SMEs and GRID computing:

The PI2S2 approach

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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
- Metereology
- Molecular engineering
- Pharmacology

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

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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

e-Science Grid

- Multi-organisation, multi-site model
- Virtualised compute resource being shared amongst its users, each typically doing compute-intensive, analysis type calculations.
- Privacy, security, data location, price and reliability are lesser concerns

Industry and Business Grid

- Located within a single organisation and typically within a single site
- Virtualisation of resources is viewed at the higher level of applications and business services
- Short, sharp business transactions are the norm rather than long running, compute intensive jobs
- A key driving force in this model is consolidation of services and the cost reductions that it can bring
- Standards, such as Web Services, play a key role in this model with data location, privacy, security and reliability being key concerns.

Grid Research - the Challenge

Promote Grid research to

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

Industry & Business

Grids

e-Science

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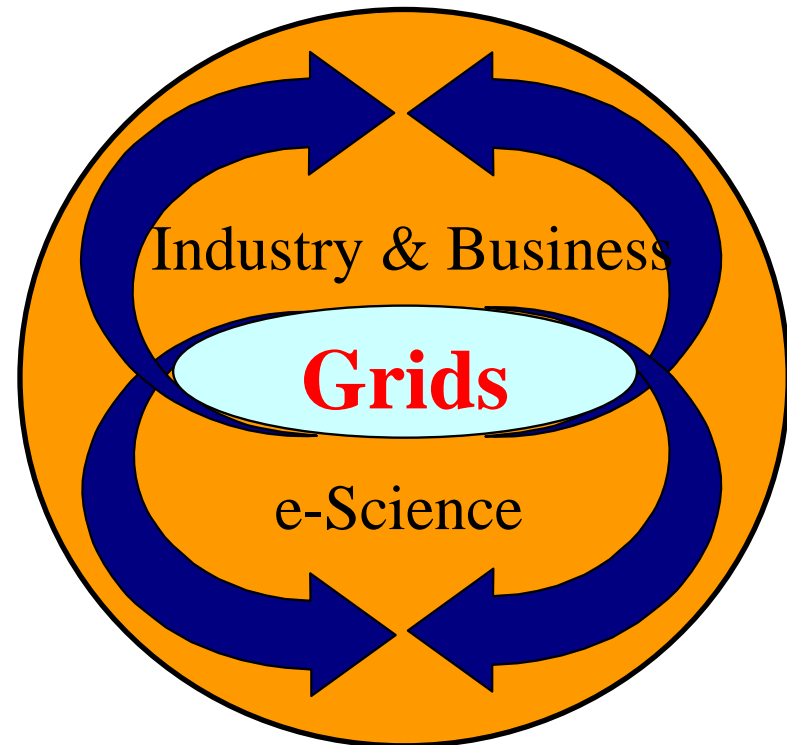
Next Generation Grid(s) – Expert Group Report 3-fold vision

"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

Simplification

- End-user empowerment
- Life-support to business processes

Abstraction

- Continuously changing requirements
- Grid services development environments

Virtualization

- Societal behaviour (millions of self-organising nodes)
- Computational semantics, ontologies, meta-descriptions
- Pervasive virtual organisations

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Grid research vision – 2007 and beyond

Grid empowers AmI (Ambient Intelligence)
Towards a Global Grid Services Infrastructure
for Business & Industry

person-centric
local

AmI

AmI
+Grid

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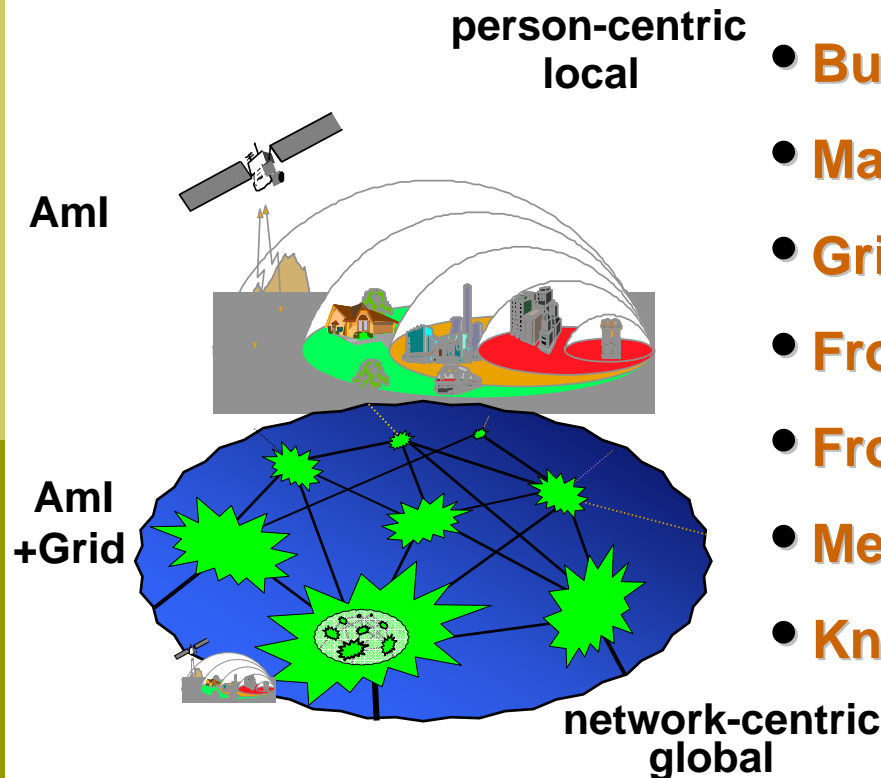
- **Building the Invisible Grid**
- **Mastering ICT complexity**
- **Grids of mobile and embedded systems**
- **From** Ctrl + Alt + Del **to self-healing systems**
- **From plug & play to connect & share**
- **Meta Operating System architecture**
- **Knowledge at the fingertips**

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Situation in Europe

- Grid Research is strong but fragmented
- Weaknesses identified related to commercial exploitation of Grid research by European industry
- Sustainability is a crucial issue

V Framework Program: 20 Grid projects, 50 M€
    Grid is the engine of the European Research Area (ERA)

VI Framework Program: > 250 M€ for Grids and testbeds

VII Framework Program: e-Infrastruttures 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
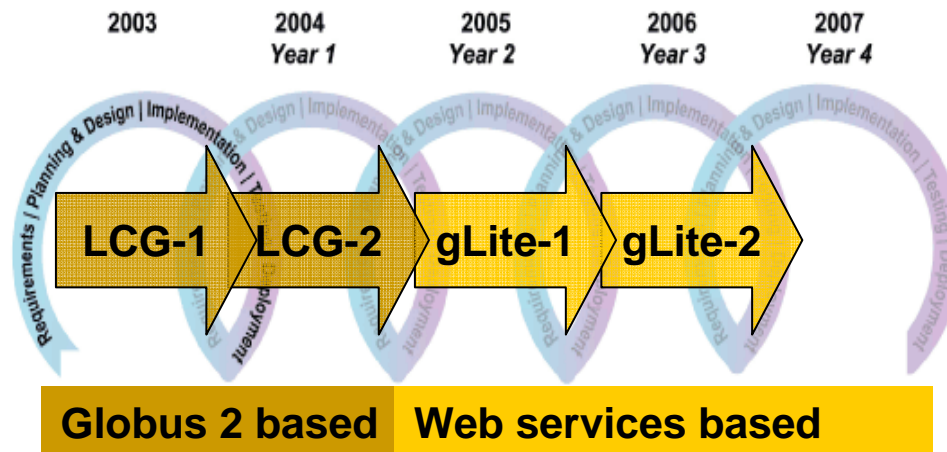
What is going on in Italy

- 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
    - Substain a pletora of scientific disciplines: Phisic, Astrophisicsm 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 internation 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
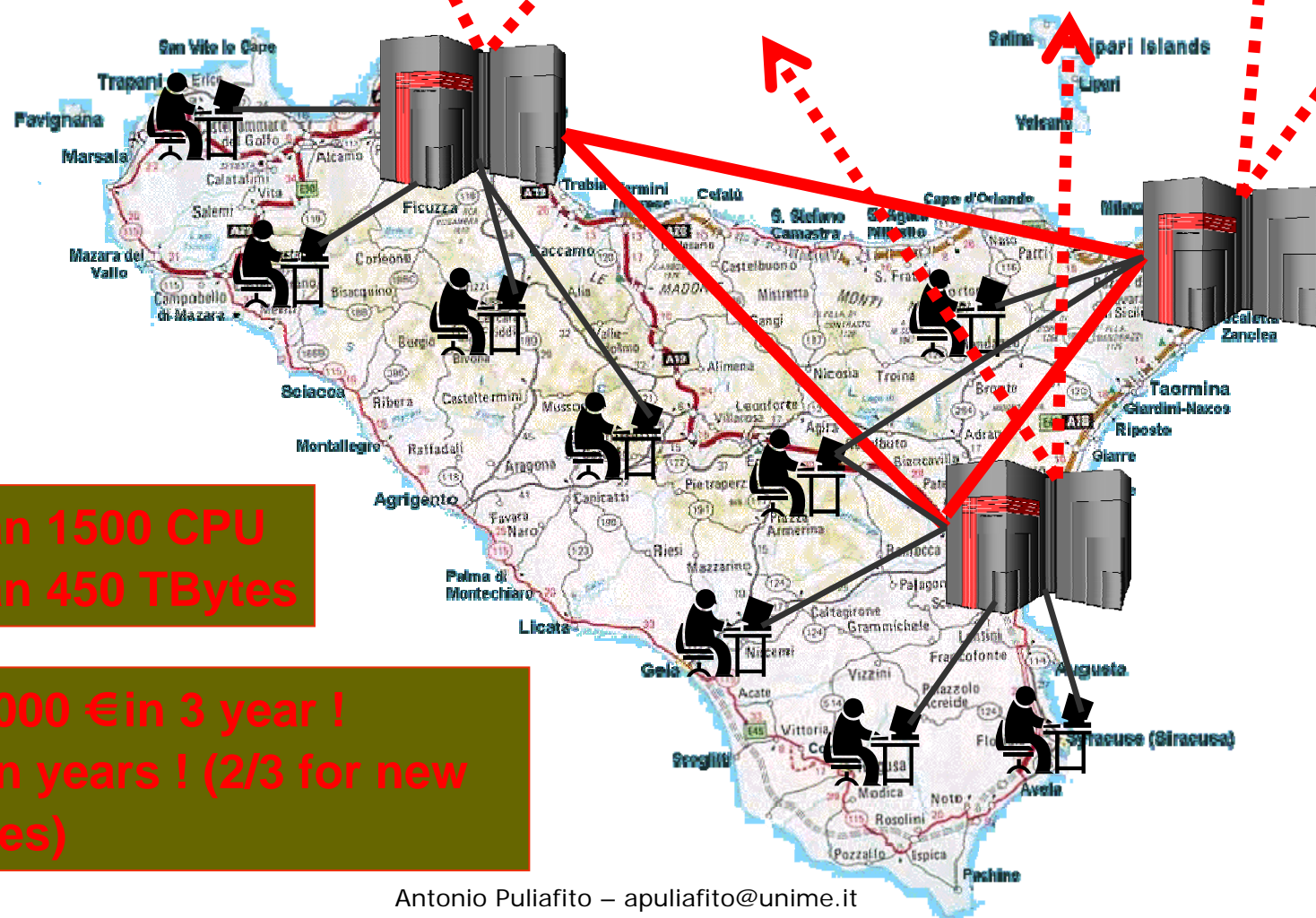
More than 1500 CPU
More than 450 TBytes

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

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The COMETA Consortium

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Industrial Partners

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
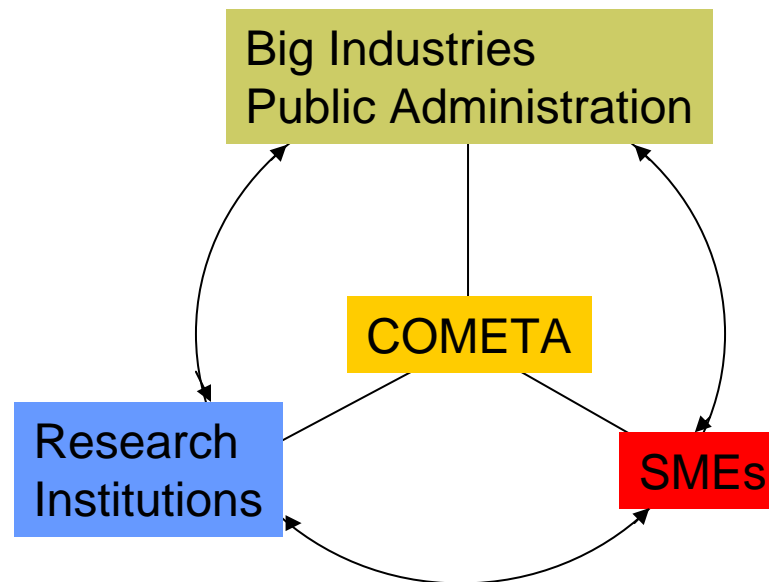- Document management and workflow

Inquadro srl
- Software performance analysis
- Grid in hospital environment

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

Exploitation and Sustainability issues

Supporting *spin-off* initiatives to contribute to the diffusion of Grid knowledge

New *spin-off* company focusing on RFID and Grid computing

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Collaboration with ORACLE

- 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

Collaboration with AICON

- Production of Luxury yachts ranging from 13 to 45 meters
- Interested in using new fluid dynamic algorithms to improve boat performance

Collaboration with "Centro neurolesi"

- IRCCS: Istituto di ricovero e cura a carattere scientifico
- Interest in processing medical images through the Grid

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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 heteroeneous 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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