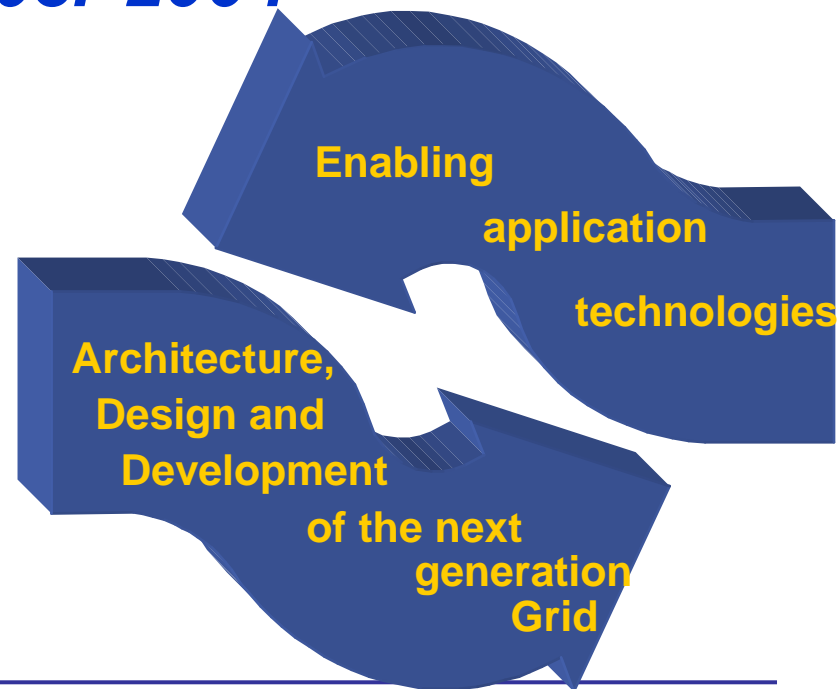


The European Grid Technologies Research Initiative

Grid Open Day
Lisbon, 21 October 2004

Maria Tsakali
Scientific Officer
DG Information Society
Grid Technologies

<http://www.cordis.lu/ist/grids/>



M. Tsakali, Directorate-General Information Society, European Commission
Scientific Officer – Grid Technologies
Grid Open Day – Lisbon – 21 October 2004



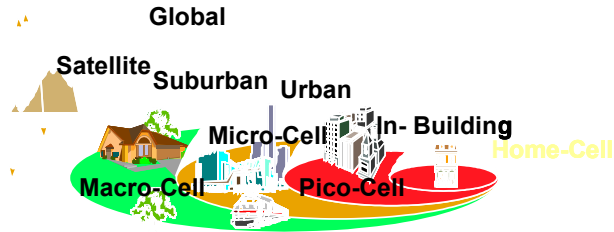
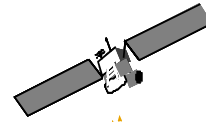
Scope

1. **IST Vision: « Ambient Intelligence »**
2. **Grid Vision: Towards the « Invisible Grid »**
3. **Initial FP5 results & Lessons Learnt (2000-02)**
4. **The EU Grid Initiatives in FP6 (2002-06)**
5. **Future Challenges**
6. **Conclusions**



Information Society Programme Vision 'Ambient Intelligence (AmI)'

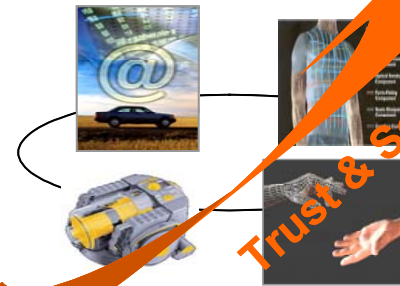
Software and Knowledge
Technologies



Seamless & Rich Connectivity



Micro- & Nano-
Electronics



Networked
Intelligent Environments

Grid empowering AmI

Anthropocentric Interfaces



2. Grid Vision: Towards the « Invisible Grid »



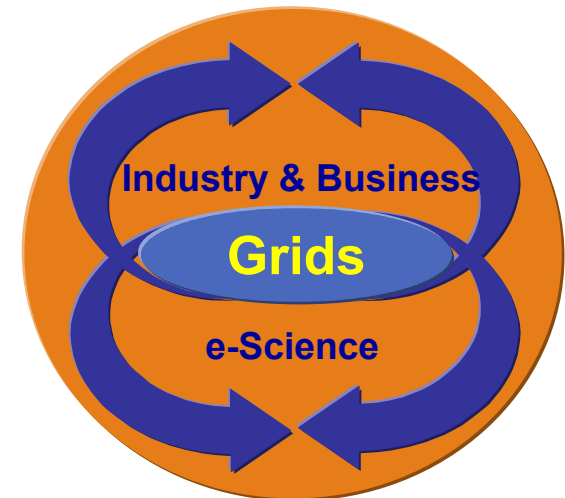
What is Grid ?

“A Grid provides an abstraction for resource sharing and collaboration across multiple administrative domains...”

(Source: NGG Expert Group, 16 June 2003 “European Grid Research 2005-2010)

• Benefits

- ⇒ Increased productivity by reducing Total Cost of Ownership
- ⇒ Any-type, anywhere, anytime services by/for all
- ⇒ Infrastructure for dynamic virtual organisations
- ⇒ Next generation Internet services backbone



Technology Forecast 2002

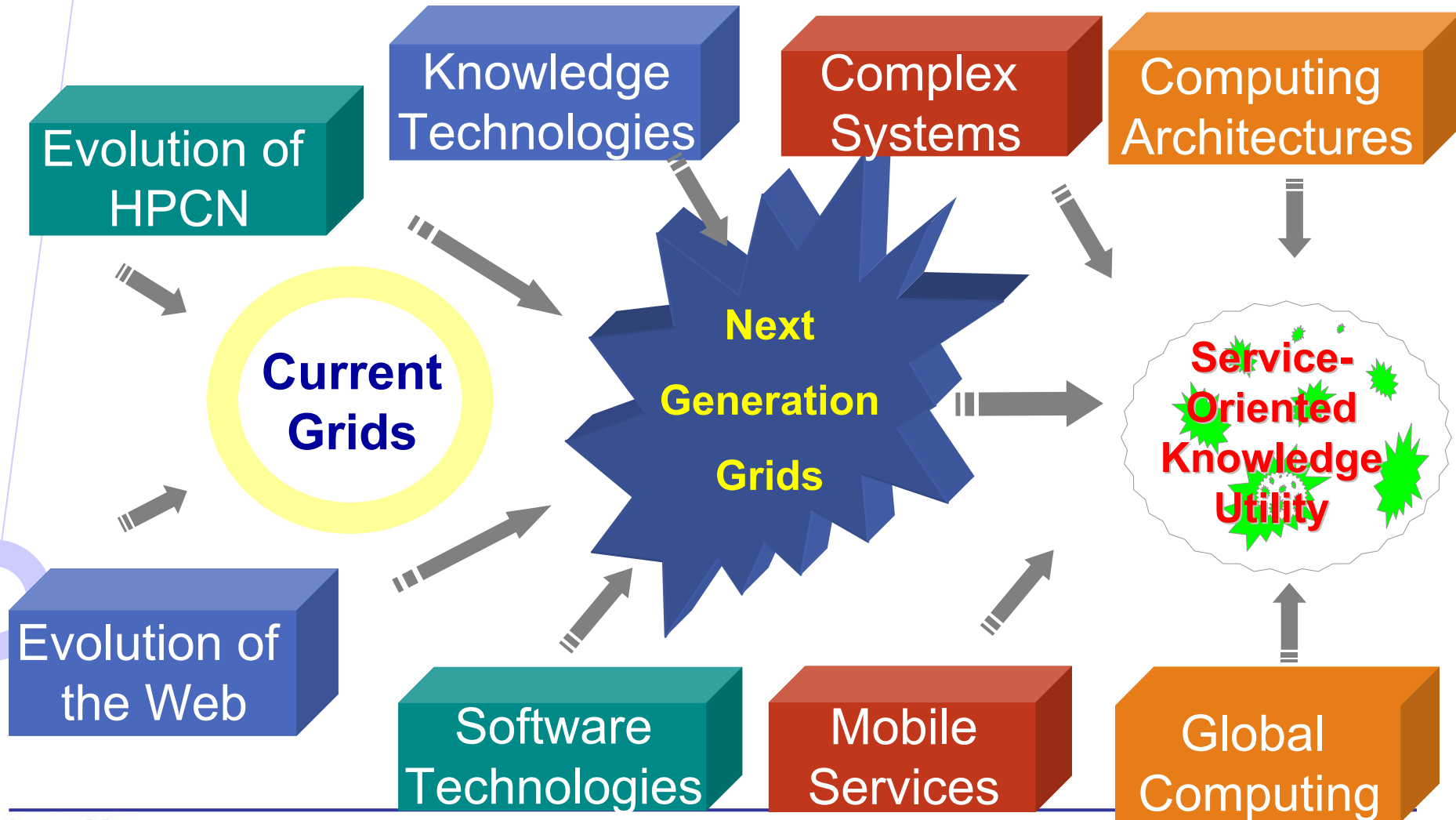
« The Internet will eventually emerge as a global networked utility, replacing computing as we know it today »

PriceWaterhouseCoopers



Grid Research - the Challenge

Complexity - Interoperability - Ease of Use - ...



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Next Generation Grid(s): 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 Vision

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

Abstraction

Software Vision

- Continuously changing requirements
- Grid services development environments

Architectural Vision

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

Virtualization

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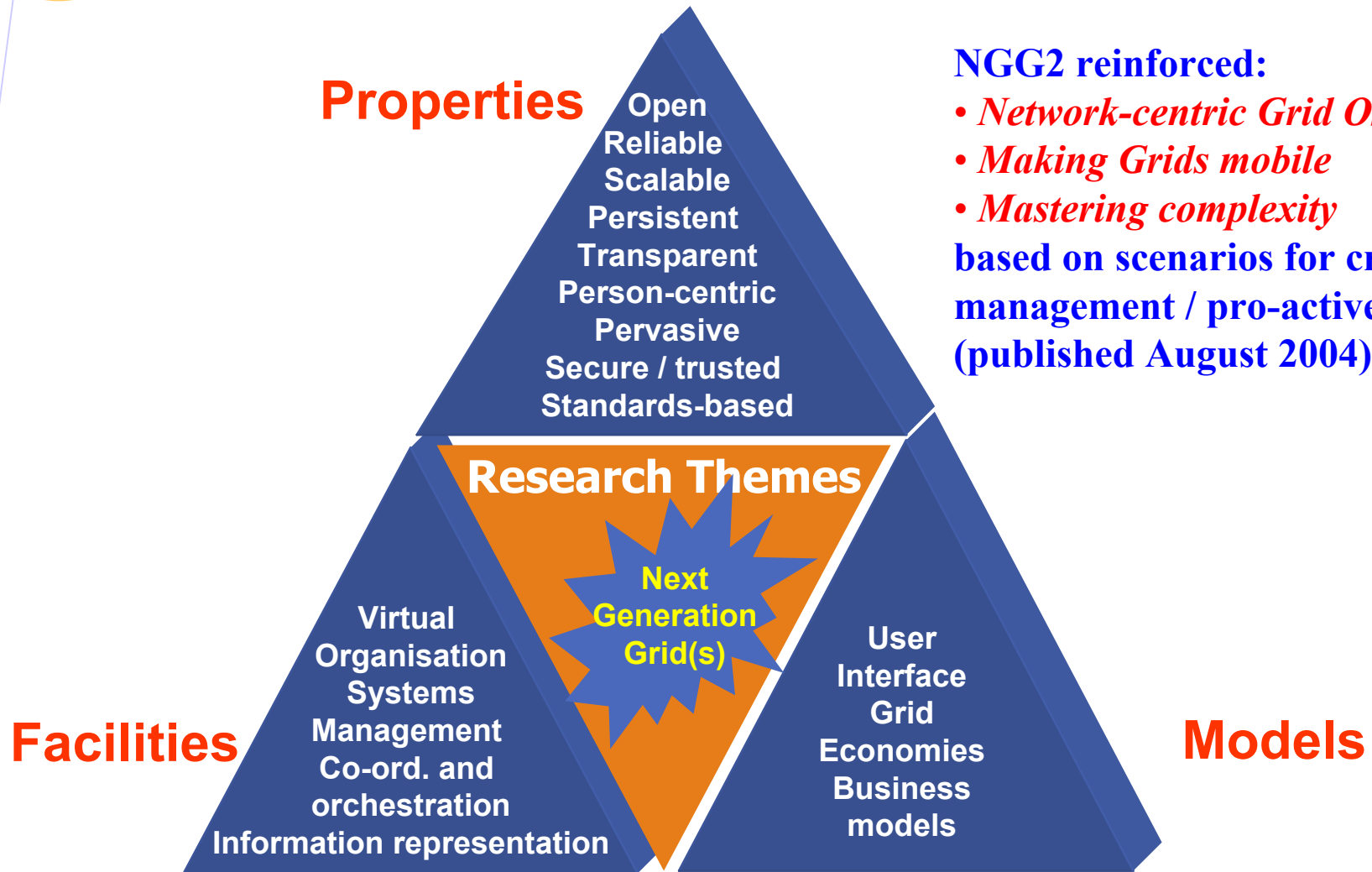


Next Generation Grid(s): Identified Research Themes

NGG2 reinforced:

- *Network-centric Grid OSs*
- *Making Grids mobile*
- *Mastering complexity*

based on scenarios for crisis
management / pro-active PDA
(published August 2004)



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Research Infrastructure Vision: creating an eInfrastructure...

Global knowledge infrastructure

Science
Society
Industry
Business

e-Infrastructure
(Grids empowered)

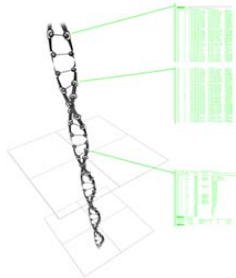
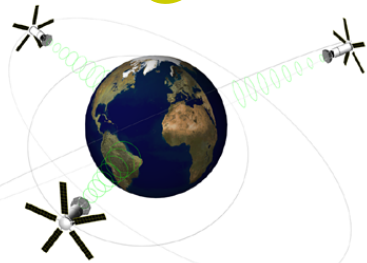
Broadband

Security

Semantic web

Next Generation Grids

Enabling Applications
Technologies



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3. Initial FP5 results & Lessons Learnt



EU FP5 Grid Projects 2000-2004

(EU Funding: 58 M€)

Applications

Middleware

Infrastructure

• Infrastructure

DataTag

• Computing

EuroGrid, DataGrid, Damien

• Tools and Middleware

GridLab, GRIP

• Applications

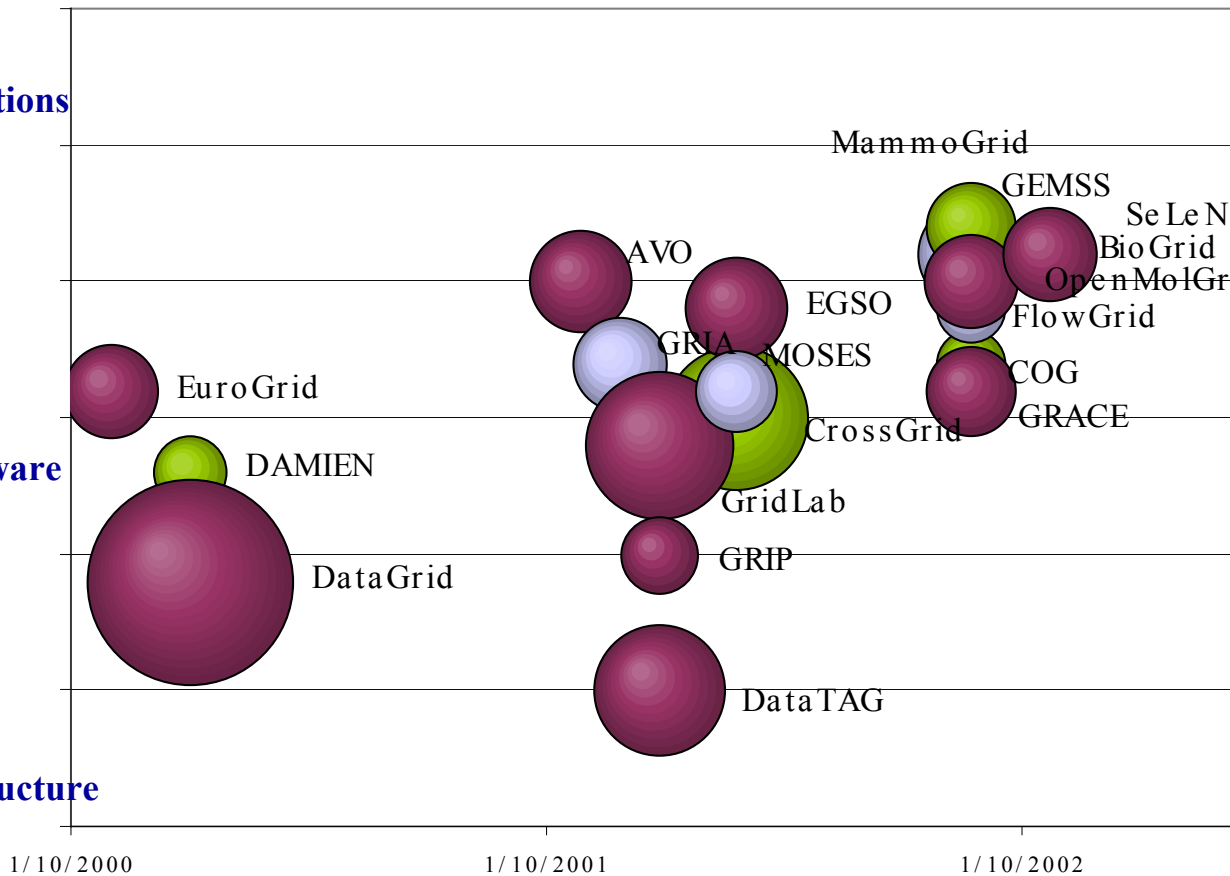
EGSO, CrossGrid, BioGrid, FlowGrid, Moses, COG, GEMSS, Grace, Mammogrid, OpenMolGrid, Selene,

• P2P / ASP / Webservices

P2People, ASP-BP, GRIA, MMAPS, GRASP, GRIP, WEBSI

• Clustering

GridStart



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FP5 Grid project achievements

Examples

- **Grid infrastructures**
GRIP – GRIA – GRASP - DATAGRID
- **Portals and application environments**
Gridlab - Crossgrid
- **Applications specific products and services**
Openmolgrid – Flowgrid
BioGrid – MammoGrid – GEMSS
GRACE – CrossGrid - ...
-



FP5 EU Grid Research Achievements

- Creation of a strong Grid research community
- Europe's position strengthened related to
 - ⇒ Grid middleware development
 - ⇒ Contribution to standardisation
- Leading position established for vertical Grid Middleware oriented towards specific application requirements
- First steps taken towards maturing Grid technologies for industrial and business use
- Grid concept proven in eScience application pilots followed by deployment in research infrastructures
- Identified weaknesses in commercial exploitation
- Emergent opportunities for service providers



4. The EU Grid Initiatives in FP6 (2002-06)



Grid Research Infrastructures & Applications in FP6

Application Research & Deployment

Industrial / Societal Applications

eBusiness, eGov, eWork, eHealth, risks management, ...

200 M€

Research Infrastructures

- Deployment of high-capacity/speed communications network – GÉANT
- Deployment in Research of Grids

Grid RTD

Grid Technologies

125 M€

- Grid-enabled applications and services for business society
- Technologies and systems for building the invisible Grid
- Network-centric Grid operating systems

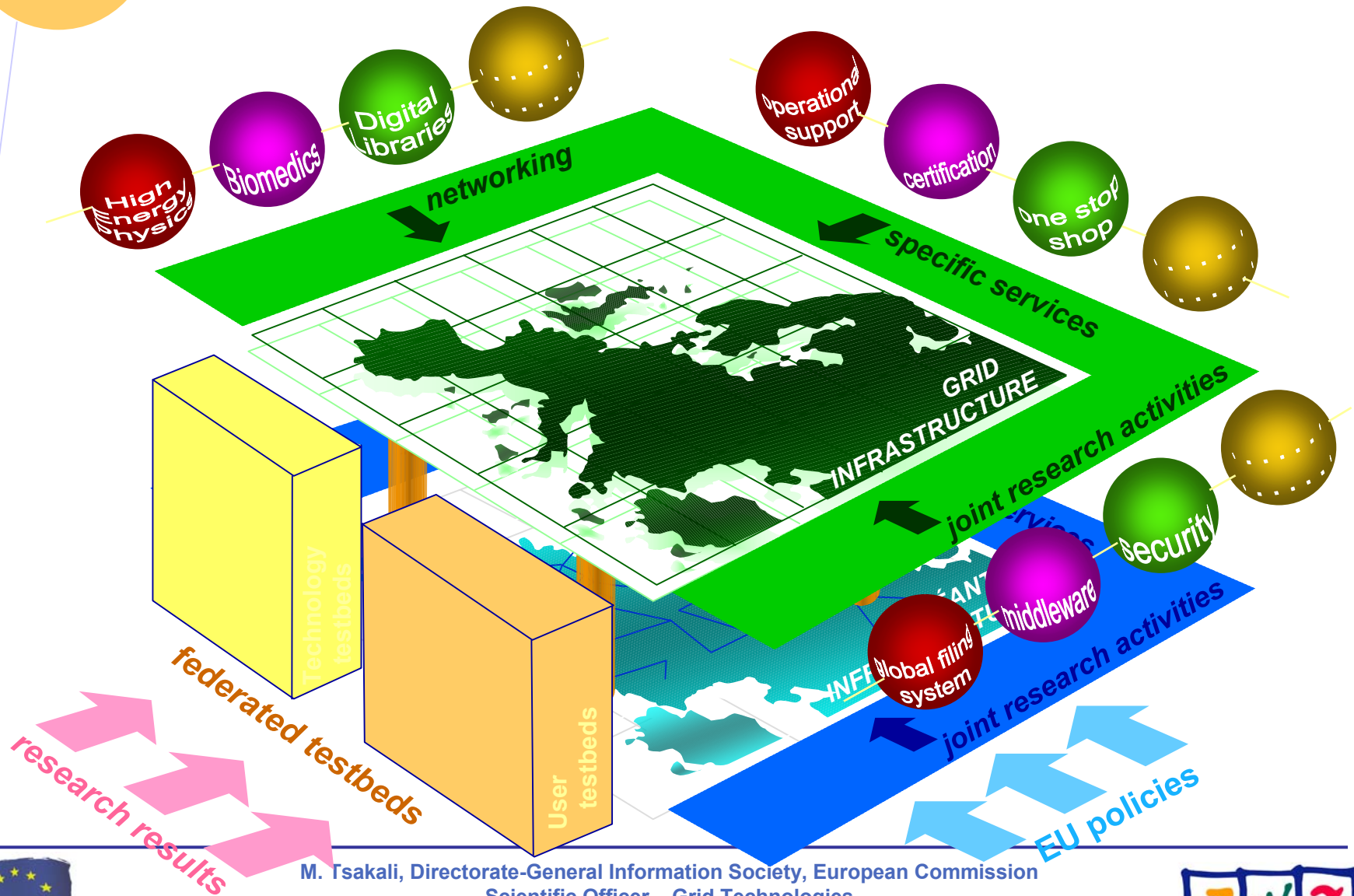
Related Research

Software-, Web-, Knowledge Technologies, Broadband-, Mobile Communication Technologies, Security

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eInfrastructure - implementation blocks



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Grid Deployment and Testbeds in FP6

User involvement...

New user communities – using Grids – Digital Libraries

DILIGENT

Real time Grid for remote control of instruments

GRIDCC

Optical solutions for Grid infrastruct.

MUPPET

...technology validation

Flexible Quality of Service Assurance

EUQoS

EGEE
DEISA
SEE-GRID

elnfrastructure

IPv6TF SC

IPv6 Task Force support

EUROLABS

Experimental testbeds

LOBSTER

Traffic monitoring

Specific Support Actions



Grid deployment in e-infrastructures

Goal

- Create a European-wide Grid production infrastructure on top of present and future EU RN infrastructure

Build on

- EU and EU member states major investments
- International connections (US and AP)

Scope

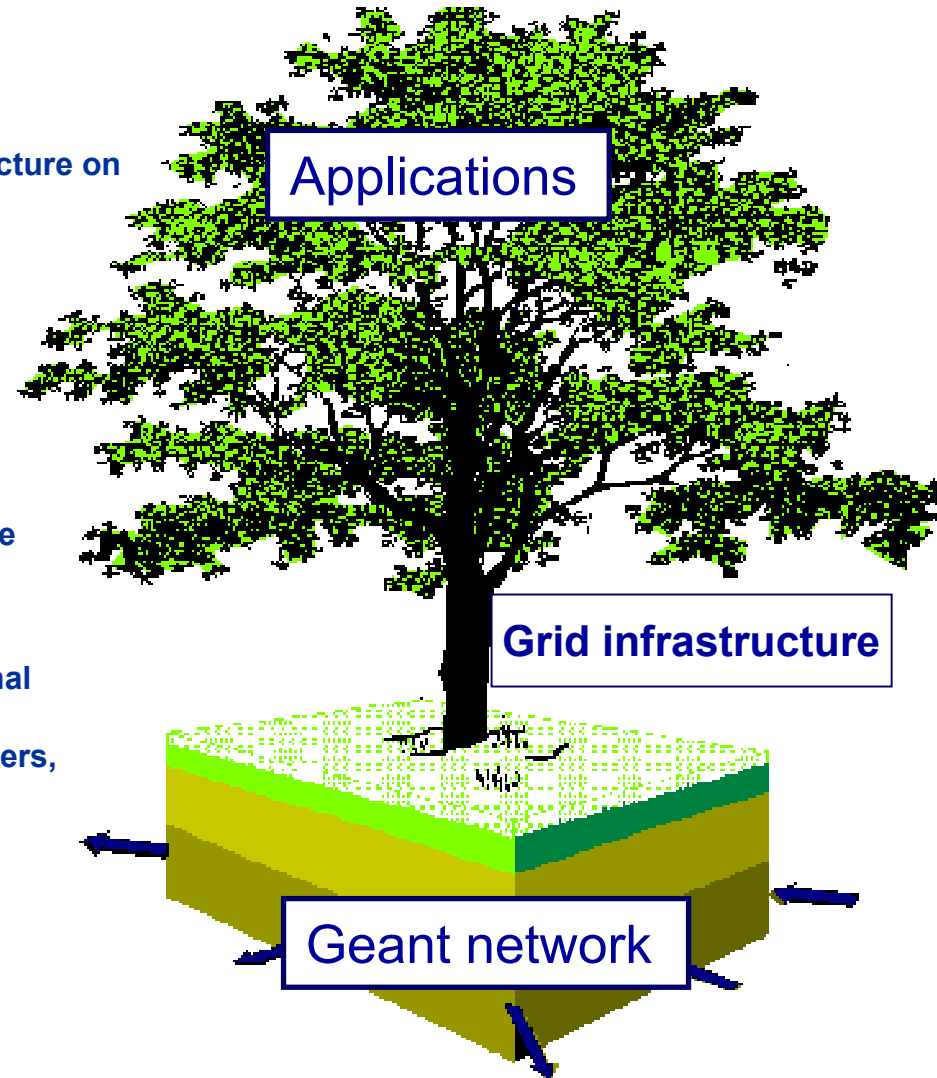
- Operations services, networking, pilots

Middleware

- Hardening & re-engineering of existing middleware functionality

Approach

- Leverage current and planned national and regional Grid programmes
- Work closely with relevant industrial Grid developers, NRENs and US-AP projects

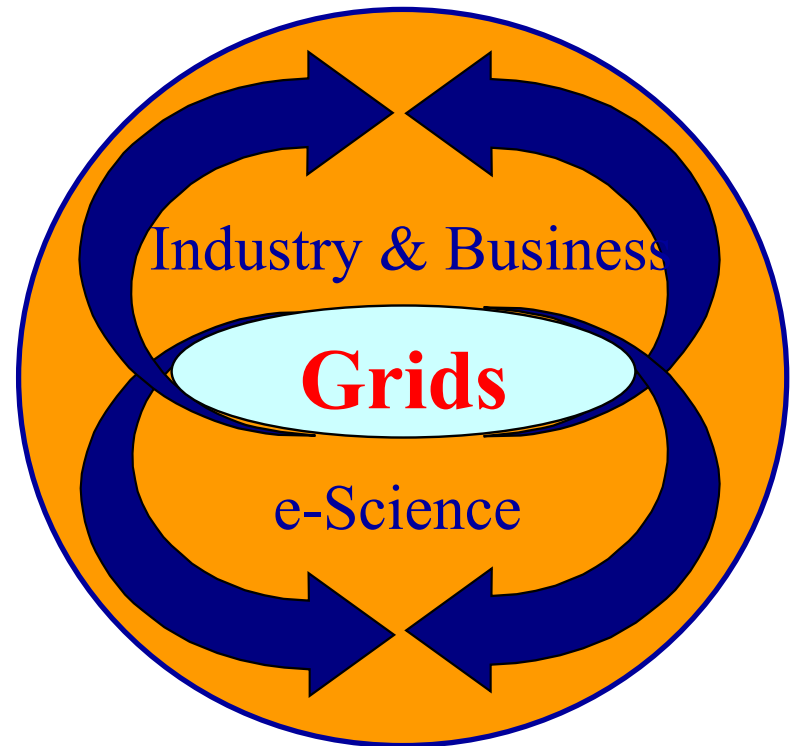


FP6 Grid Research Objectives

Moving Grid from e-Science to Industry

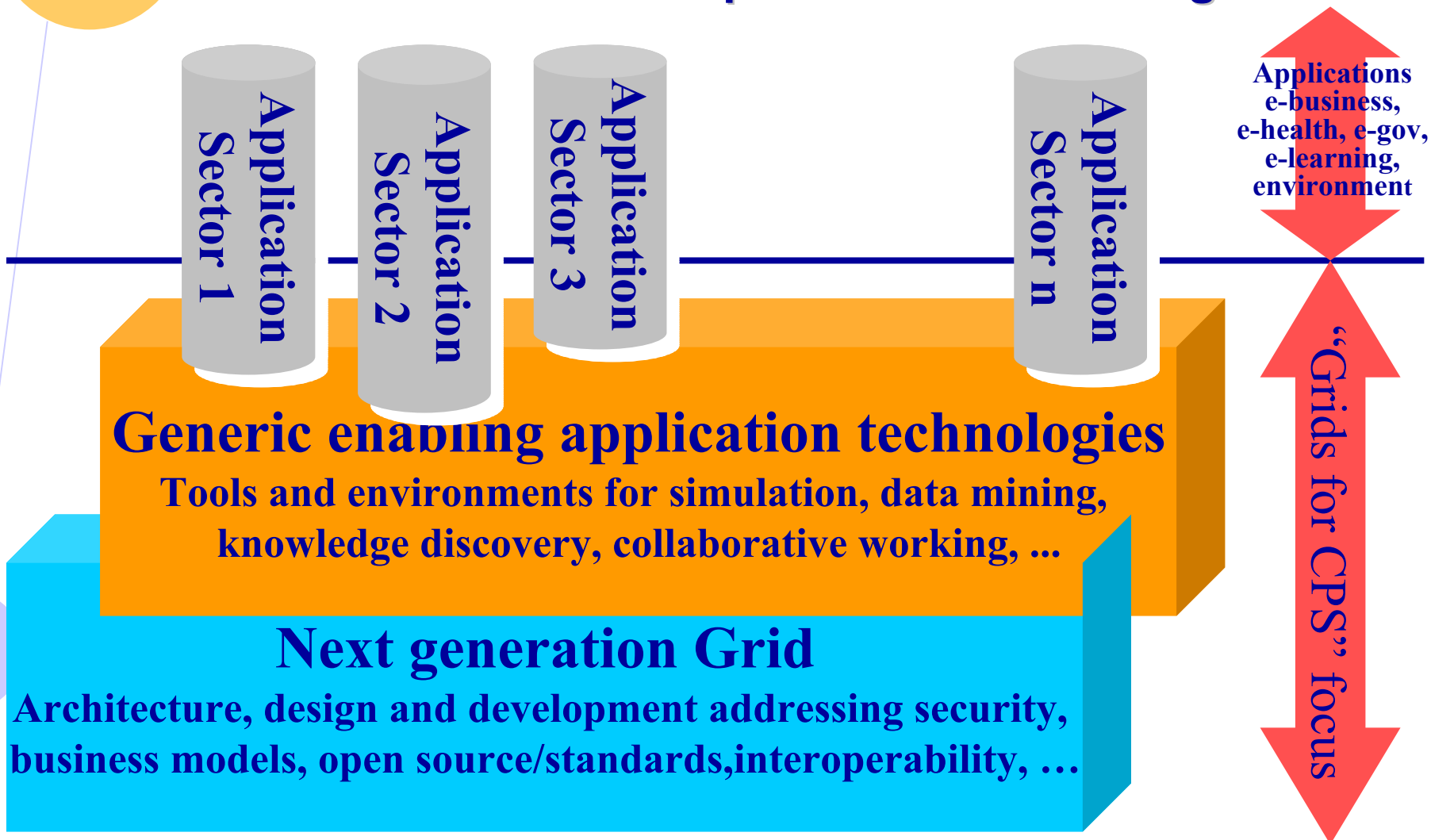
Promote Grid research to

- ⇒ Exploit the potential of Grids beyond e-Science
- ⇒ Support the development of Next Generation Grids



IST Workprogramme 2003-04

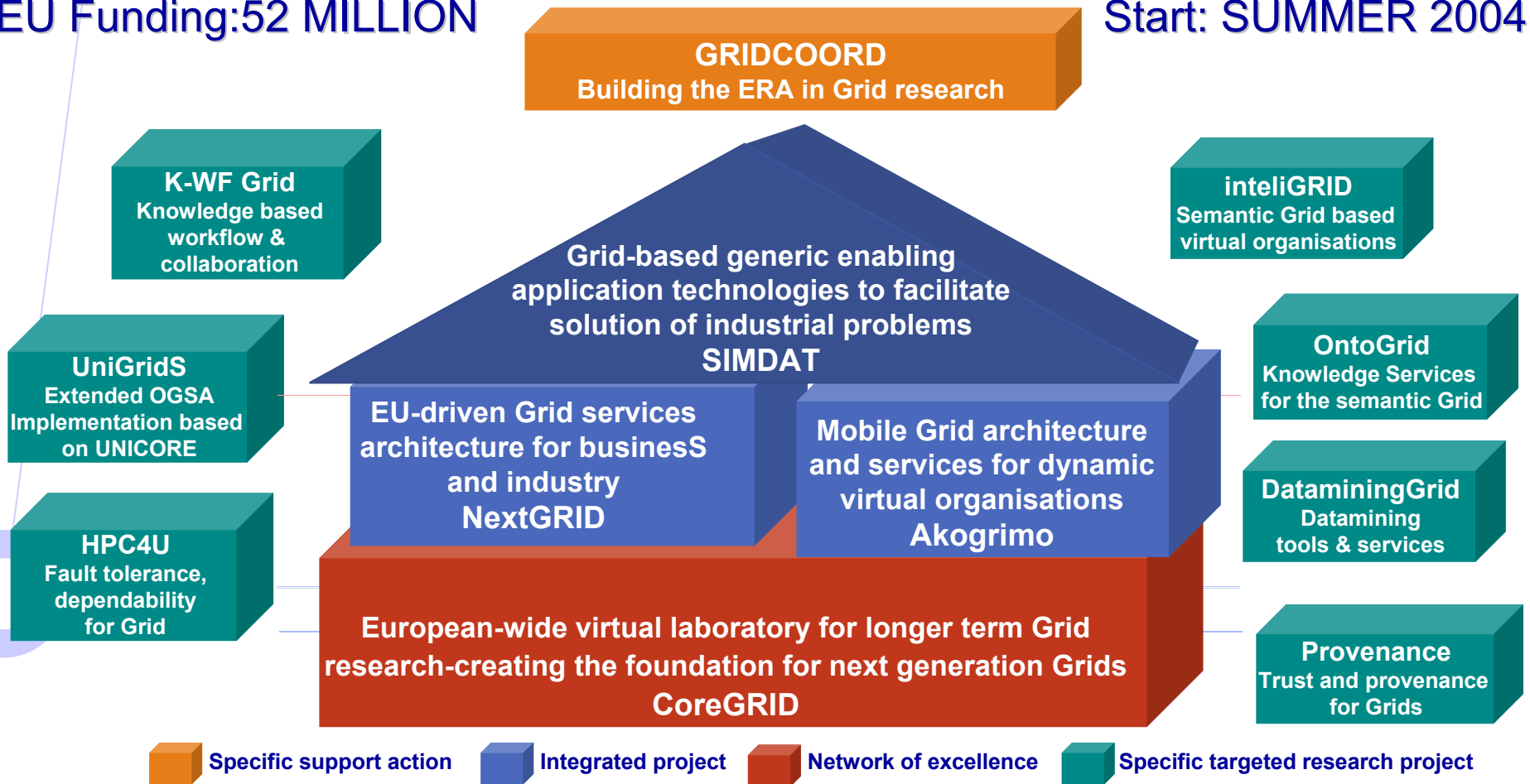
Grids for Complex Problem Solving



New Grid Research Projects in FP6

EU Funding: 52 MILLION

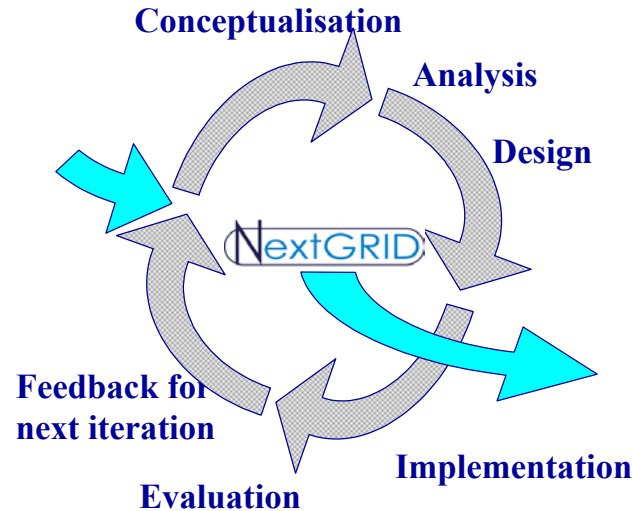
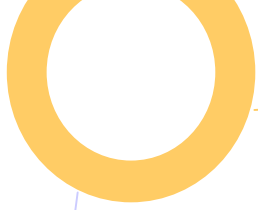
Start: SUMMER 2004



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Information Society



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



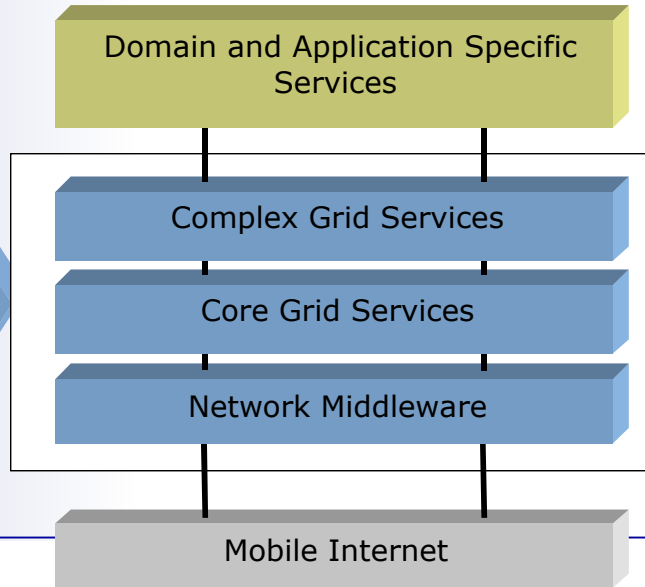
Integrated Project



Two testbeds

- E-Learning
- Hospital
- Generalisation to
- other applications

AKoGriMo Focus



The Next Generation "GRIDNET"

Technology Vision

- NGG based on next generation IPv6 networks and supporting security, QoS, accounting /billing, user & context awareness.
- Use of mobile comm's beyond 3G.
- Dynamic Virtual Organisations based on trust management

Mobile Grid architectures and services for dynamic virtual organisations

Telcom operators

- Telefonica I&D (SP)
- Telnor (N)
- Tel Inst (P)

Grid Providers & Industry

- HLRS (D)
- CCLRC (UK)
- Uni Hohenheim (D)
- Datamat (I)

Universities

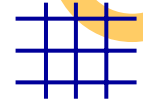
- Uni BW München (D)
- CRMPA (I)
- NTUA (Gr)
- UPC(SP)

IT Industry (tools & services)

- BOC (UK)
- SchlumbergerSEMA

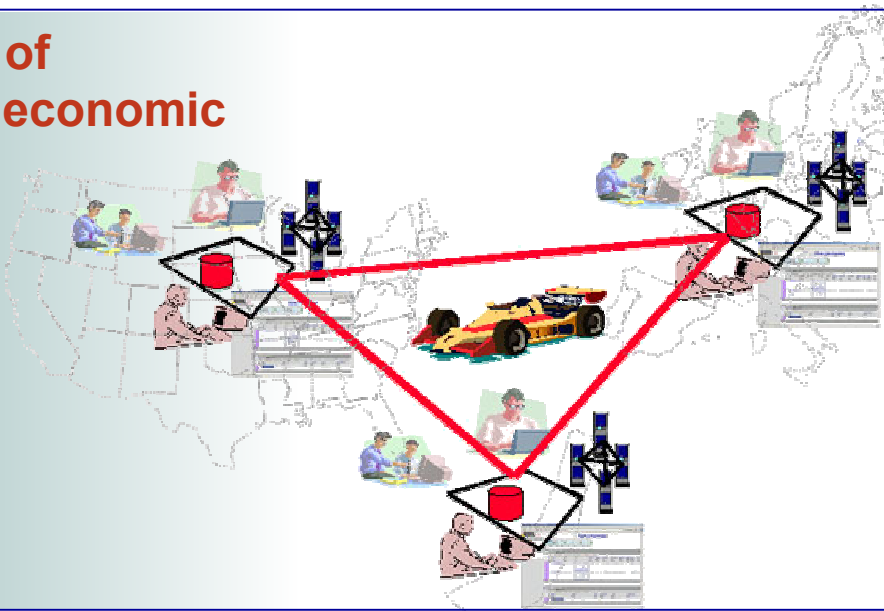
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 Scientific Officer – Grid Technologies
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Four sectors of international economic importance:

- Automotive
- Pharmaceutical
- Aerospace
- Meteorology



Seven Grid-technology development areas:

- Grid infrastructure
- Distributed Data Access
- VO Administration
- Workflows
- Ontologies
- Analysis Services
- Knowledge Services

The solution of industrially relevant complex problems using data-centric Grid technology

Grid Technologists



Capability Providers



End Users



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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

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

6 EU Virtual Institutes

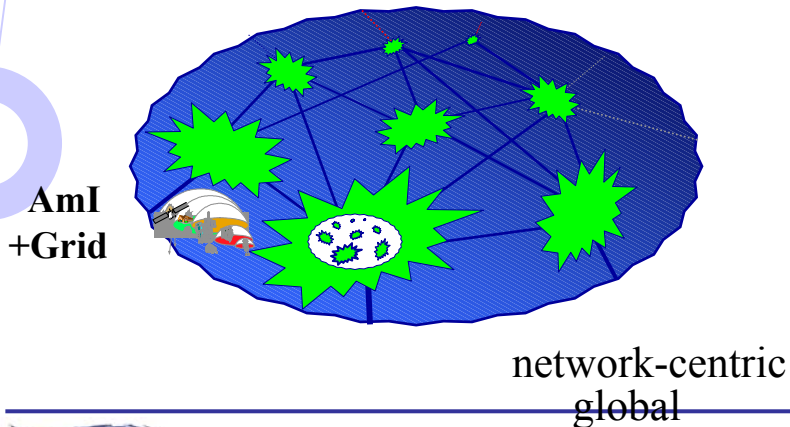
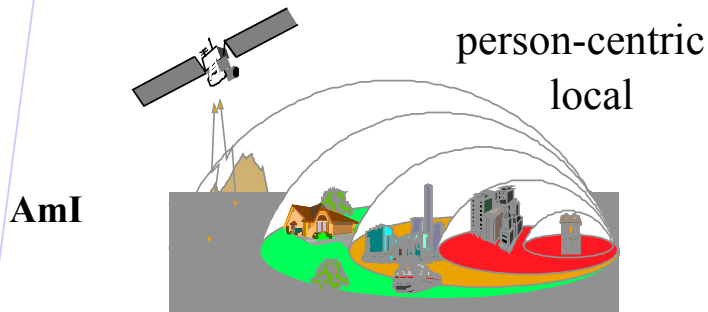


5. Future Challenges



Grid research vision - 2007 and beyond

Grid empowers AmI (Ambient Intelligence) *Towards a Service-oriented knowledge utility 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

Research Infrastructure: Next Calls for proposals in FP6

Year 2004

Year 2005

Year 2006

elInfrastructure - Consolidating initiatives

- New user communities
- Policies, Resource registries
- International aspects

FP6
RI

25 M€

elInfrastructure - Grids

Continue building advanced Grid-empowered infrastructures

Emphasis on:

- Production quality & ready-to-use
- SW-infrastructures
- Address industry requirements
- Environments dynamically adaptable to user needs

FP6
RI

55 M€

Test-beds

- Optical, Wireless, Security, Grids, other technologies.
- User involvement / technology validation

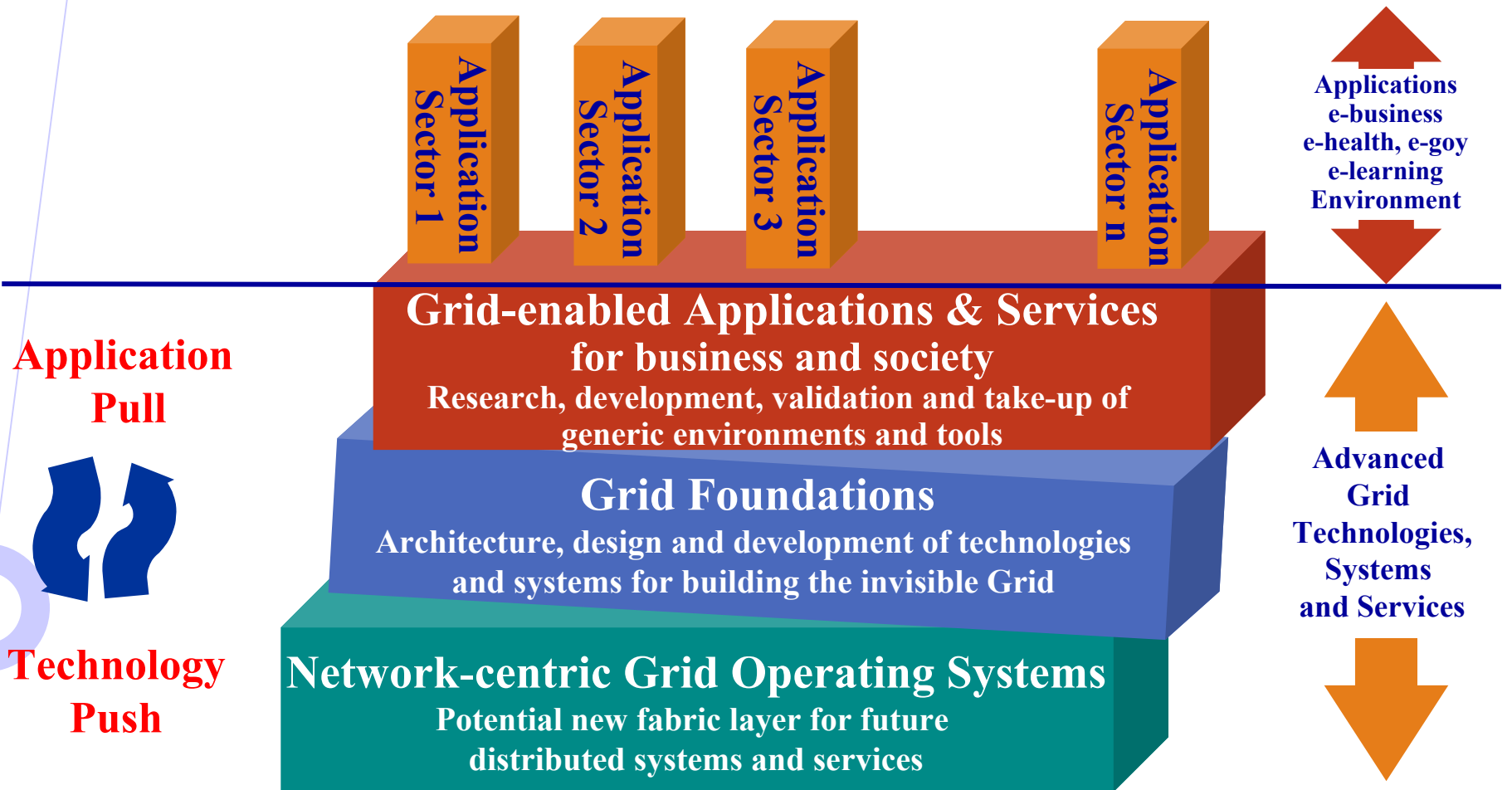
FP6
IST

18 M€



IST Workprogramme 2005-06

Advanced Grid Technologies, Systems and Services



M. Tsakali, Directorate-General Information Society, European Commission
Scientific Officer – Grid Technologies
Grid Open Day – Lisbon – 21 October 2004



Information Society

Grid Research: Next Calls for proposals in FP6

- **Nov 2004:** Publication of Workprogramme
Opening Call 4
IST2004 Conference (15-17)
- **May 2005:** Opening Call 5, incl. Strategic
Objective « Advanced Grid
Technologies, Systems and
Services » (~ 70 M€)
- **Sept 2005:** Closing Call 5



6. Conclusions



Conclusions (1)

Grid Potential

- ✓ **Grid as a utility: a new paradigm for service delivery**
- ✓ **Grids: a key building block of the knowledge economy**
- ✓ **Grids: as an enabler for innovation (e.g., business, life sciences, etc.)**
- ✓ **Grids: a new service and business model for IT and Telco service providers**



Conclusions (2)

IST Grid Programme

- ✓ **EU expects to capitalise on its strengths in Grid research and applications through strategic portfolio of new FP6 Grid Research projects launched September 2004**
- ✓ **ERA Pilot 'GridCoord' and NoE 'CoreGrid' as well as Research Infrastructures projects 'EGEE' and 'DEISA' are essential building blocks for a European Research Area for Grids**
- ✓ **More coherent approaches and joint longer-term strategies supported by commitments from all key stakeholders is required to secure commercial benefits**
- ✓ **The Grid of the future is a global challenge, thus International co-operation and standards are essential**



References /Background Information

Grid research:

www.cordis.lu/ist/grids

eInfrastructure:

www.einfrastructures.org

www.pd.infn.it/einfrastructures

www.heanet.ie/einfrastructures

www.e-irg.org/

