

The GRID challenge: can GRID be adopted in business?



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Why is GRID a priority area?

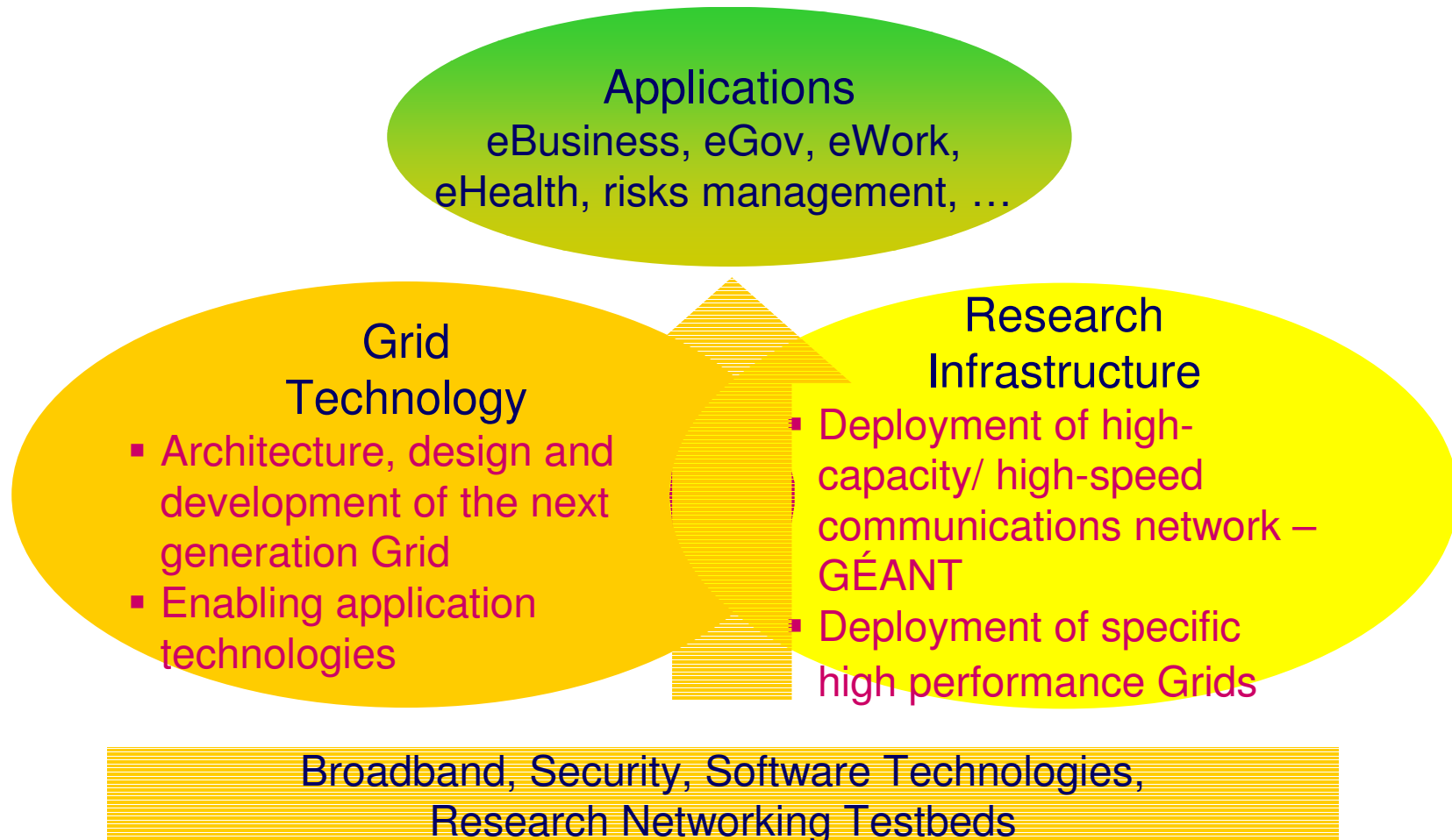
- Facilitates the interconnection of a large range of heterogeneous devices to the Internet and enables the delivery of a new class of services.
- Strengthens the role of the network in providing anywhere, anytime an immense variety of services to the user. In this way it leads to a closer convergence between computing and communication technologies.
- Makes computing and data resources which are distributed worldwide available seamlessly as a single resources via the Internet.

Application areas

- Aeronautics
- Astronomy
- Astrophysics
- Bioinformatics
- Chemistry
- Climatology
- Cosmology
- Earth observations
- Earthquake studies
- E-learning
- Environmental management
- Fluid dynamics
- Genomics
- Geology
- High energy physics
- Industrial design
- Medicine
- Meteorology
- Molecular engineering
- Pharmacology

As a matter of fact GRID technology is still confined to a very restricted scientific environment

Grid Research and Deployment

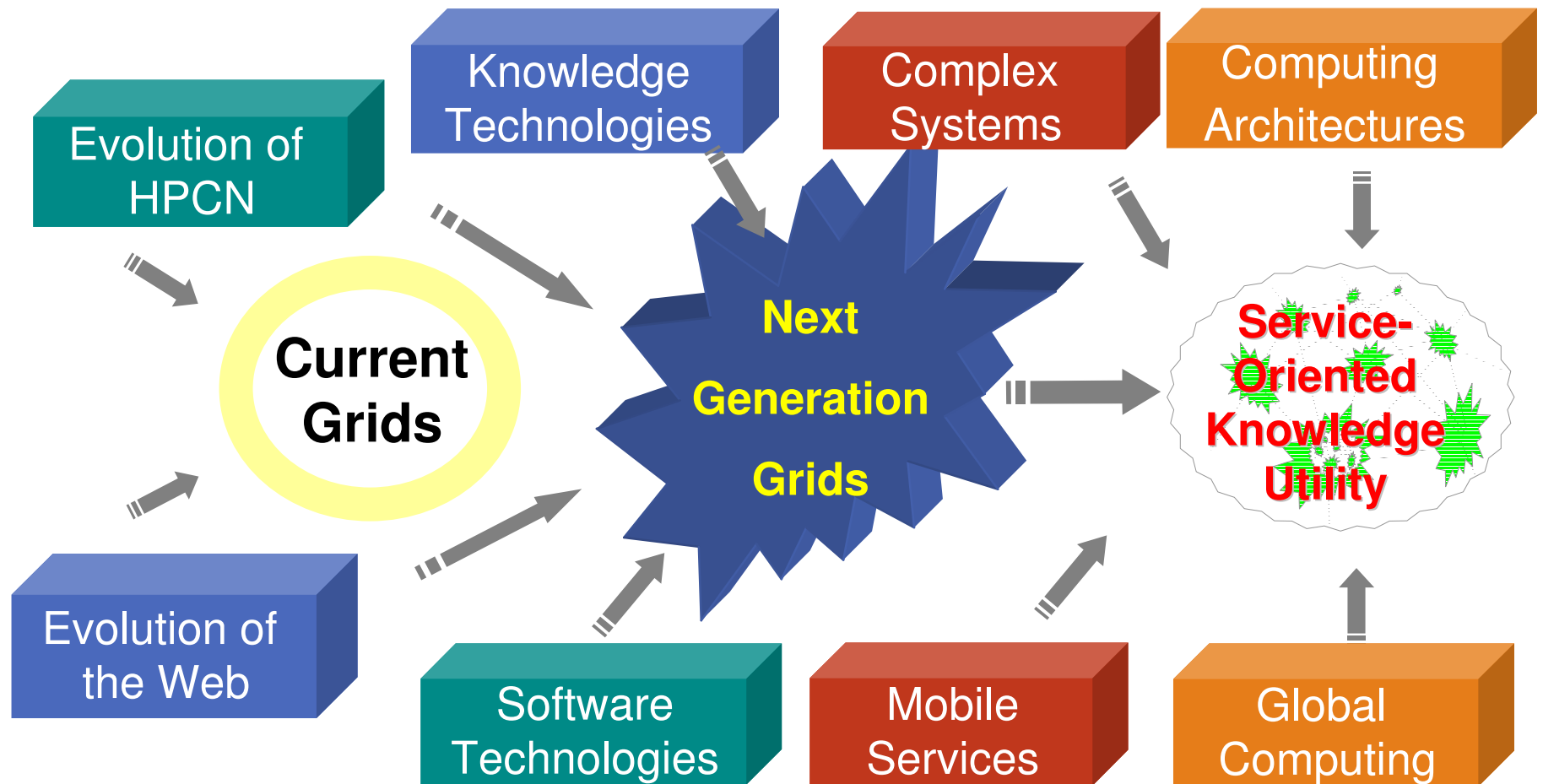


Achievements of EU Grid Research

- ❑ Creation of a strong research community on Grid research
- ❑ Europe's position strengthened in Grid middleware development
- ❑ Grid concept proven in eScience application pilots
- ❑ First steps taken towards maturing Grid technologies for industrial use
- ❑ Strengthened European contribution to standardisation
- ❑ Grid deployment in research infrastructures

Grid Research - the Challenge

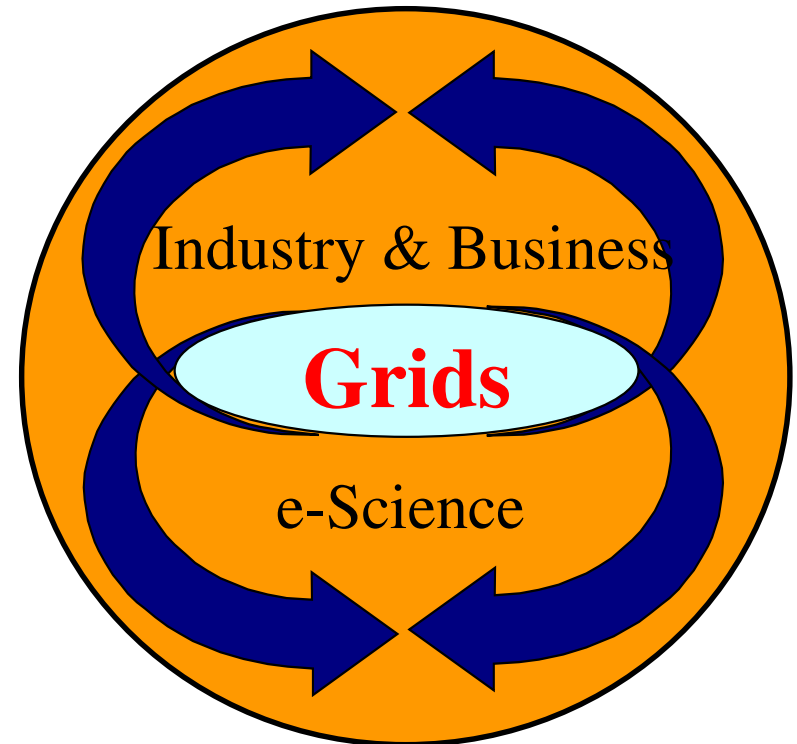
Complexity - Interoperability - Ease of Use - ...



Grid Research - the Challenge (2)

Promote Grid research to

- **Move Grid from e-Science to Industry**
- **Solve new complex problems with high economic and societal impact**

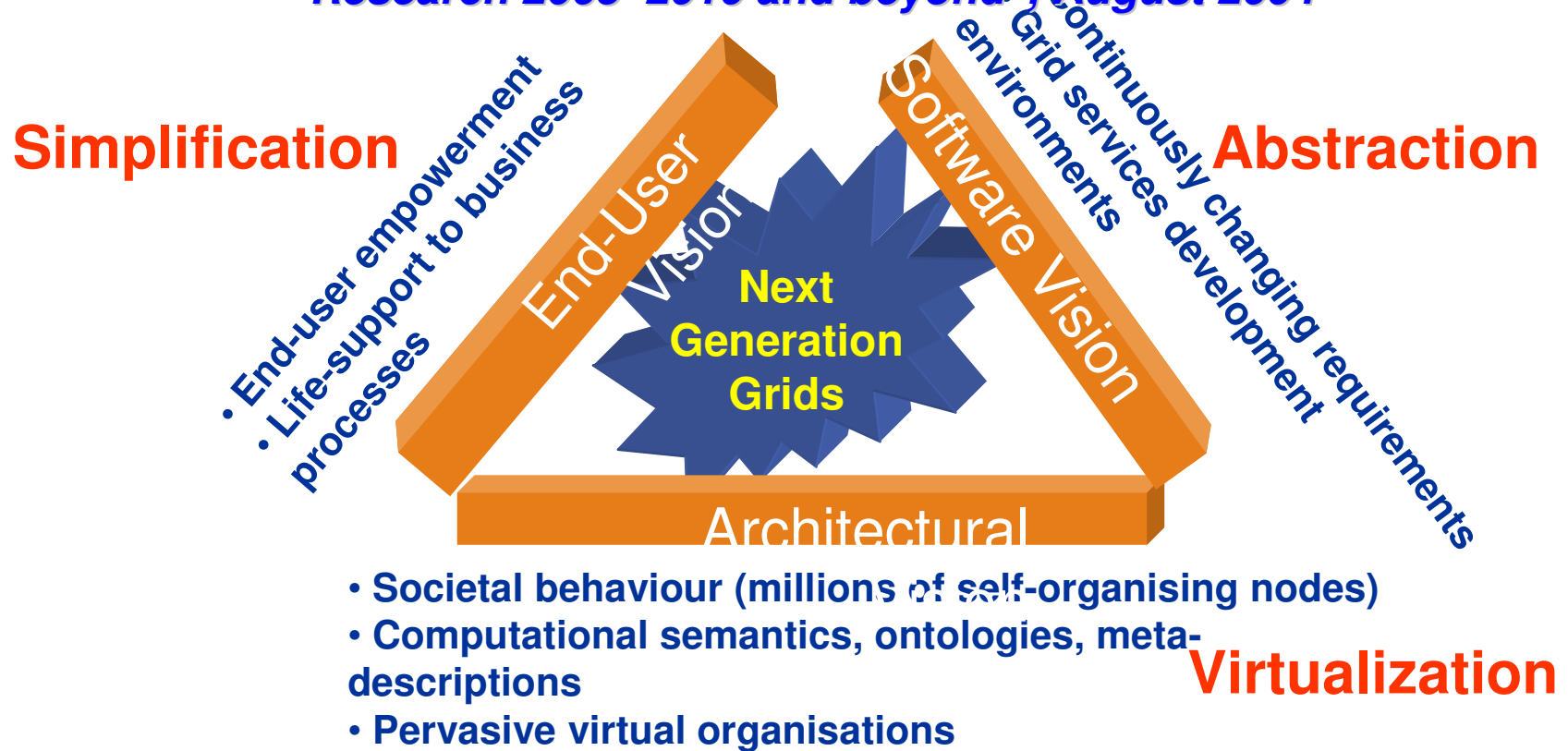


Next Generation Grid(s) – Expert Group Report

3-fold vision

“Next Generation Grid(s) - European Grid Research 2005 - 2010”, June 2003

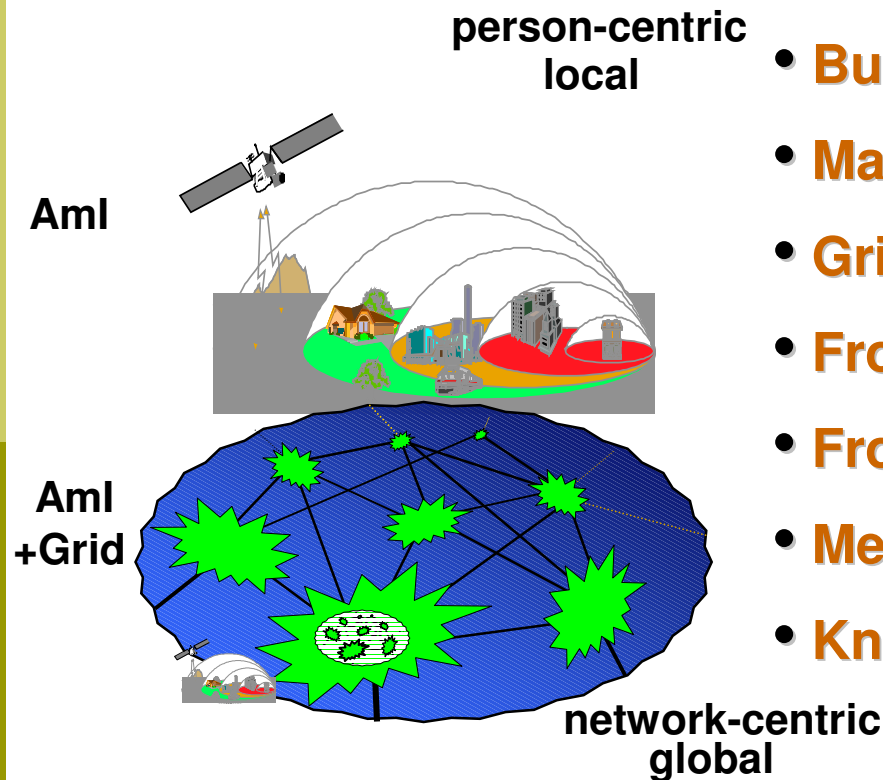
“Next Generation Grids 2 – Requirements and Options for European Grids Research 2005–2010 and beyond”, August 2004



Grid research vision - 2007 and beyond

Grid empowers Aml (Ambient Intelligence)

***Towards a Global Grid Services Infrastructure
for Business & Industry***



- **Building the Invisible Grid**
- **Mastering ICT complexity**
- **Grids of mobile and embedded systems**
- **From `Ctrl+Alt+Del` to self-healing systems**
- **From plug & play to connect & share**
- **Meta Operating System architecture**
- **Knowledge at the fingertips**

GridCoord: ERA Pilot on a co-ordinated Europe-wide initiative on Grid Research



□ Situation in Europe

- With more than 10 Grid Research programmes at MS & EU level, Europe is strong on Grid Research but fragmented
- Weaknesses identified related to commercial exploitation of Grid research by European industry

□ General Objectives

- Overcome fragmentation and dispersion across EU to reinforce impact of national and Community research
- Strengthen Europe's position in Grid Research and its exploitation

Grid in Europe (1)

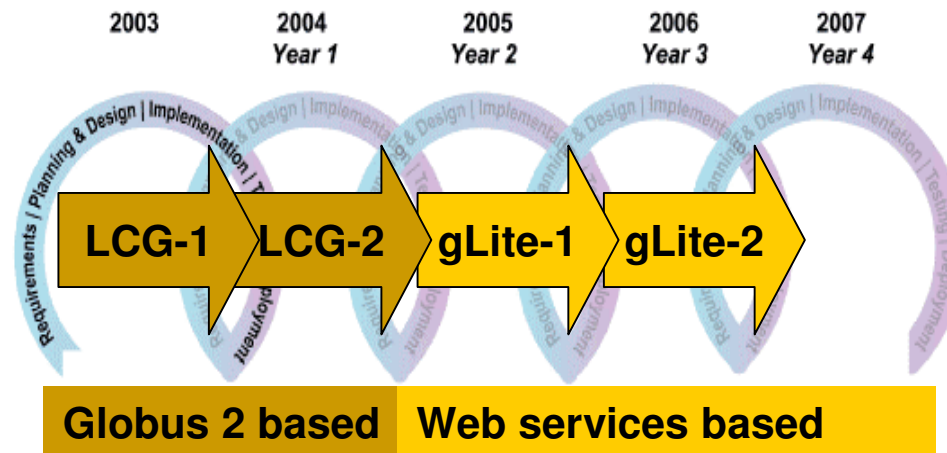
- DATAGRID , EU Project, Cern coord., 3 years, 10 M€ (2001-3)
 - European integration and new MW services for HEP, Biology, Earth science. Italy ~20%.
- DataTAG, EU Project, Cern coord., 2 years, 4 M€ (2002-03)
 - Optical networking e Interop. with US Grid. Italy ~ 15%
- V Framework Program: 20 Grid projects, 50 M€, Italy ~10%
 - Grid is the engine of the European Research Area (ERA)
- LHC Computing Grid (LCG) (2002-05-08), >60M€
 - World wide Grid for physics with USA, Japan, Canada and Cina

Grid in Europe (2)

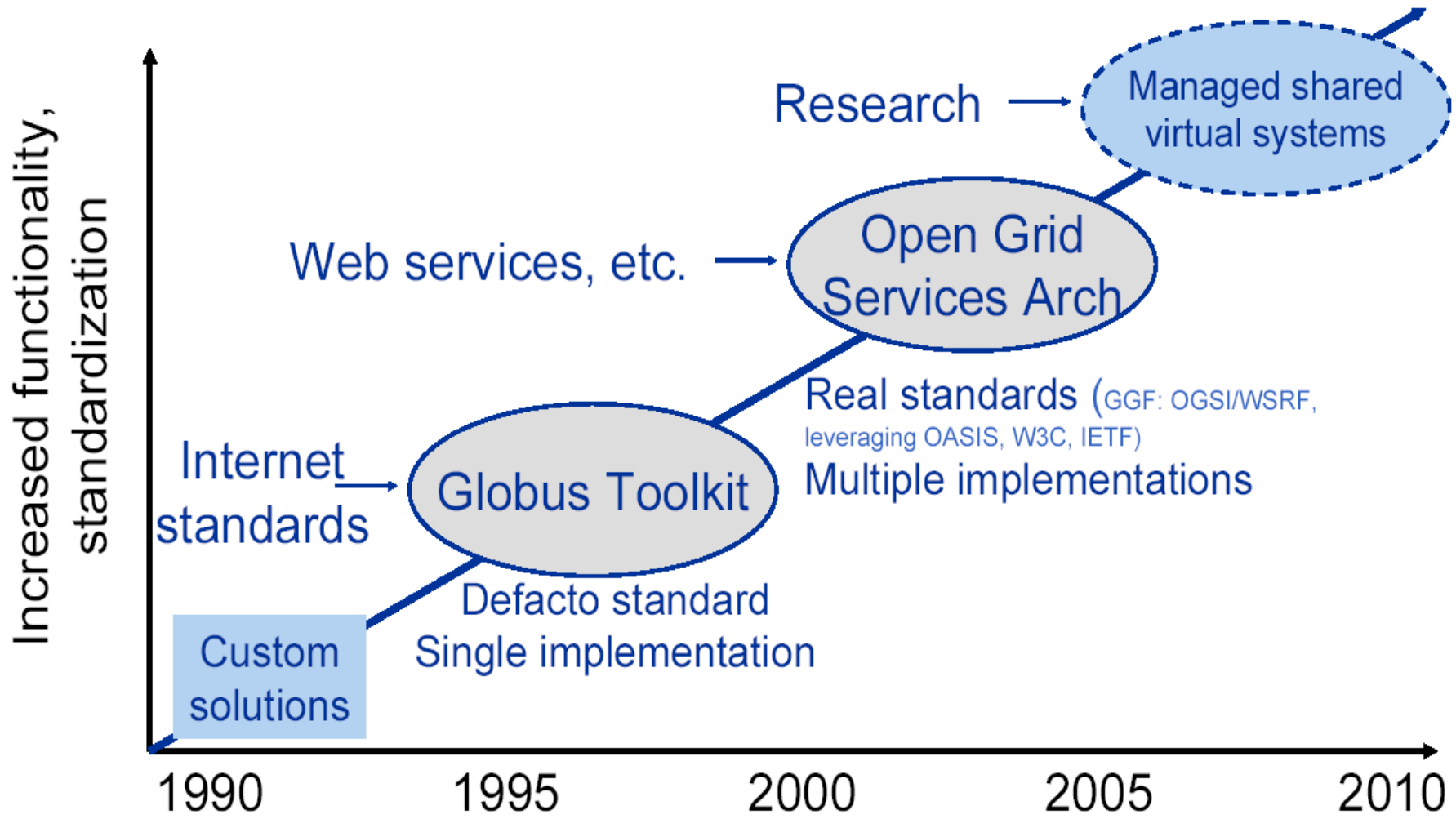
- 2004 VI Framework Prog. > 250 M€ for Grids and testbeds
- 2004 EGEE, coord. CERN: 32M€
 - 70 Institutions, 25 different countries
 - Italian federation coordinated from INFN: ~ 15%.
 - Link through DEISA with CINECA e supercomputing centers
- Other EU VI PQ projects coordinated from italian organizations
 - Gridcc, Coord. INFN : grid for real time, remote control room, **4 M€**
 - Diligent, Coord. CNR: integration of digital libraries in EGEE **6 M€**
 - EUMED Grid, EELA, EU-China Grid, coord. INFN and BIO-INFO-GRID.....
- FP7: e-Infrastructures and Grid explicitly mentioned as an enabling technology

gLite: the new middleware

- The EGEE gLite middleware will substitute LCG-2 in Europe and world wide.
- It solves some of the main limits of LCG-2 and provides new advanced services to the applications
- It is based on Web Services, Service Oriented Architecture (SOA) and is conform to international standards



Developing Grid Standards



What is going on in Italy

- MIUR has financed projects on GRID for ~ 30 M€:
 - Grid.IT, 3+1 years 12 M€ (2002-05), Coord. CNR
 - R&D on next generation tools: Programming environ., Information Sys.
 - National production e-Infrastructure for Italian Science Institutions
 - S-PACI National project 3+1 years 4 M€ (2002-05)
 - The grid infrastructure in the South of Italy
 - Egrid National project 3 years 3 M€ (2003-06)
 - The Grid for finance
 - LIBI and LITBIO 3 years 7 M€ (2004-2007)
 - The Grid Laboratory for Bio-informatics
- Recently ~30 M€ for Grids and Supercomp. through 4 PON approved in Sicily, Sardinia, Campania(2)
- PNR projects under evaluation

Grid sustainability in Europe and Italy

- EGEE proposes to create the European Grid Organization to:
 - Guarantee the development and long term support of the european e-infrastructure made of EGEE, DEISA and the Grid national projects
 - Provide coordination at the EU level, similarly to what has happened with Geant, DANTE and NREN, such as GARR

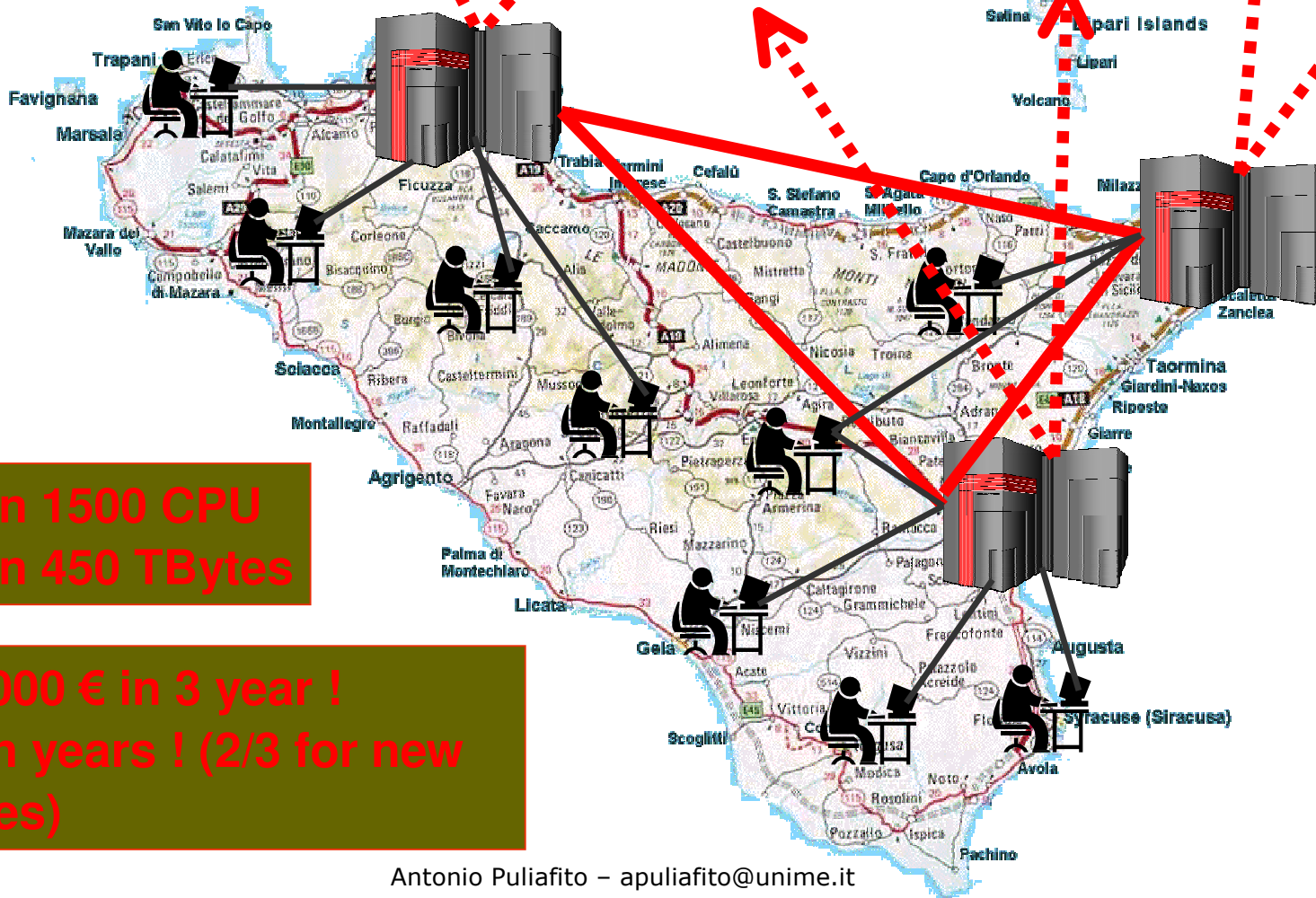
- INFN proposes to create the Association for the Italian Grid Infrastructure (IGI) to:
 - Include all the Institutions involved in national e-infrastructures
 - Sustain a plethora of scientific disciplines: Phisic, Astrophysicsm Biology, Medicine, Chemistry, Geophisic, Economy, Finance, with extensions to other areas such as crisis management and e-learning

TRIGRID and PI2S2: The Sicilian GRID Infrastructure

- ❑ Creation of the first Sicilian GRID infrastructure for scientific and industrial applications (Overall budget 15 M€)
- ❑ Integration with the Italian and European GRIDs to foster and improve the scientific collaboration and the competitiveness of regional PMI, both at national and international level
- ❑ Porting of scientific and industrial applications on the GRID
- ❑ Dissemination of the “GRID paradigm” through events and training courses to people of the private and public area, also not directly involved in such projects
- ❑ Support to spin-off initiatives



The Sicilian e-Infrastructure



More than 1500 CPU
More than 450 TBytes

~15.000.000 € in 3 year !
~250 man years ! (2/3 for new employees)

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The COMETA Consortium





Industrial Partners



ITALCOMPANY GROUP
CANTIERI NAUTICI
www.PortodiCatania.it

MICROSOL
INGEGNERIA APPLICATA ALLE MATERIE PLASTICHE



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PI2S2: Progetto per l'Implementazione e lo Sviluppo di una e-Infrastruttura in Sicilia basata sul paradigma della grid

Work Packages

WP1	Design and creation of a GRID infrastructure
WP2	Middleware integration with design and development of test procedures
WP3	Hardware and software platforms for dissemination and training
WP4	Development and integration of applications in the GRID

Main Industrial Applications

IR&T engineering

- Cultural heritage

Numidia srl

- Fluid dynamic simulation in car engines
- Chemical, thermo dynamic, electromagnetic simulations

SCIRE – FIAT auto

- Simulation of aerodynamics problems
- Fluid dynamics optimization

Italcompany e Microsol

- Using the Fluent software tool in the grid

Seasoft

- Document management and workflow

Inquadro srl

- Software performance analysis

Hitec2000 srl

- Simulation of critical working conditions
- Cultural heritage

	Areas of interest
4.5	Engineering
4.6	Physics and astrophysics
4.7	Earth science
4.8	Bio-Informatics
4.9	Chemistry

Collaboration between Oracle and COMETA

- ❑ Further investigate the accountability problem at large (including Grid Licensing Scheme, Service Level Agreement – SLA-, Quality of Service – QoS);
- ❑ Set a pilot project and proof-of-concepts where services offered by PI2S2 are tracked and accounted;
- ❑ Define best-practices in the accountability area;
- ❑ Integrate results of the joint activity in Oracle's product and possibly in some public documentation.
- ❑ Create a competence centre on Oracle Technology in the South of Italy.
- ❑ Position COMETA as a service provider on the medium long term for the R&D and SME world
- ❑ Benefiting from increased visibility at national and international level

Conclusions

- ❑ Grids are the enabling platform to create the European Research Area (ERA) and promote the scientific and industrial research to build a critical mass in many heterogeneous sectors
- ❑ e-Infrastructures contribute to widen access to knowledge with a new market for IT applications
- ❑ Future sustainability of e-Infrastructures is a crucial issue to exploit long term development of technology and industrial and commercial level
- ❑ Concrete interest of the industrial world towards the GRID: specific activities have to be set up

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