase of PRACE (20 M€ more in 2011)
- Fine tune the organisational and governance models
- Demonstrate impact and benefits of HPC
 - Use and supply
- Development of exa-scale prototypes from 2011 onwards (first tranche of 24 M€)
- Support international exa-scale coordination (in 2010 and 2011: EESI)
- Preparation of 8th Framework Programme

Conclusions

- e-Infrastructures provide the platforms for data and computation-intensive collaborative Science
- HPC becomes part of EU policy
- DEISA and PRACE are delivering tangible results
 - but impact of “tier 0” HPC beyond Science needs substantiation
- Comprehensive EU strategy for HPC still to be developed
 - Use vs. supply, industry vs. academia, national vs. EU, ...

Connecting
the finest
minds

... Linking ideas at
the speed of light

Sharing the
best scientific
resources

... Harnessing
the unlimited power
of computers,
instruments and data

Building virtual
global research
communities

... Innovating the
scientific process



e-infrastructure



géant | grids | scientific data | supercomputing

