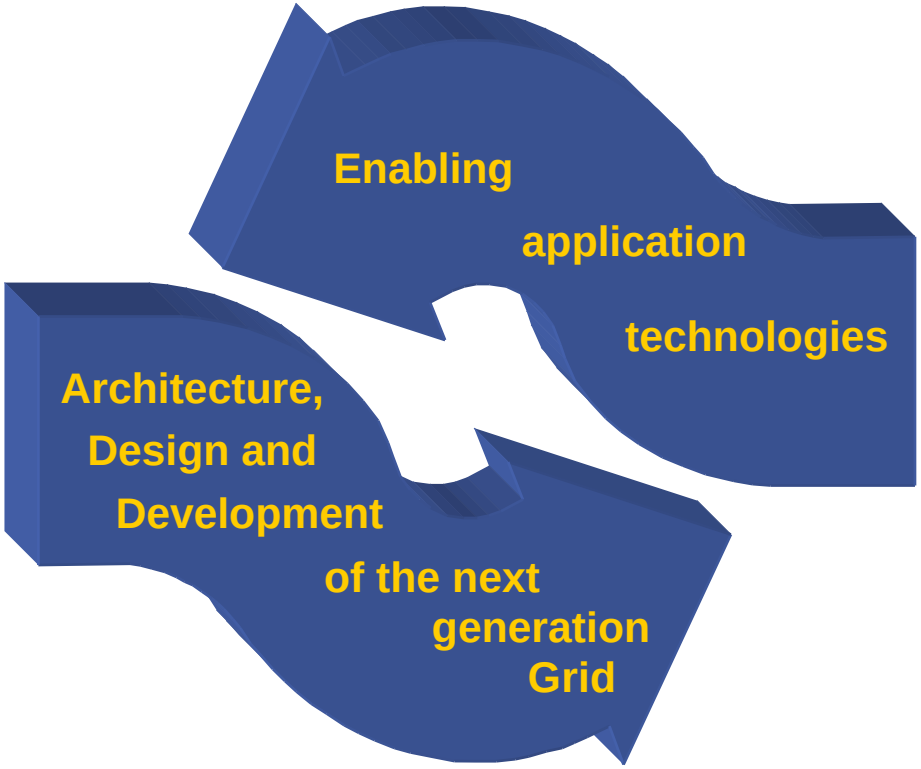
Grid Research in the European Union

Objectives and Research Focus



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European Commission

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http://cordis.europa.eu/ist/grids

Grid Research and Deployment in FP6

Application-oriented
Strategic Objectives
e.g. eBusiness, eGov, eHealth,
environment & risks management

R&D

Grid Technologies

- Architecture, design and development of the next generation Grid
- Enabling application technologies
- Industrial and business applications

Research & Development

130 M€ (IST)

Technology-oriented
strategic objectives
e.g. semantic web,
software and services

R&D

Research Infrastructures

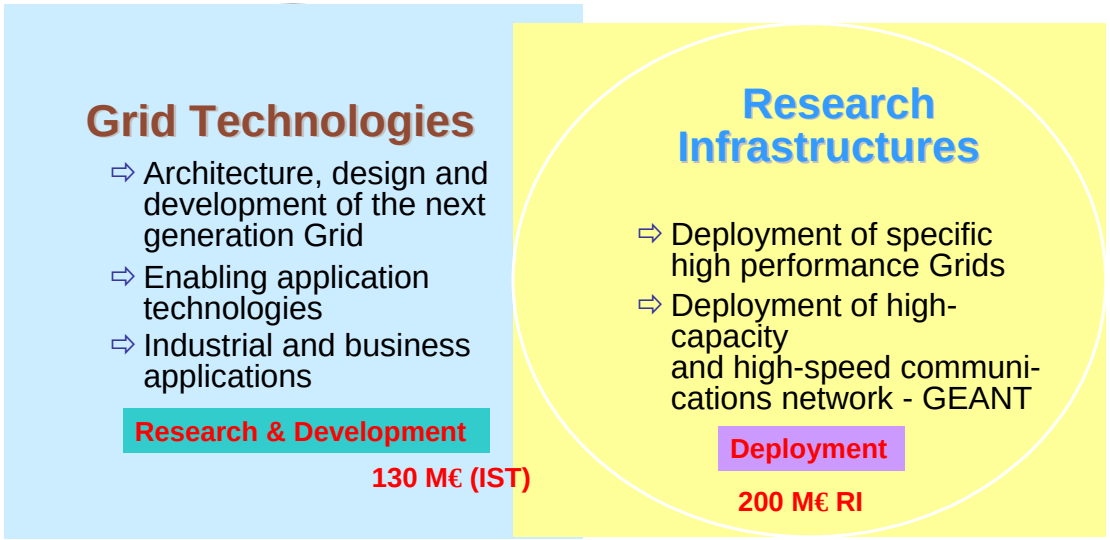
- Deployment of specific high performance Grids
- Deployment of high-capacity and high-speed communi-cations network - GEANT

Deployment

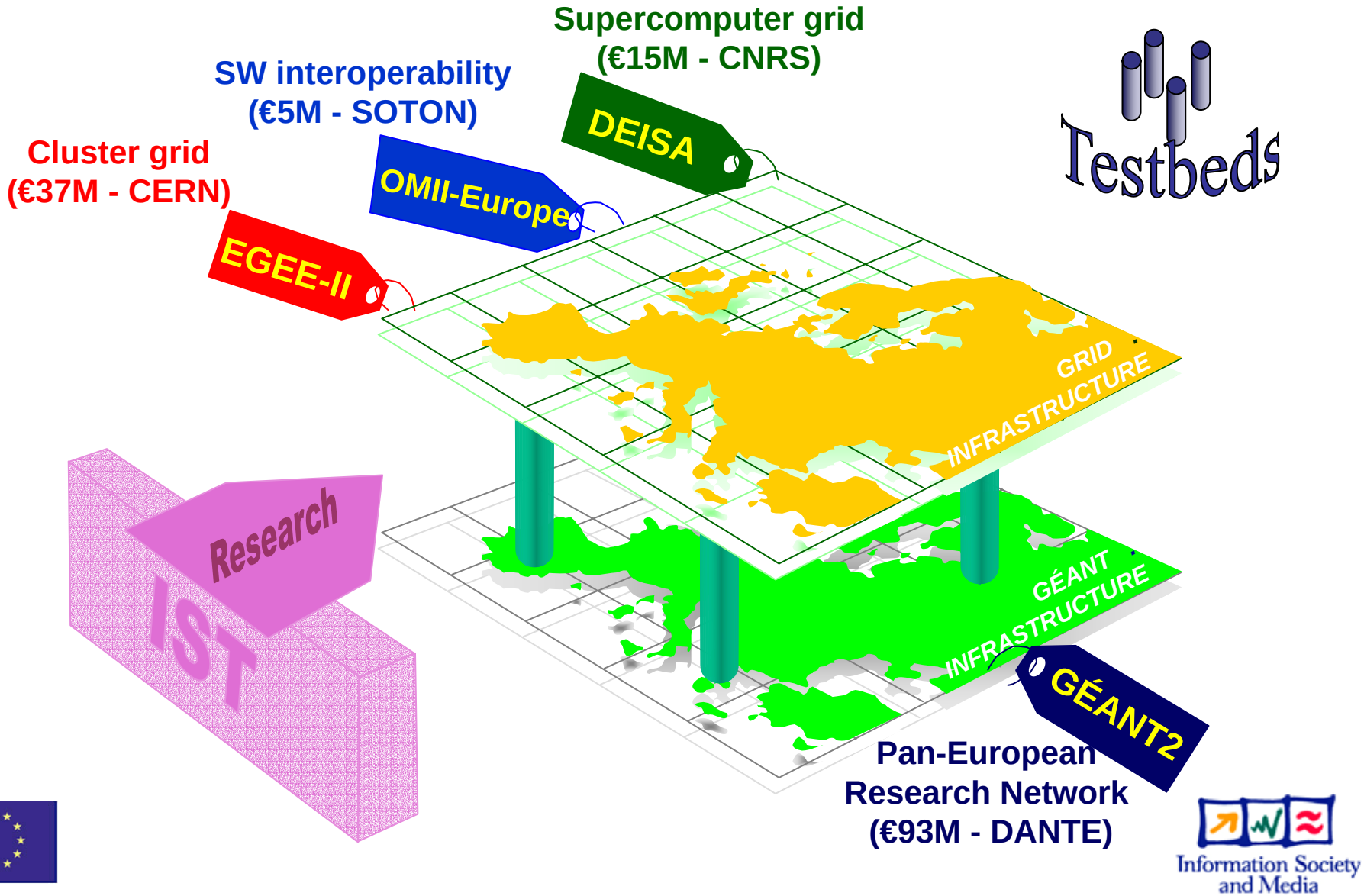
200 M€ RI

OUTLINE

- ⇨ **The EU Research Infrastructures programme in 2003 - 2006**
- ⇨ **EU Grid Research in 2003 - 2006**
- ⇨ **Concluding remarks**

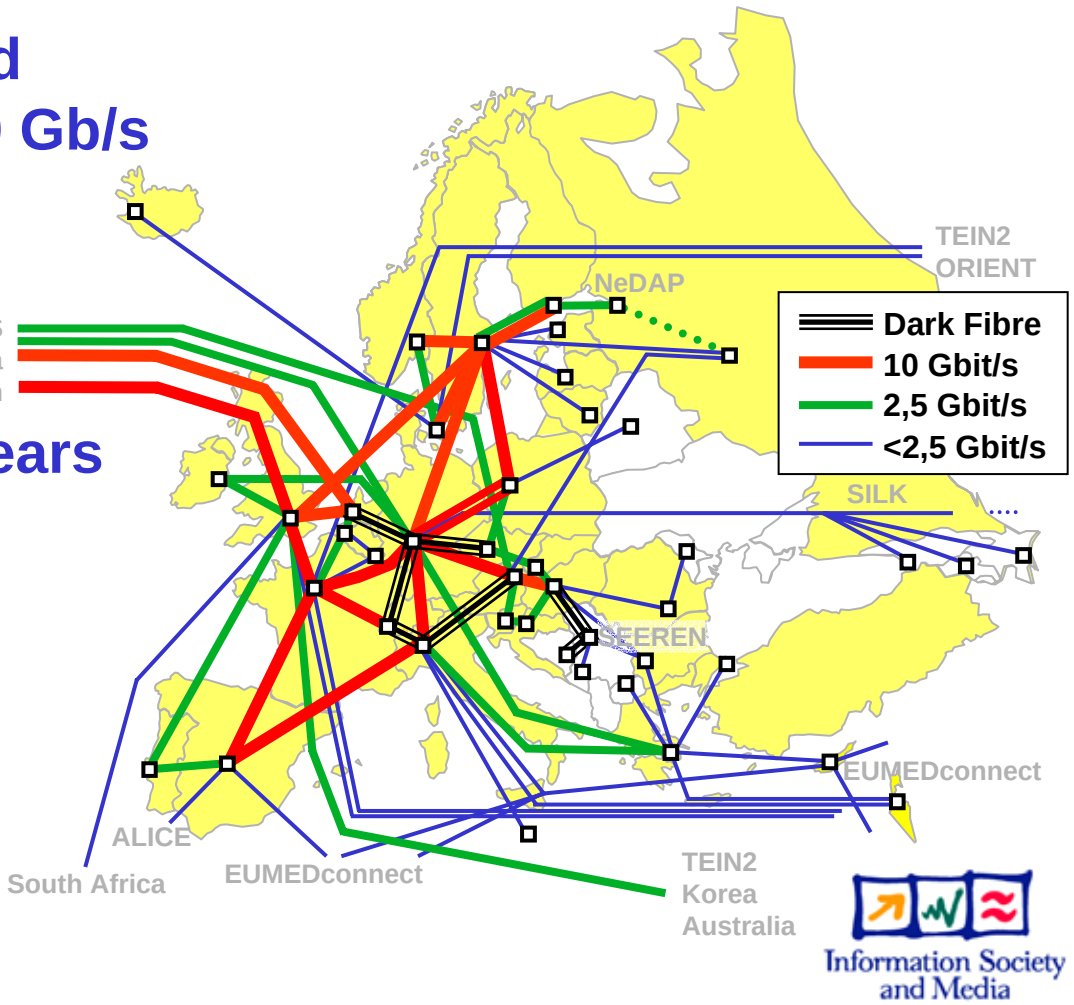


Major projects



GEANT2: connecting Europe and beyond

- Pan-European coverage (40+ Countries/NRENs)
- Dark fiber wavelength and Gigabit connectivity at 10 Gb/s
- Linking more than 3900 Universities
- 30+ Million Students
- Total 200 MEuro over 4 years (93 MEuro from EU)
- Extend to Mediterranean, Asia Pacific Rim, Latin America ...



eInfrastructure: better connectivity

EUROLabs
(connected testbeds)

LOBSTER
(traffic monitoring)

MUPPED
(optical tech.)

EUQoS
(flexible QoS)

GO4IT
(IPv6 testing)

Technology validation

SEEREN2/SEEFIRE
(Balkans)

PORTA OPTICA
(Caucasus)

ORIENT
(China)

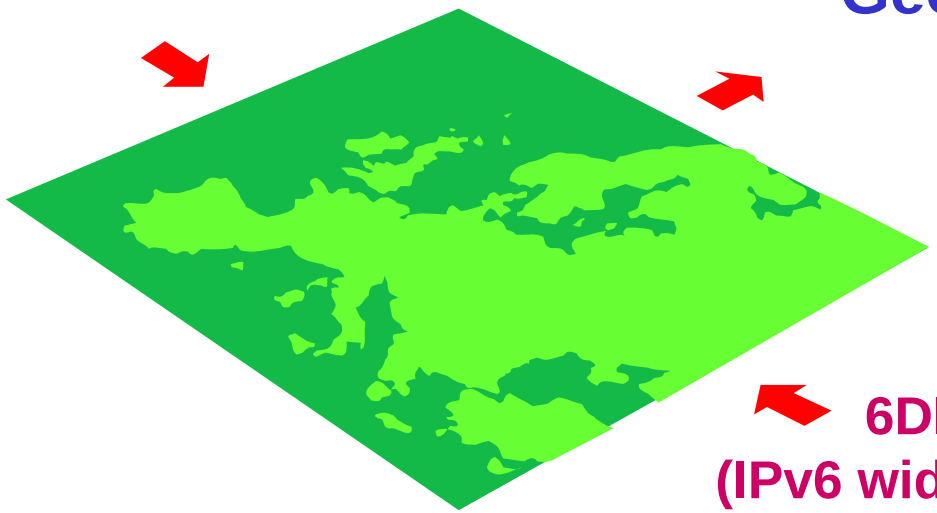
TEIN2
(Asia)

ALICE
(Latin America)

OCCASION
(NIS)

EUMEDCONNECT
(Mediterranean)

Geographical extension



User involvement

AUGERACCESS
(cosmic rays)

IPv6TF SC
(IPv6 take up)

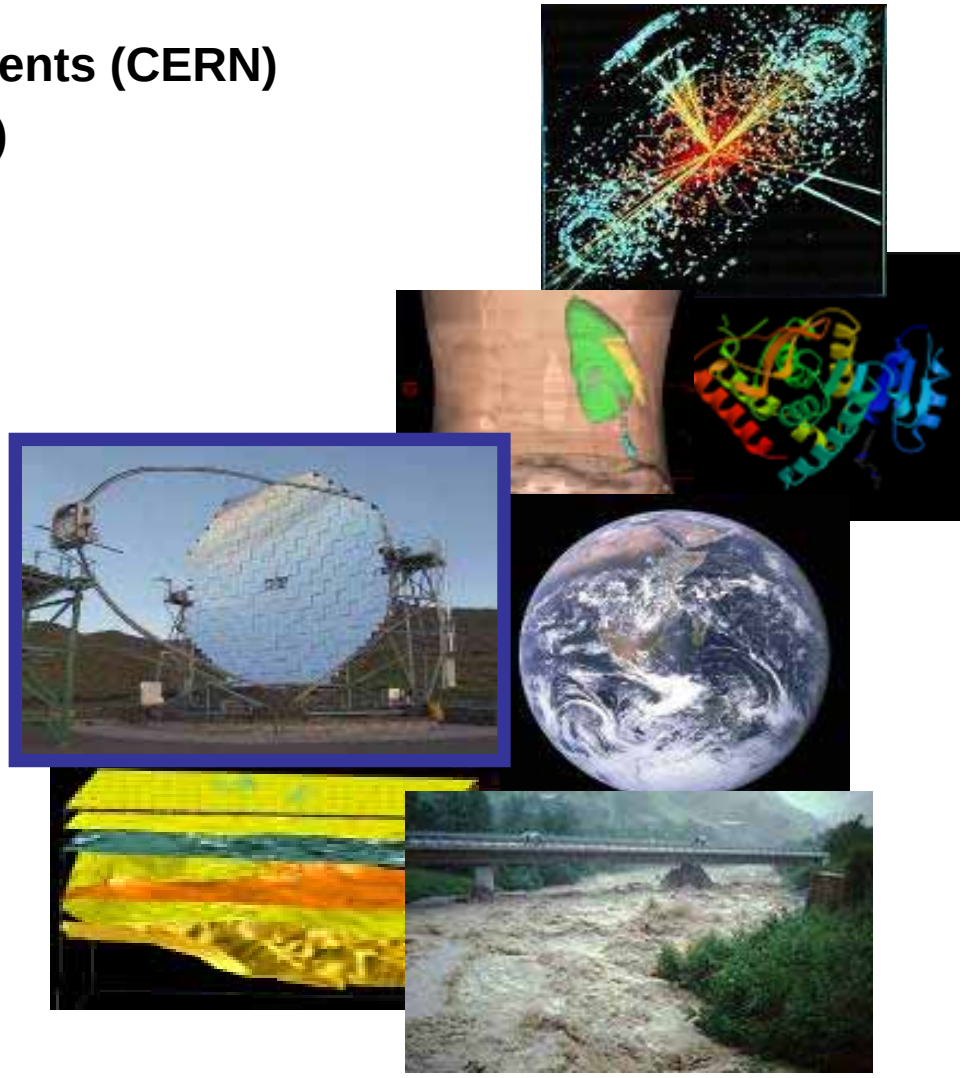
6DISS
(IPv6 widespread)

EXPReS
(astronomy)

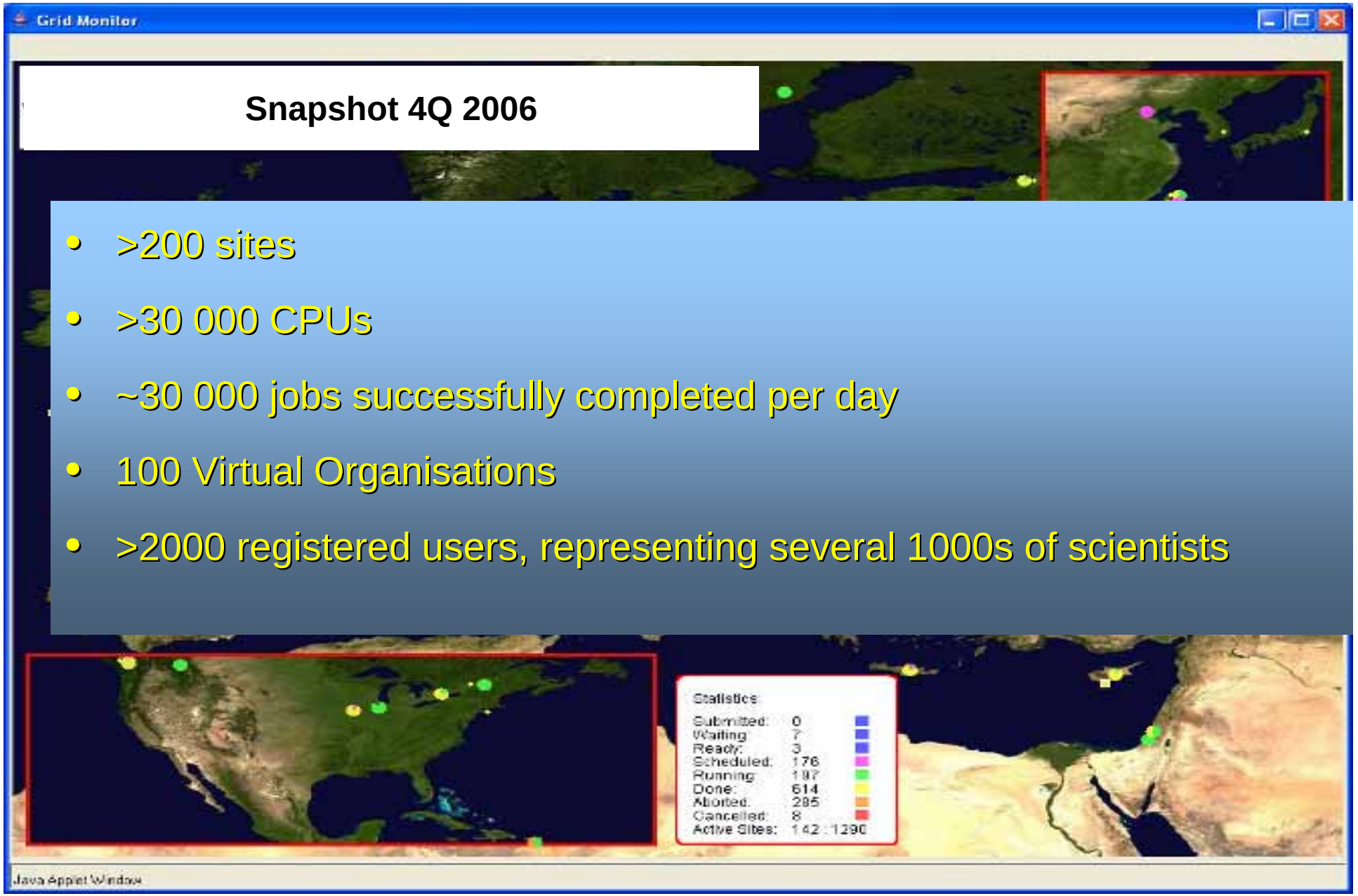
Information Society and Media

EGEE: 20 applications from 6 scientific domains

- **High Energy Physics**
  - 4 Large Hadron Collider experiments (CERN)
  - Other HEP (DESY, Fermilab, etc.)
- **Biomedicine**
  - Bioinformatics
  - Medical imaging
- **Earth Sciences**
  - Earth Observation
  - Solid Earth Physics
  - Hydrology
  - Climate
- **Computational Chemistry**
- **Astronomy**
  - Cosmic microwave background
  - Gamma ray astronomy
- **Geophysics**
  - Industrial applications



EGEE: world's largest multi-science grid



- >200 sites
- >30 000 CPUs
- ~30 000 jobs successfully completed per day
- 100 Virtual Organisations
- >2000 registered users, representing several 1000s of scientists

eInfrastructure: expanding the Grid

ICEAGE (education)

ITHANET (clinical)

BELIEF (support)

EELA (Latin America)

BalticGrid (Baltic)

SEEGRID (SEE)

BIOINFOGRID (bioinformatics)

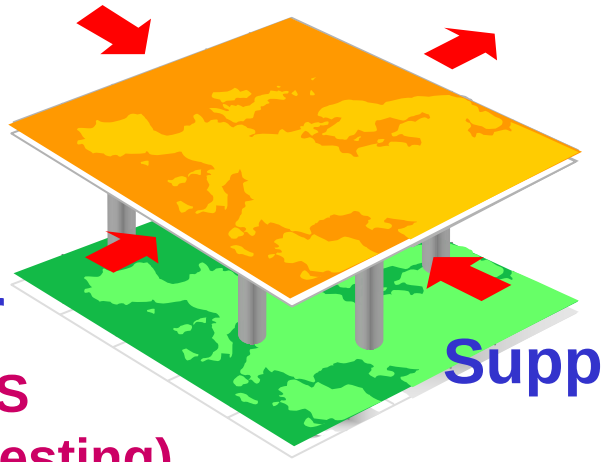
DILIGENT (digital libraries)

EUChinaGRID (China)

EUMEDGRID (Mediterranean)

New user communities

New regions



Making it better

ISSeG (security)

ETICS (software testing)

GRIDCC (instrumentation)

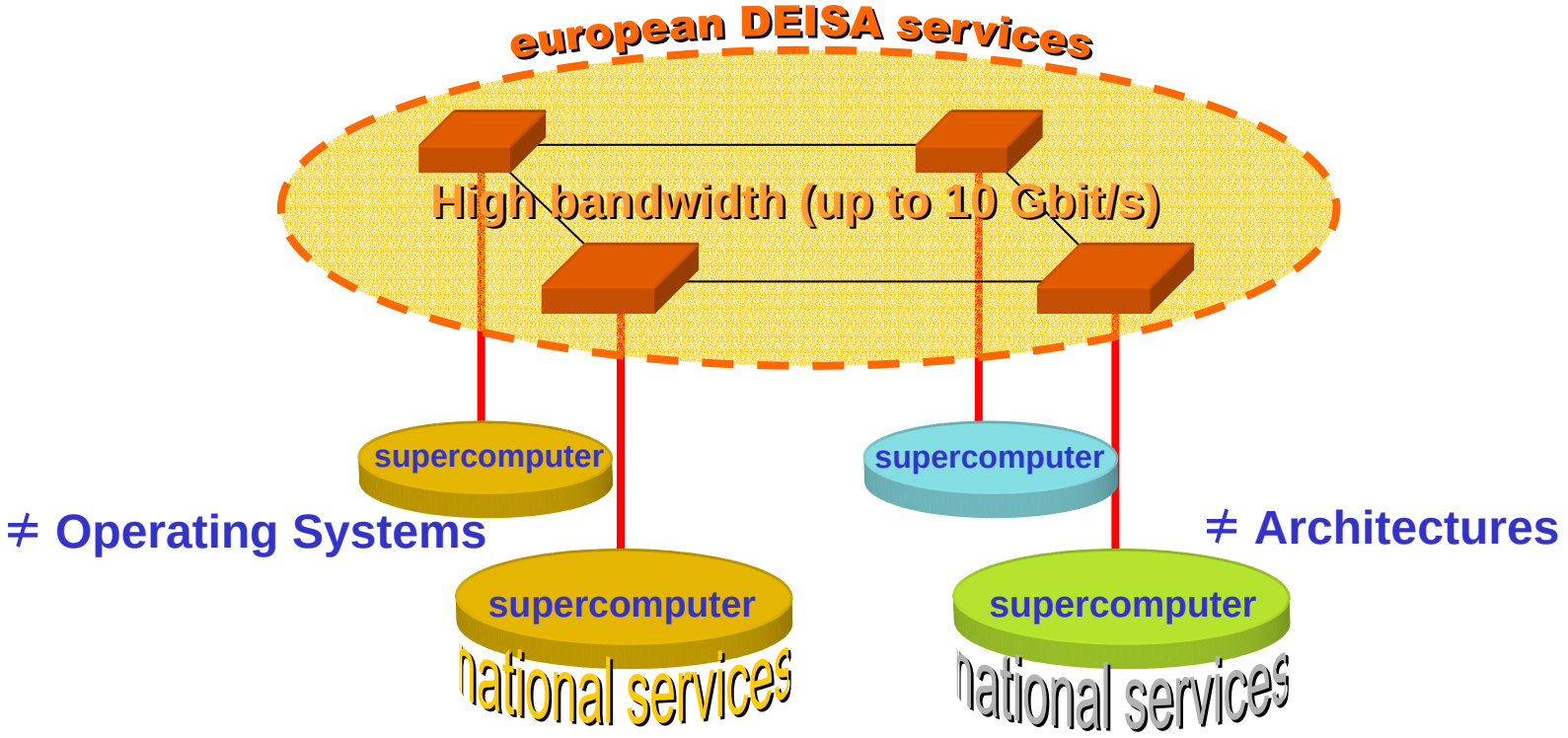
Supporting policy making

eIRGSP (eIRG)

Information Society and Media

DEISA: the supercomputing grid

- Integrates Europe's most powerful supercomputers
- Multiple application areas + DEISA Extreme Computing Initiative



Information Society and Media

DEISA: bringing together major EU supercomp.

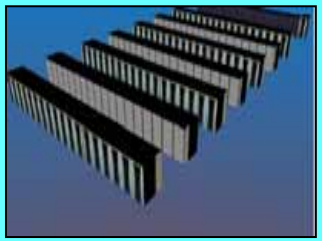
AIX IBM domain

RZG (DE)

IDRIS (FR)

LINUX SGI

SARA (NL)



LRZ (DE)

ECMWF (UK)

High Performance Common Global File System

LINUX Power-PC

CSC (FI)

CINECA (IT)

FZJ (DE)

BSC (ES)

Information Society and Media

OUTLINE

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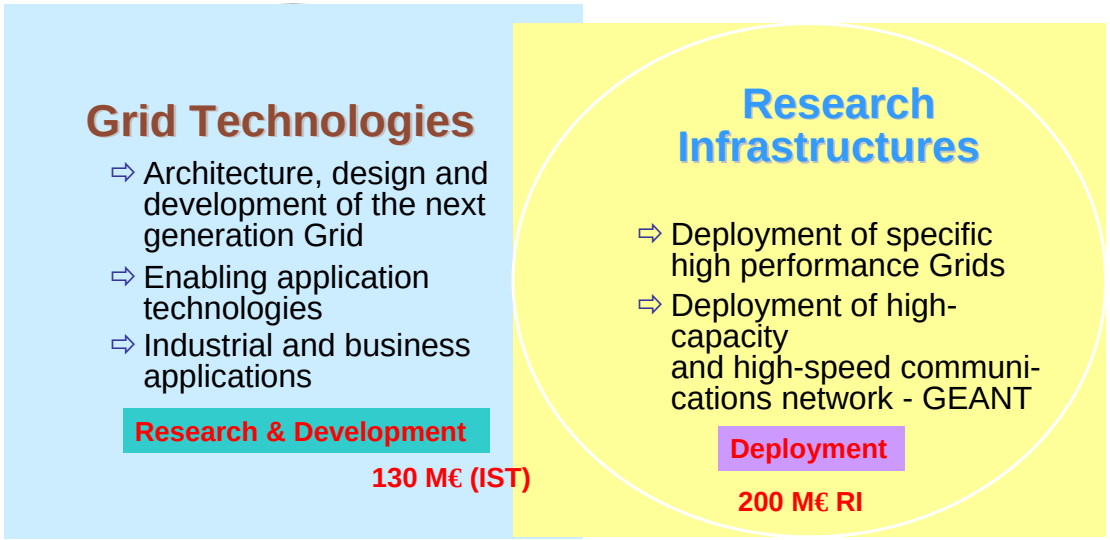
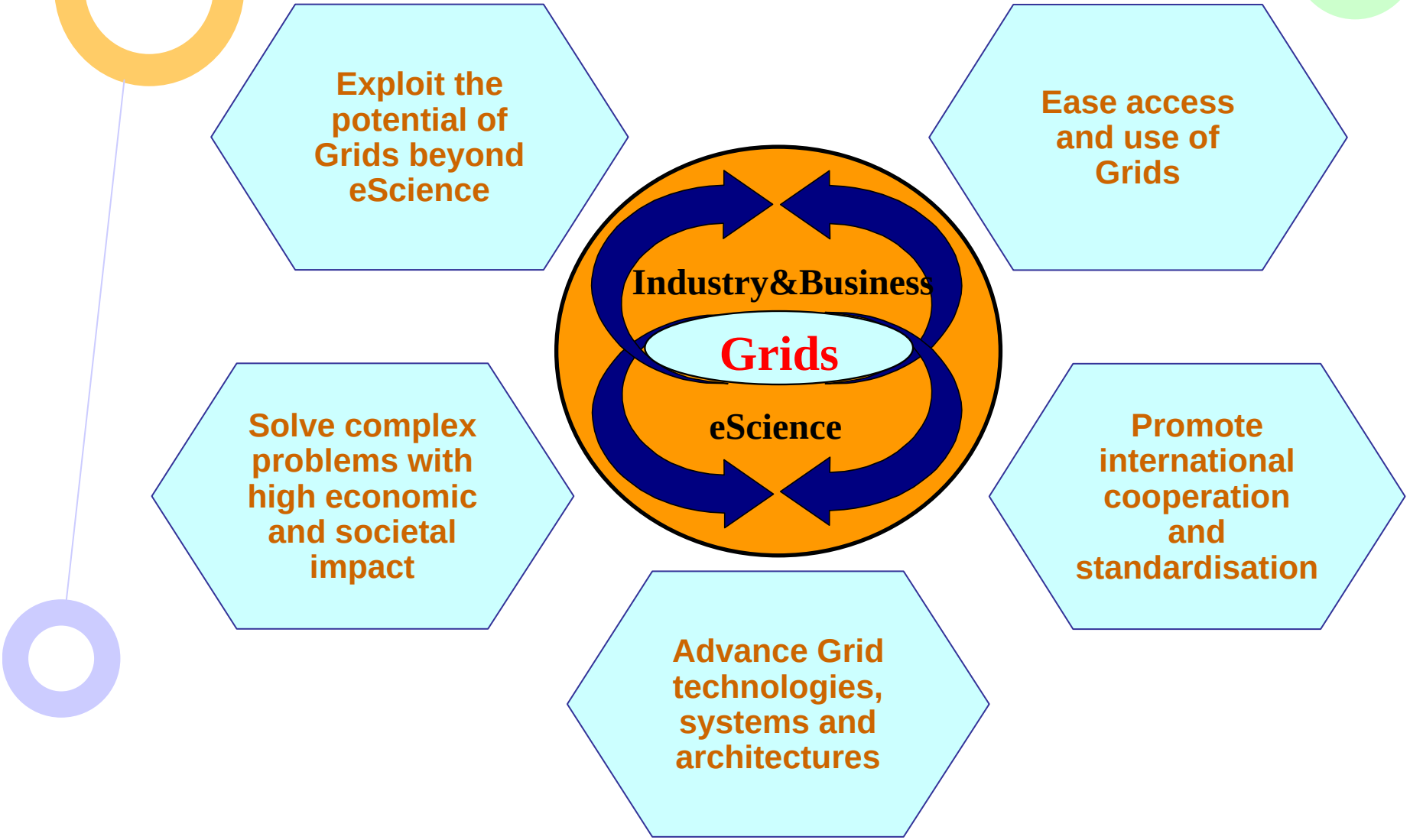
- ⇨ **EU Grid Research in 2003 - 2006**
- ⇨ **Concluding remarks**



Objectives of Grid Research in FP6



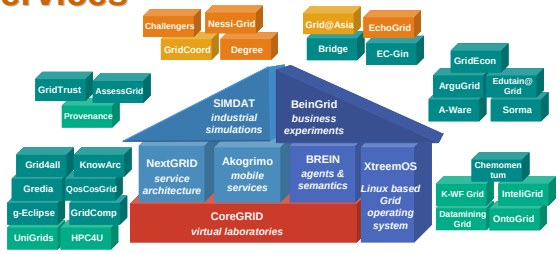
Grid Strategy towards the Lisbon Objectives

- Coordination of National Programmes
- Opening-up of National Programmes
- International cooperation
- Build critical mass
- Derive standardisation strategy

NESSI

- Leadership
- Competitiveness
- Addressing standardization, regulation, …
- Innovation framework to increase adoption
- Aligning business and research agendas

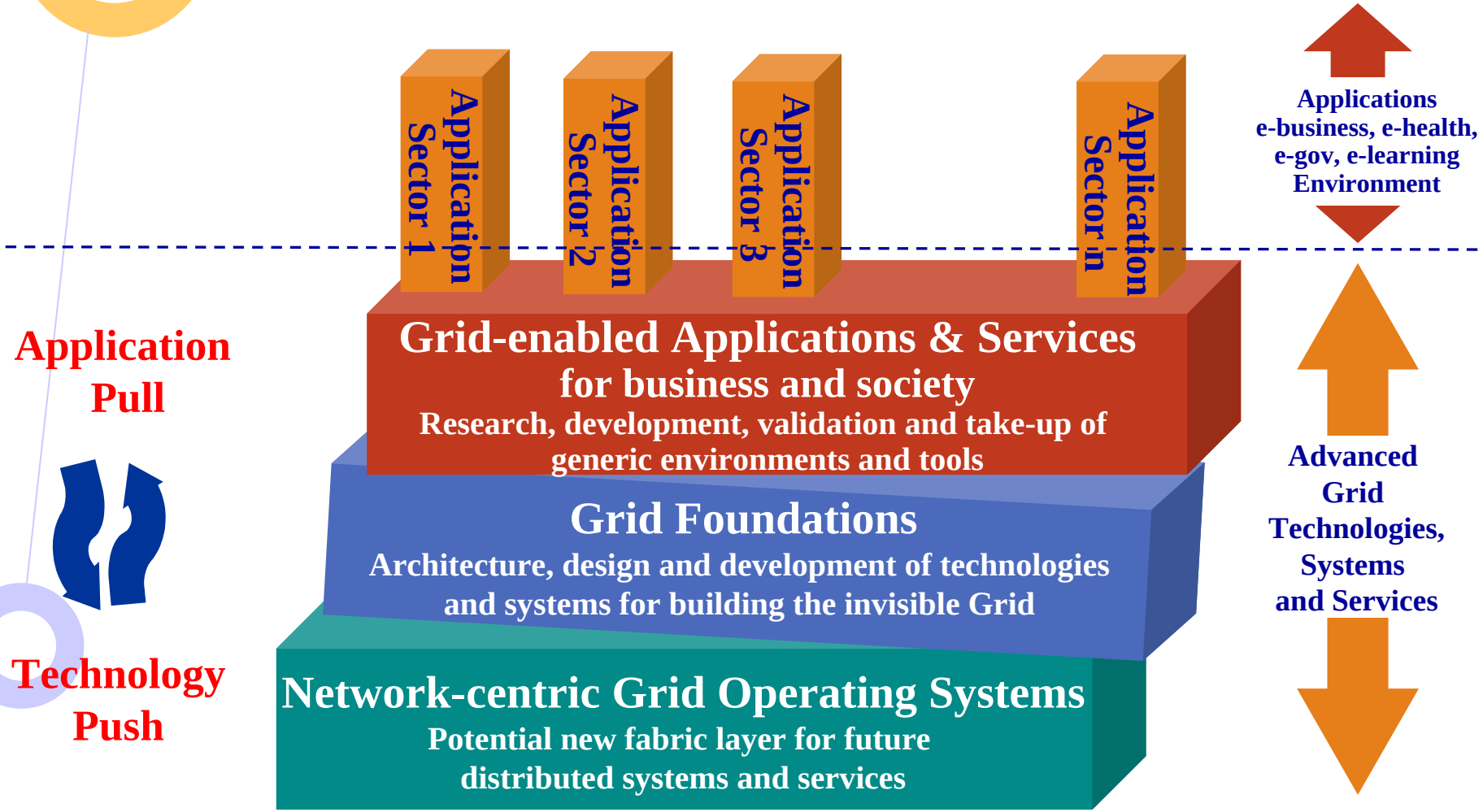
- Developing new methods, tools, systems and services
- Advance excellence and know-how
- Long-term and ***business-driven*** R&D
- Integration – structuring – standardisation



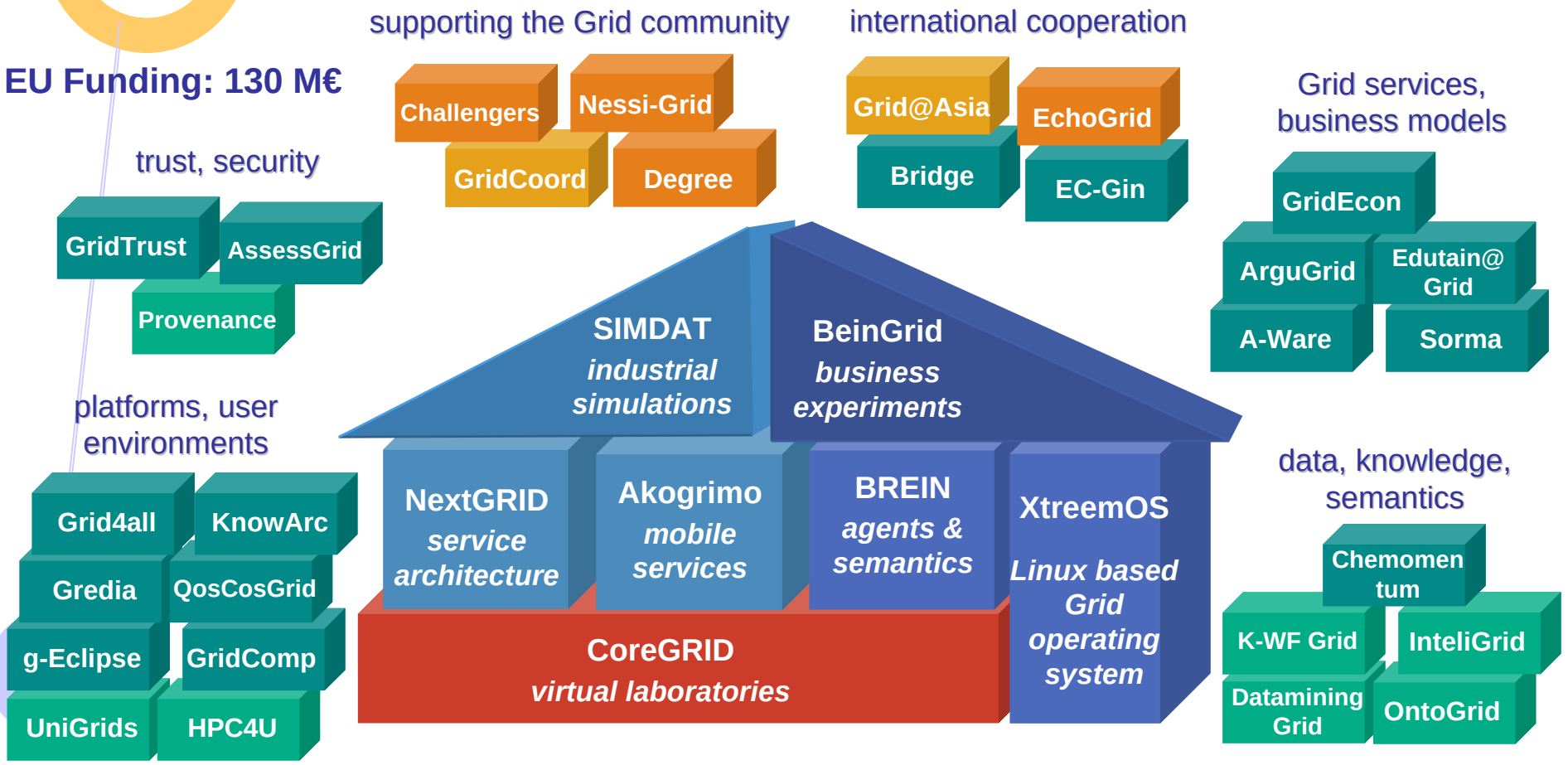
Information Society and Media

Calls for proposals in FP6 – Grid Technologies

EU funding: 130 M €



Grid Research Projects under FP6



CoreGRID NoE

European Research Network on Foundations, Software Infrastructures and Applications for Large Scale Distributed, Grid and Peer-to-Peer Technologies

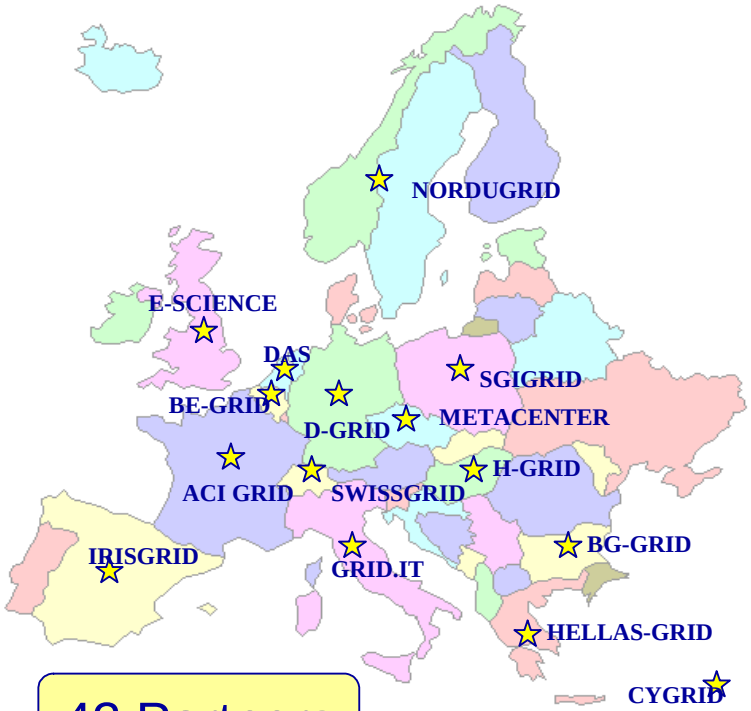
Objectives

- Build S&T excellency on Grid - EU-wide virtual laboratory
- Achieve sustainable restructuring and integration
- Disseminate EU research on Grid
- Set-up a think-tank to create spin-off projects
- Create the European "Grid Lighthouse"

Research Focus

- Knowledge and data management
- Programming models
- System architecture
- Resource management
- Scheduling
- Problem solving environments

6 EU Virtual Institutes



42 Partners

NextGRID

IP

Main Research and Development Areas:

Grid architecture

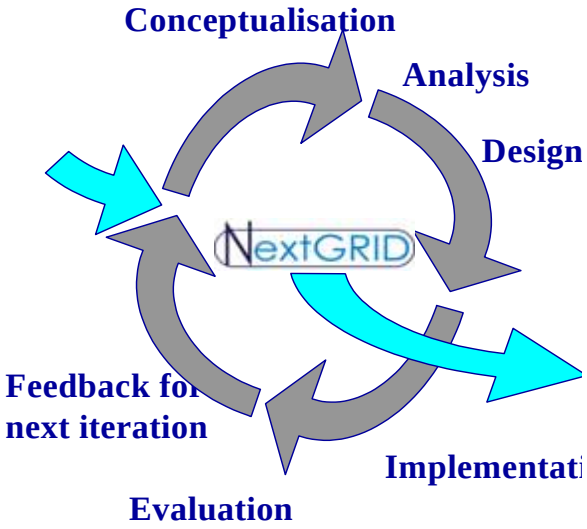
Foundations & core services

Dynamic federation and VO

Grid business models

Reference implementations

Standards and applications



Main Application Areas:

Data mining legal sector

Broadcasting and entertainment

Financial modelling

Digital media

Supply chain management

Next Generation Grid services architecture for business and industry

Research org.:

EPCC, IT Innov., FZJ, USTUTT, KTH, NTUA, QUB, UvA, CNR-ISTI

Technology providers:

Grid Systems, HP, Intel, Microsoft, Nec

Service providers:

Fujitsu, BT, T-Systems, Datamat

Application developers / users:

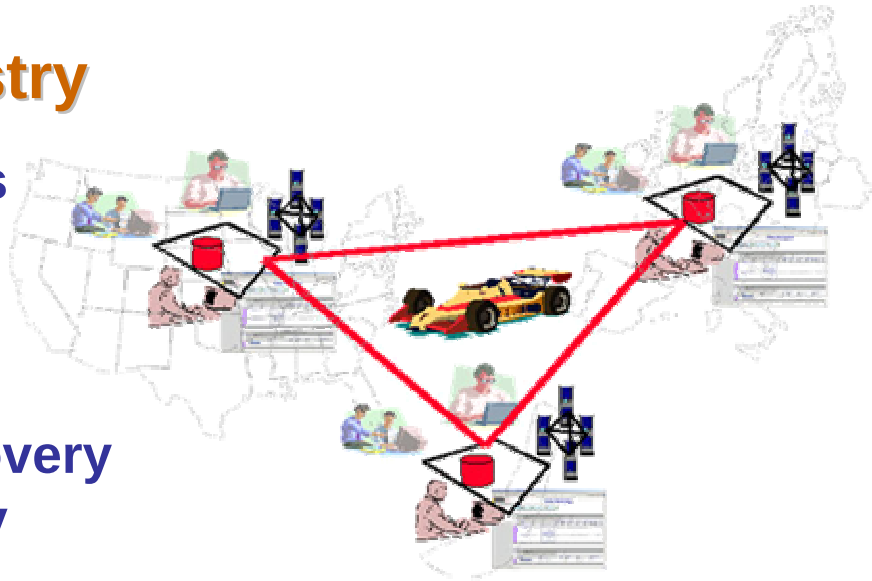
SAP, First derivatives, Kino

Industrial example

SIMDAT

Grid Solutions for Complex Problems in Industry

1. Grid-enabled data integration across administrative domains
2. Grid-powered collaboration across manufacturers and suppliers
3. Novel analysis and knowledge discovery services exploiting Grid connectivity



Grid Technologists

FhG, NEC, intel, iT innovation, IBM, ORACLE, Universität Karlsruhe (TH)

Capability Providers

ESI GROUP, InforSense, MSC SOFTWARE, lms, LION, ontoprise

Automotive
Pharmaceutical
Aerospace
Meteorology

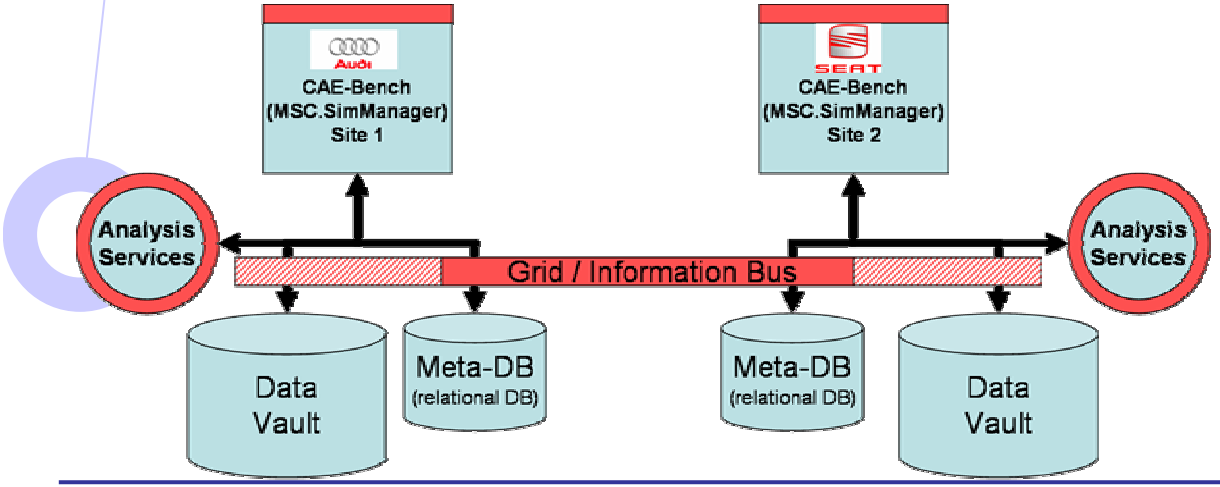
End Users

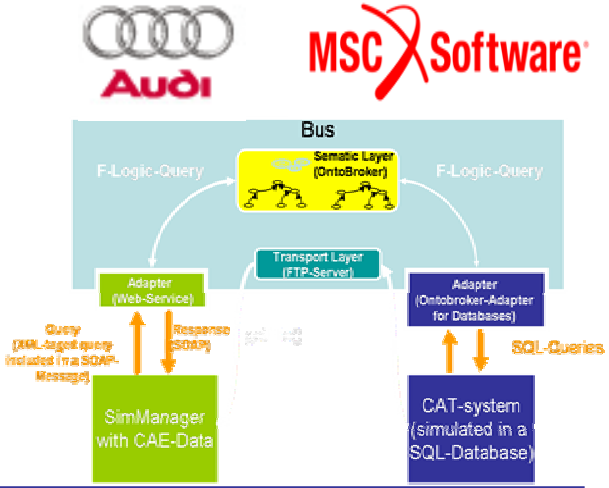
gsk, Audi, EADS, Met Office, RENAULT, EUMETSAT, METEO FRANCE, BAE SYSTEMS

Achievements of Phases 1+2

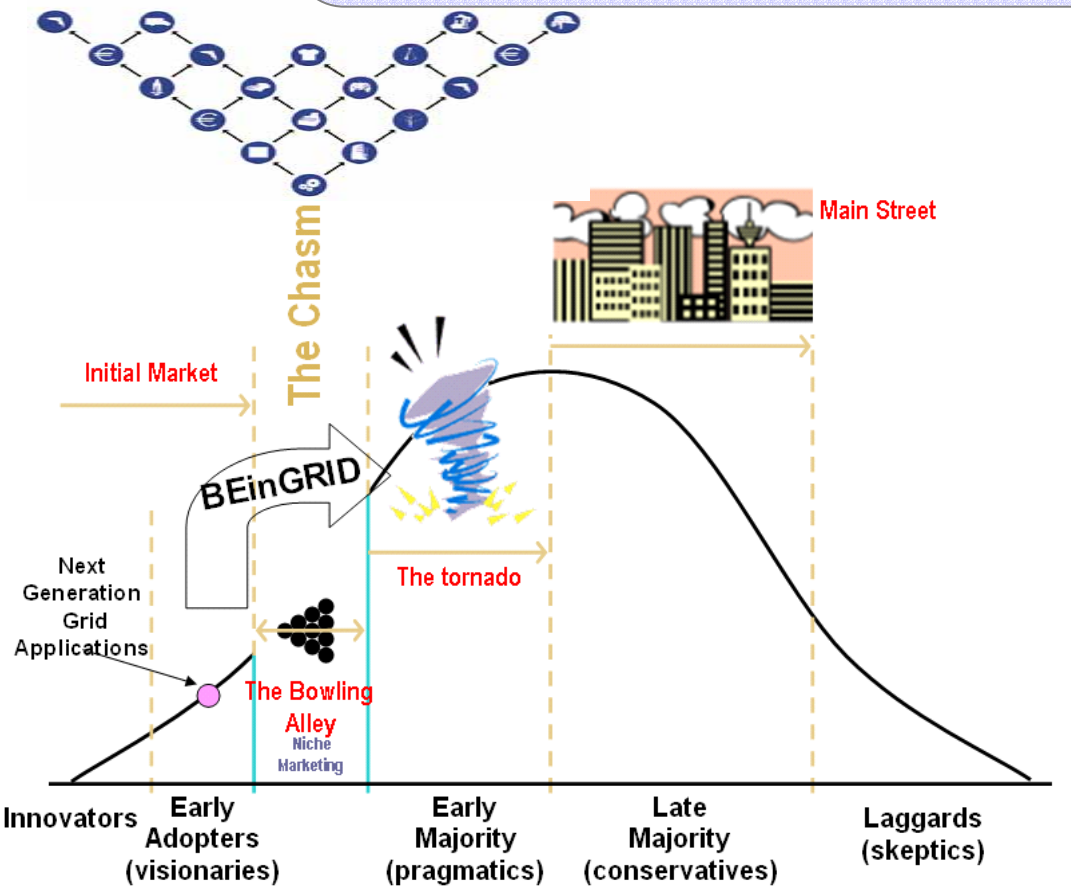
SIMDAT

1. Successful installation of Grids including integrated access to distributed data repositories in seven industrially led prototypes
2. Grid technology development on collaboration to be deployed in the next phase prototypes
3. One prototype already fed into a new product:
   Grid-based integration environment for the automotive industry decided to be deployed at AUDI and transferred to SEAT in 2007.





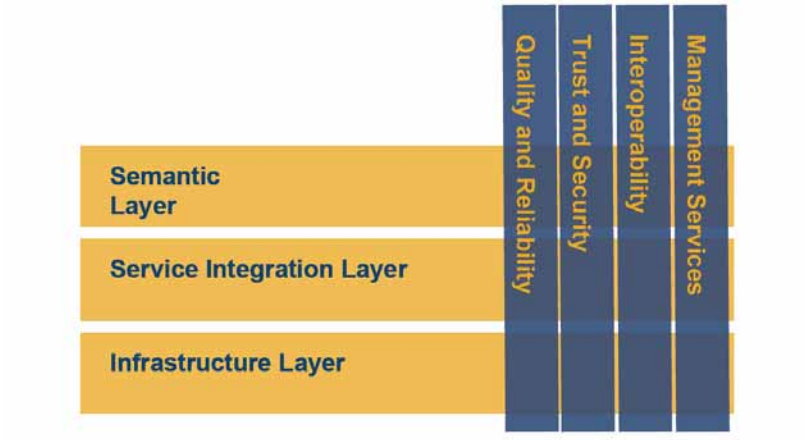
IP BEINGRID aims to exploit European Grid middleware by creating a *toolset repository of Grid services* from across the Grid research domain and to use these services to deliver a set of *18 business experiments* that stimulate the early adoption of Grid technologies for provisioning of services across the EU.



75 partners across the value chain of technology & service providers and users in diverse industrial sectors such as automotive, aerospace, ship building, finance, retail, logistics, new media, textile, environment, public services, …

Networked European Software and Services Initiative

A European Technology Platform for SW, Grids & e-Services:



Mission:

Develop a visionary strategy for Software, Grids and Services driven by a common European Research Agenda where innovation and business strengths are reinforced

www.nessi-europe.com

OUTLINE

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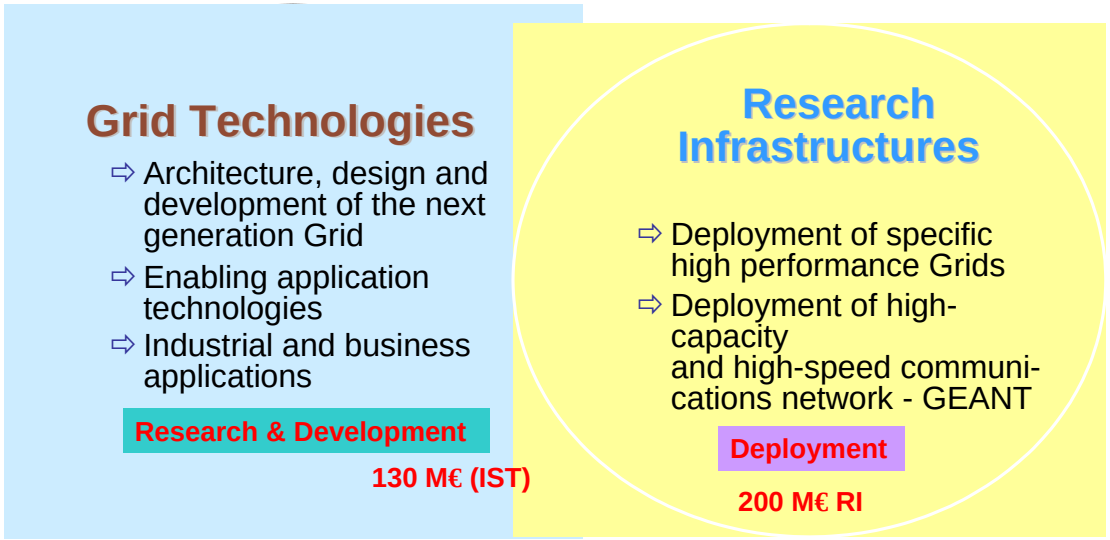
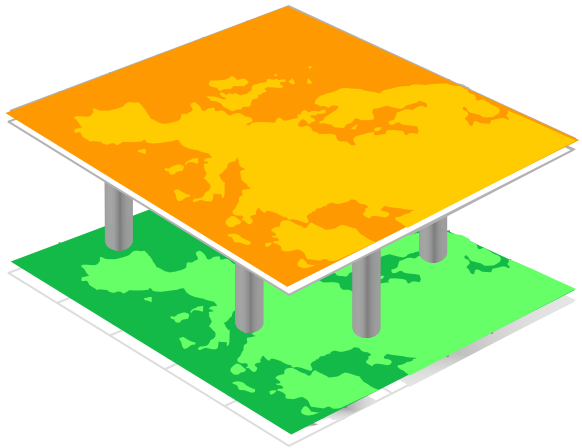


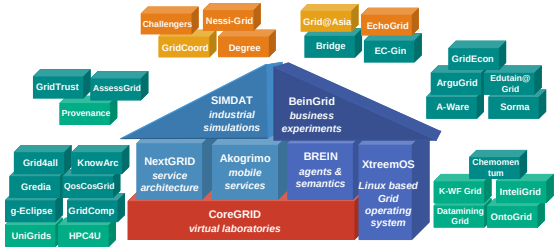
Concluding remarks (I)

- **GEANT2: Connecting Europe and beyond**
  - Better connectivity
  - User involvement
- **eInfrastructure: expanding the Grid**
  - New user communities
  - New regions
  - Improved technologies



Concluding remarks (II)

- **Evolution of the Grid vision towards Service Oriented Knowledge Utilities (SOKU)**
  - 2003: virtualisation, simplicity
  - 2004: mobile Grids & NC-OS
  - 2005/06: Convergence of Grid-web services ⇨ SoA/SOKU
- **130 M€ EU funding for 36 projects ⇨ longer-term research + industry orientation**
- **Building strong European industrial commitment**



Further Information

- **Brochure: From Grids to Service-Oriented Knowledge Utilities**
  - ⇨ FP6 Grid Project Fact Sheets and Interim Achievement Sheets
- **Workshop and Expert Group Reports**
  - ⇨ "Next Generation Grids 3 – Grids and service oriented knowledge utilities: vision 2010 and beyond", publication expected February 2006

  and more: cordis.europa.eu/ist/grids
- **Research Infrastructure web site:** cordis.europa.eu/ist/rn/home.html
- **FP7:** cordis.europa.eu/fp7/