ICT Infrastructures for e-Science

The Communication by the Commission and the case of supercomputing

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"The views expressed in this presentation are those of the author and do not necessarily reflect the views of the European Commission"

Science and ICT

- Scientific advances more important than ever
  - Global challenges with high societal impact
  - Innovation and economic development
- Adoption of ICT changes the scientific discovery process
  - Computing, simulation and data
  - Tackling the very small, the very big and the very complex
  - Cost efficiency
  - Open, cross-border and cross-discipline collaboration

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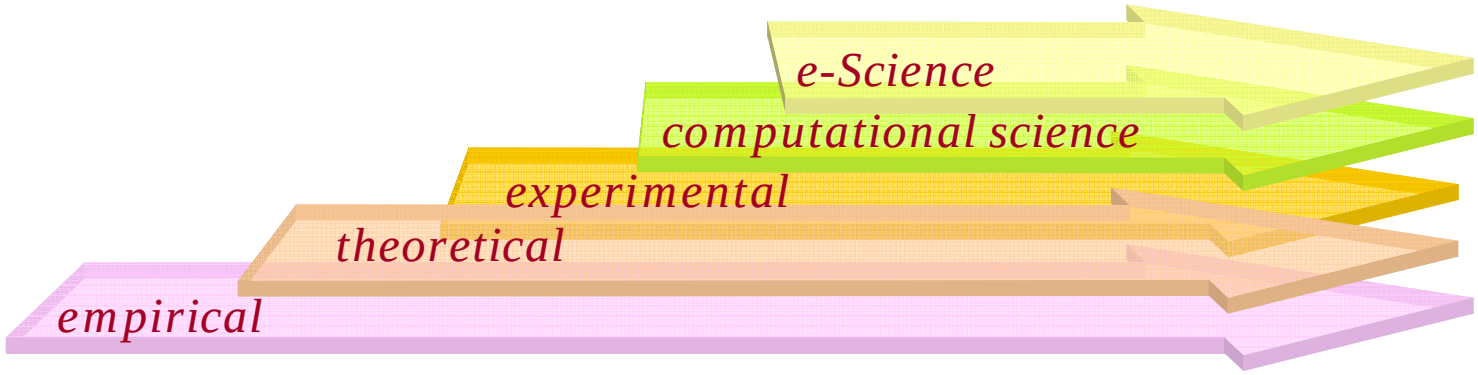
The e-Science paradigm shift



towards a scientific Renaissance

e-Infrastructures for science

...ubiquitous research environments for accessing and sharing resources and tools...

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e-Infrastructures today

Innovating the scientific process:
global virtual research communities

Accessing knowledge:
scientific data

Experimenting *in silico*:
simulation and visualisation

Sharing the best computational resources:
e-Science grid, supercomputing

Linking at the speed of the light:
GÉANT

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World Leadership

- GÉANT: biggest and fastest research & education network in the globe
- EGEE: world leading grid-infrastructure

- DEISA: peering European supercomputing capability with that of other regions
- Data infrastructures: laying down the foundations
  - multi-disciplinary use, easy and open access

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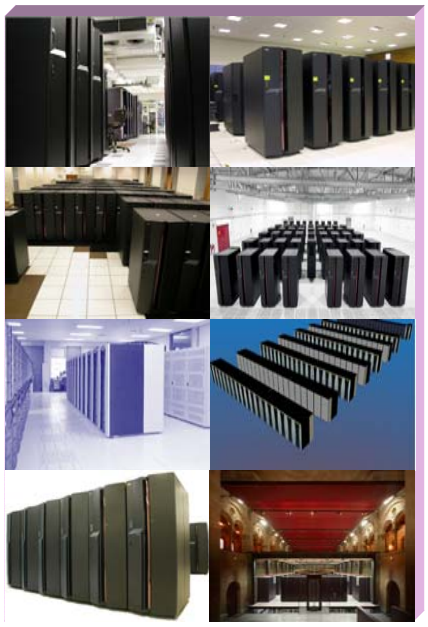
DEISA:
'virtual' HPC services since 2004



Distributed European Infrastructure for Supercomputing Applications

- 12 sites in 7 countries connected at 10 Gb/s
- Over 22,000 CPUs with an aggregated peak performance of close to 1 Peta flops
- Running larger parallel applications in individual sites
- Enabling workflow applications with grid technologies (UNICORE)
- Providing a global data management service
- Extreme Computing Initiative

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Future challenges

- World leadership requires ever-increasing efforts
- Scientific progress poses new requirements; e.g.
  - simulations soon at exa-scale level
  - handling mind-boggling quantities of data
  - new applications and tools
- Widespread use demands sustainable quality services
- ICT changes; HW performance increases rapidly

e-Infrastructures need to embrace new paradigms and include richer functionalities … to support multi-disciplinary teams to transform bits, bytes & flops into scientific discoveries & engineered products

A renewed strategy

Europe: hub of excellence in **e-Science**

Sustainable and continuous services (production quality 24/7)

Innovation: exploit know-how beyond science (public services, large scale experimentation,...)

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Call for Action

- …
- **Supercomputing**:
  - ✓deploy top-class ecosystem of computational resources
  - ✓Member States to scale up & pool investments (PRACE)
  - ✓Commission actions to define and support ambitious, broad strategic agenda
    - from components and SW to systems and services
- …
- …successful implementation … requires reinforced and coordinated efforts of Member States, the Commission and the scientific communities

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European supercomputing: *the ambition*

- Make Europe a leading player in supercomputing
  - User and supplier of components, software, systems, services
- Joining forces
  - Member States and Commission to pool investments
  - Scientific community to implement coordinated plan of action
- Strengthen competitiveness; face global challenges
  - Medicine, climate, energy,...

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PRACE: the preparatory phase

- **Late 2009: 1PF in the top 5**
- **Late 2010: 2 PF in the top 5; 1PF in the top 10**
- **2011: over 10PF in the top 5; 2 PF in the top 10**
- **2020: the exaflop in the top 5**

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European supercomputing facility: *principles*

- Efficient and fair governance
- Openness in use and contributions
- Sustainable operation model
- Service/user orientation

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European supercomputing facility: *implications*

- **Legal form** and **seat** of joint structure
- **Governance** – who decides on what
- Concerted plans for **pooling resources** - financial and in-kind
  - Who, what, how much and by when
- **Operation models & use policy**; peer-review process
- Policy towards **industry** – as user or supplier
- **R&D** programme – to prepare next generations
- Links with DEISA and EGI

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further information

www.cordis.europa.eu/fp7/ict/e-infrastructure/

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