

Building the European HPC Ecosystem

ISC BOF
June 18th, 2008

Kimmo Koski
CSC – The Finnish IT Center for Science



Computational science infrastructure



Main players in European HPC Ecosystem

- **ESFRI Roadmap and 35 new research infrastructures**
- **PRACE – Petaflop computing centers**
- **EU-supported infrastructure projects, such as DEISA, EGEE, GEANT2, ...**
- **European Grid Initiative, EGI**
- **Policy groups, such as HET, ESFRI and e-IRG**
- **Regional activities**
- **National Infrastructures**
- **International centers, such as CERN, EBI and ECMWF**
- **User communities with HPC requirements, such as fusion or climate**



PRACE First Steps and Achievements

Production of the HPC part of the ESFRI Roadmap;
Creation of a vision,
involving 15 European countries



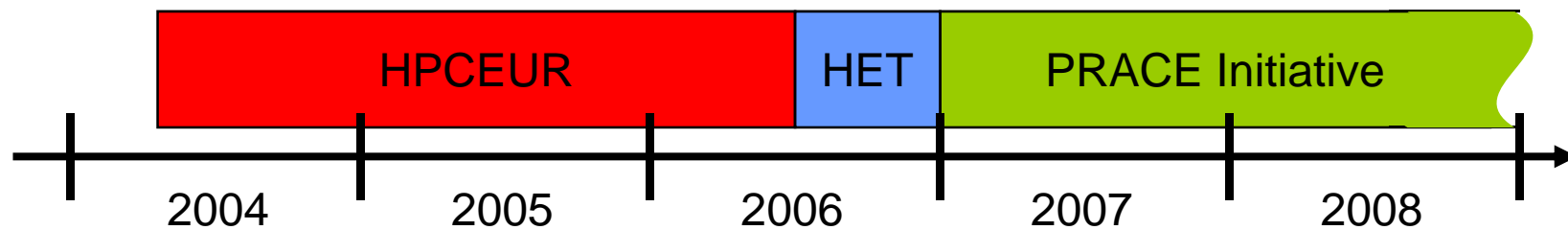
Signature of the MoU

Submission of
the project proposal

Approval of the project

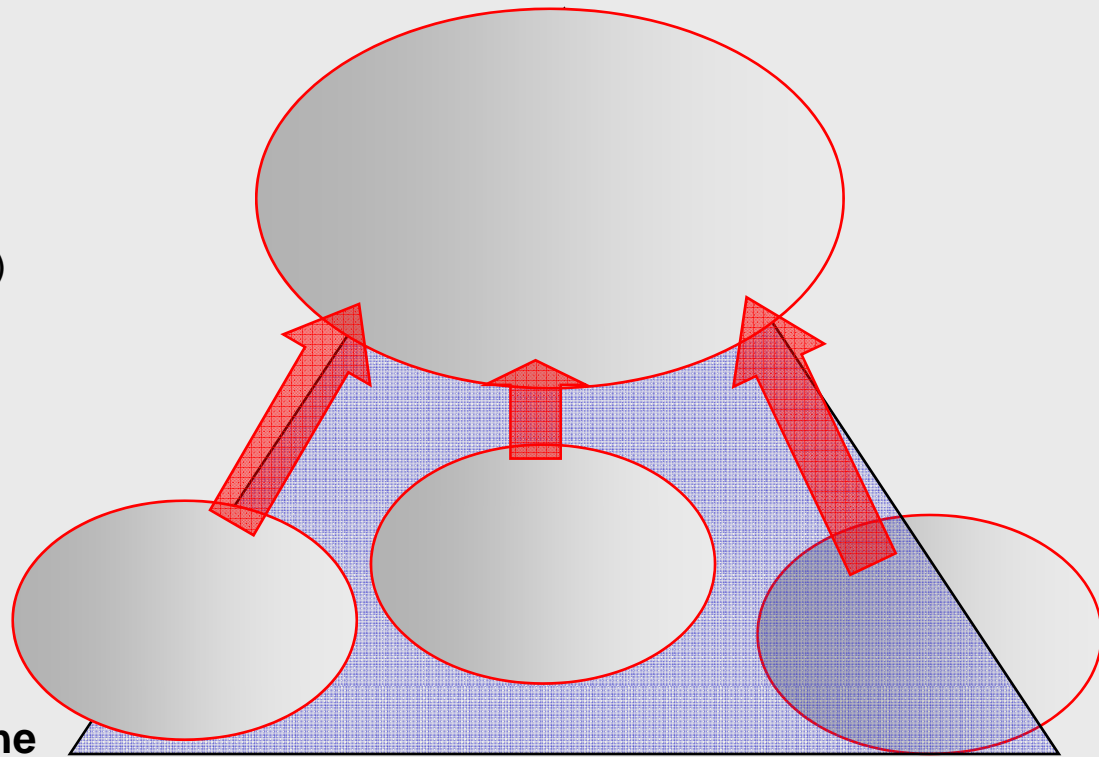
Kick-off

Bringing scientists together
Creation of the Scientific Case



HPC Ecosystem to support the top

- **The upper layers of the pyramid**
 - HPC centers / services
 - European projects (HPC/Grid, networking, ...)
- **Activities which enable efficient usage of upper layers**
 - Inclusion of national HPC infrastructures
 - Software development and scalability issues
 - Competence development
- **Interoperability between the layers**



Policy and strategy work

- **HET: HPC in Europe Taskforce**
<http://www.hpcineuropetaskforce.eu/>
- **e-IRG: e-Infrastructure Reflection Group**
<http://www.e-irg.org/>
- **ESFRI: European Strategy Forum on Research Infrastructures**
<http://www.cordis.lu/esfri/>



ESFRI

- **Strategy Forum with a consulting role to EU**
- **Wide representation of scientists in various disciplines**
- **Roadmap process for major new European research infrastructures (range of 10-1000 MEUR for an infrastructure)**
- **Roadmap published in 2006**
 - 35 projects labeled mature
 - One of the projects European HPC Service
- **Preparatory projects for each project**
 - 1-4 years
 - Deadline for project call was May 2nd, 2007
- **ESFRI-list update in process**
 - Renewed list targeted for autumn 2008



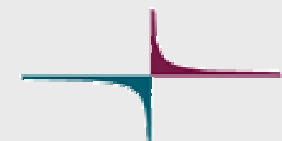
Topics to discuss in HPC Ecosystem

- **How to collaborate between different projects?**
- **How to involve all relevant stakeholders?**
- **How to improve interaction between researchers and those providing IT services?**
- **How to increase the decision makers' interest towards computational science?**

- **What do the users really need?**



Some definitions...



CSC

Terminology and pointers

- **HPC**
 - High Performance Computing
- **HET**, <http://www.hpcineuropetaskforce.eu/>
 - High Performance Computing in Europe Taskforce, established in June 2006 with a mandate to draft a strategy for European HPC ecosystem
- **Petaflop/s**
 - Performance figure 10^{15} floating point operations (calculations) in second
- **e-IRG**, <http://www.eirg.eu>
 - e-Infrastructure Reflection Group. e-IRG is supporting the creation of a framework (political, technological and administrative) for the easy and cost-effective shared use of distributed electronic resources across Europe - particularly for grid computing, storage and networking.
- **ESFRI**, <http://cordis.europa.eu/esfri/>
 - European Strategy Forum on Research Infrastructures. The role of ESFRI is to support a coherent approach to policy-making on research infrastructures in Europe, and to act as an incubator for international negotiations about concrete initiatives. In particular, ESFRI is preparing a European Roadmap for new research infrastructures of pan-European interest.
- **RI**
 - Research Infrastructure

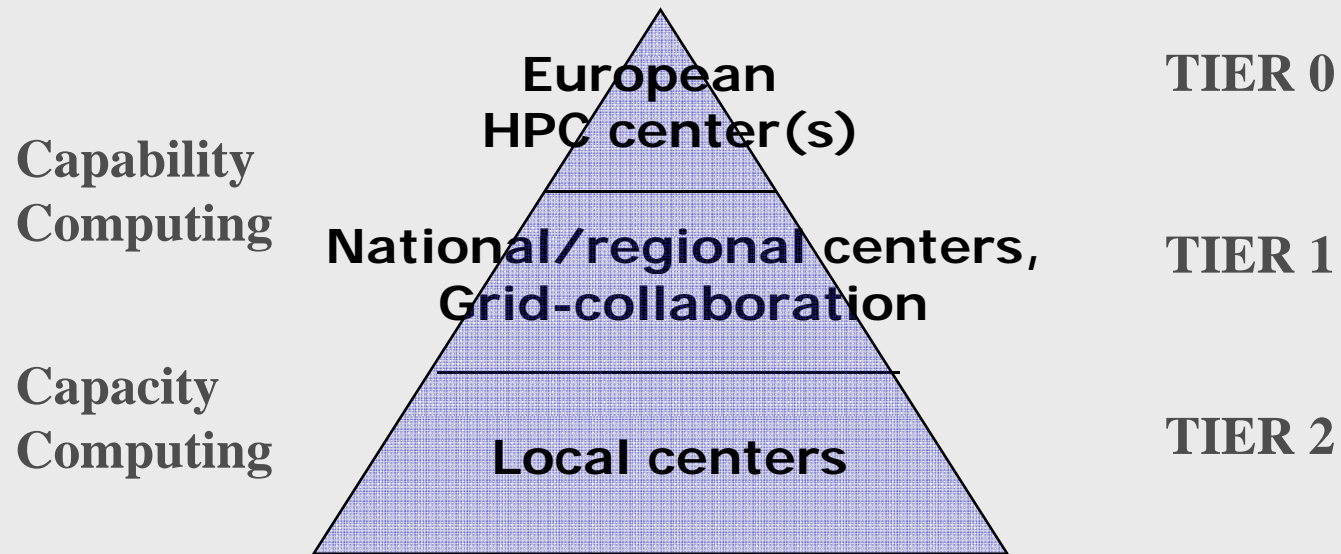


Terminology and pointers (cont.)

- **PRACE**
 - Partnership for Advanced Computing in Europe
 - EU FP7 project for preparatory phase in building the European petaflop computing centers, based on HET work
- **DEISA**, <https://www.deisa.org/>
 - Distributed European Infrastructure for Supercomputing Applications. DEISA is a consortium of leading national supercomputing centers that currently deploys and operates a persistent, production quality, distributed supercomputing environment with continental scope.
- **EGEE-II**, <http://www.eu-egee.org/>
 - Enabling Grid for E-science. The project provides researchers in academia and industry with access to a production level Grid infrastructure, independent of their geographic location.
- **EGI**, <http://www.eu-egi.org/>
 - An effort to establish a sustainable grid infrastructure in Europe
- **GÉANT2**, <http://www.geant2.net/>
 - Seventh generation of pan-European research and education network



Performance Pyramid



Need to remember about petaflop/s...

- **What do you mean with petaflop/s?**
 1. Theoretical petaflop/s?
 2. LINPACK petaflop/s?
 3. Sustained petaflop/s for a single extremely parallel application?
 4. Sustained petaflop/s for multiple parallel applications?
- **Note that between 1 and 4 there might be several years**
- **Petaflop/s hardware needs petaflop/s applications, which are not easy to program, or not even possible in many cases**
 - Do we even know how to scale over 100000 processors ...

