International e-Infrastructure

Mike Mineter
mjm@nesc.ac.uk

Overview

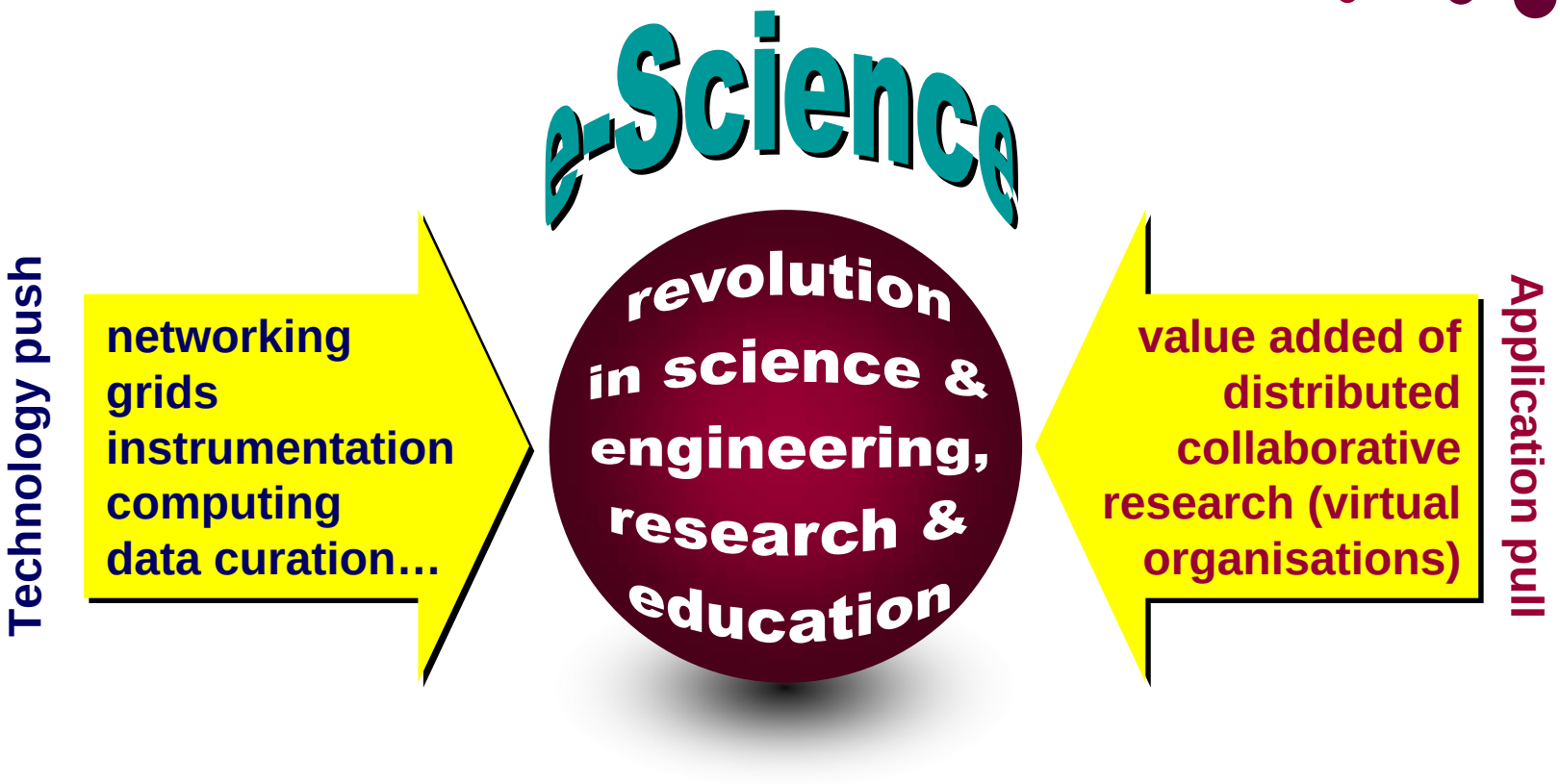
- **The view from the European Commission**

- **GEANT – European network**
- **DEISA – for when HPC is just not HP enough!**
- **EGEE – establishing grid e-Infrastructure**
  - WHY?!
  - HOW?!
  - With whom?

View from European Commission

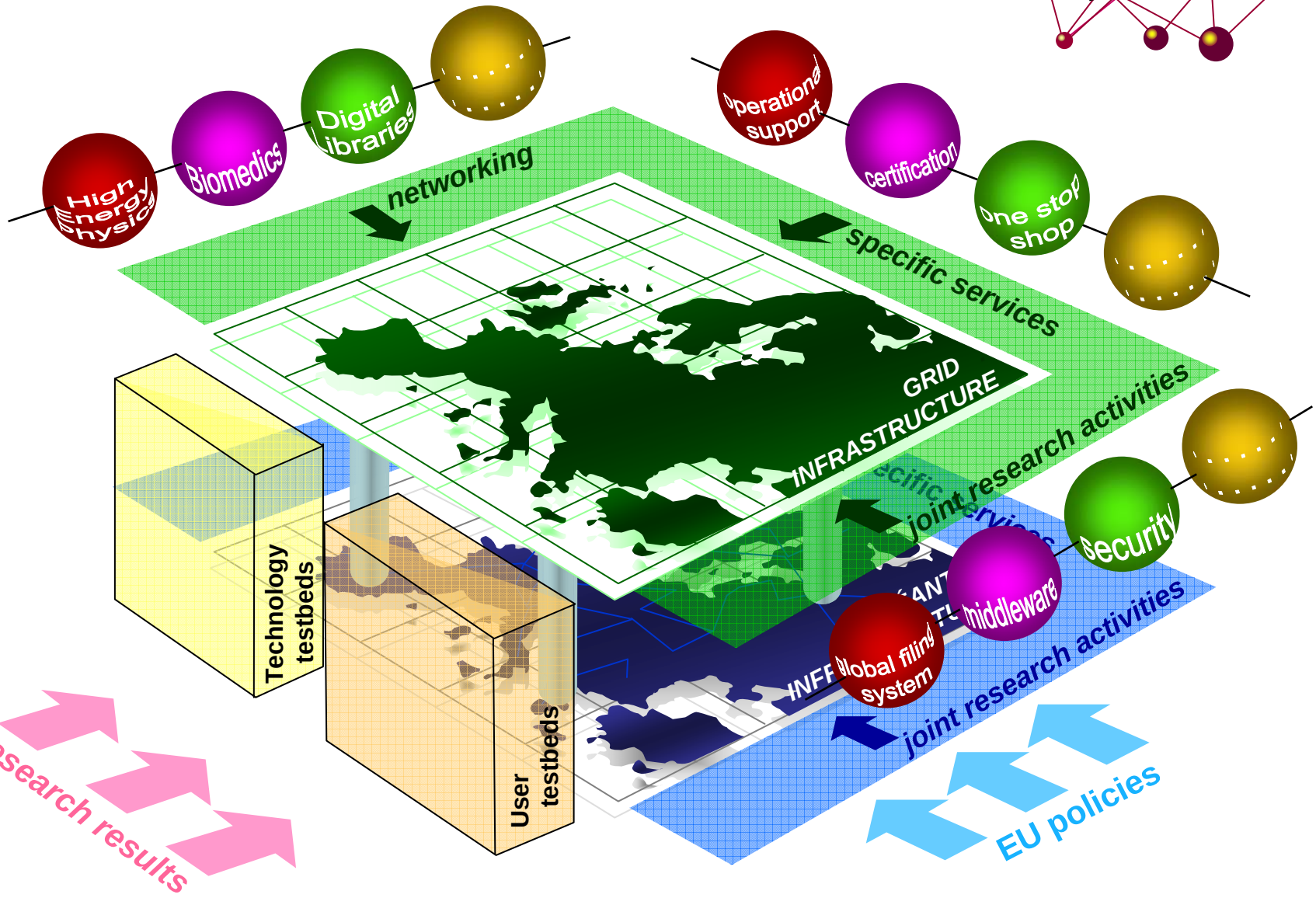
- **Entering the “knowledge society” from the “industrial society”**
  - Industrial society = Transportation Infrastructure
  - Knowledge society = Communications infrastructure
- **Lisbon strategy: Research and Innovation will be the most important factors in determining Europe’s success through the next decades**
- **THE GOAL: “UNLEASH CREATIVITY”- by investment in**
  - Human skills
  - Infrastructures
- **Demands in growth of e-infrastructure**

A new way of doing Science

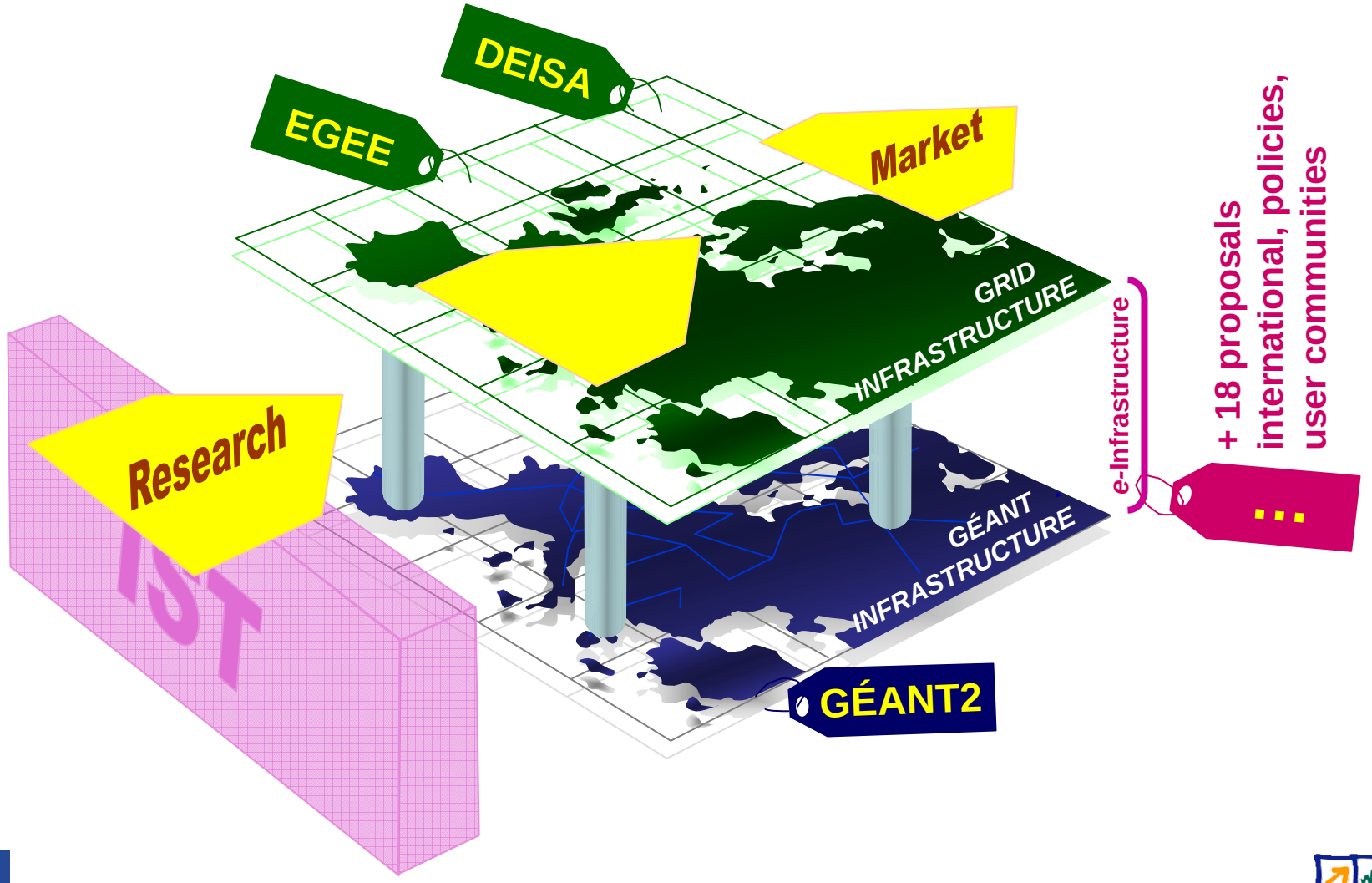


a new way for all scientists to work on research challenges that would otherwise be difficult to address

e-Infrastructure - Implementation blocks



e-Infrastructure - Strategic building blocks



DEISA

- **“integration of existing national high-end platforms, tightly coupled by a dedicated network and supported by innovative system and grid software”**

- **Initial scientific applications include**
  - Material Sciences
  - Cosmology
  - Plasma Physics
  - Life Sciences

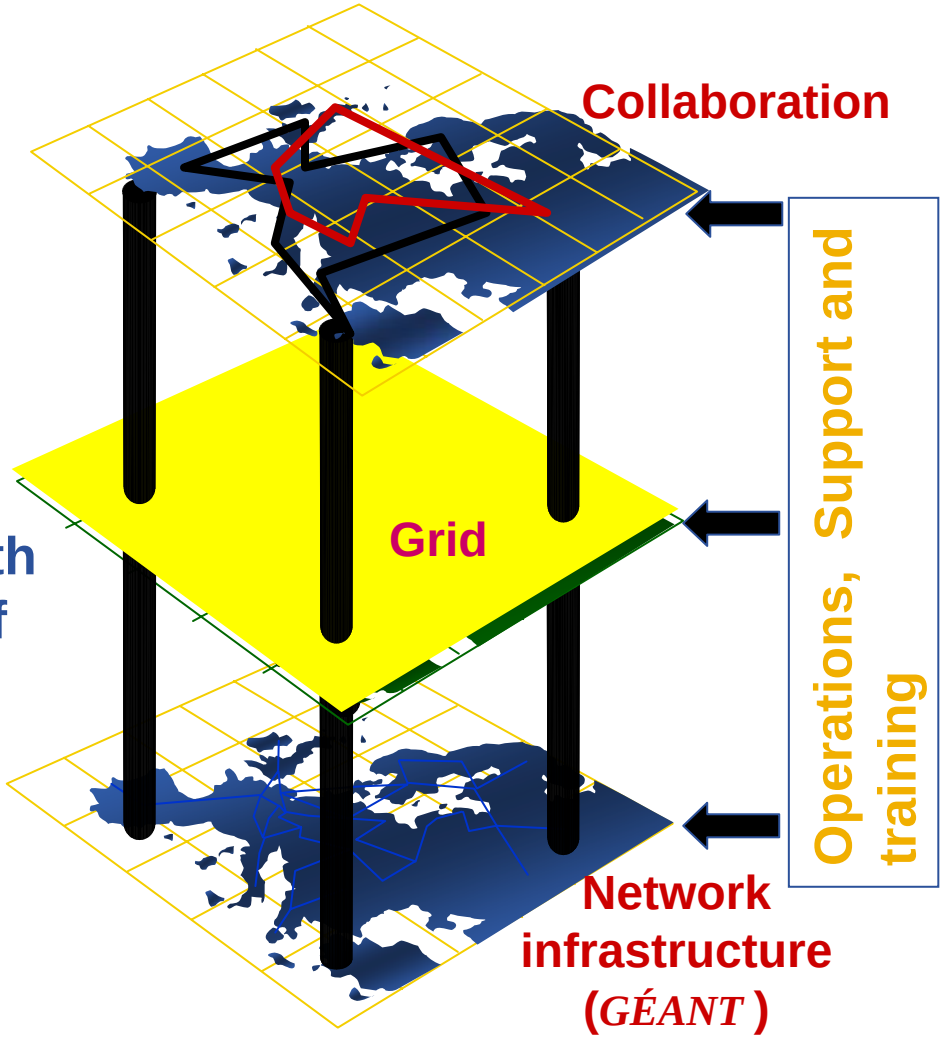
- **http://www.deisa.org**

GEANT

- **Interconnects 34 National Research & Education Networks-NRENs of the extended European Research Area (ERA)**
- **Connects more than 3500 Research & Education Institutions**
- **Serves millions of end-users + eScience Projects (e.g. Grids) under Accepted Usage Policy (AUP) rules**
- **3-tier Federal Architecture, partially subsidized by National and EU Research & Education funds:**
  - The Campus Network (LAN/MAN)
  - The NREN (MAN/WAN)
  - The Pan-European Interconnection
- **GEANT2 en route**
- **http://www.geant.net/**

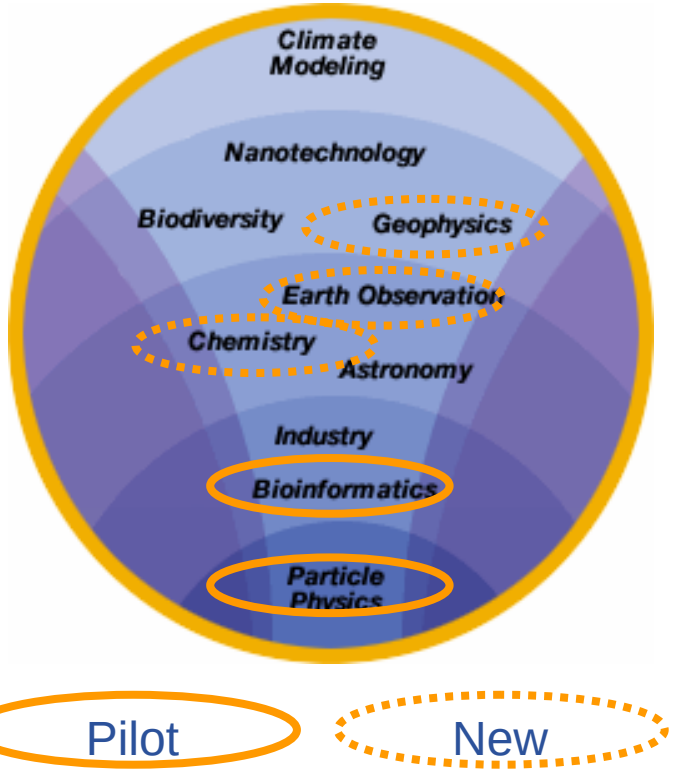
EGEE- building grid infrastructure

- To underpin collaboration
- Link with and build on national, regional and international initiatives
- Foster world-wide international cooperation both in the creation and the use of the e-infrastructure



In the first 2 years EGEE is

- **Establishing production quality sustained Grid services**
  - 3000 users from at least 5 disciplines
  - integrate 50 sites into a common infrastructure
  - offer 5 Petabytes (10^{15}) storage
- **Demonstrating a viable general process to bring other scientific communities on board**
- **Proposed a second phase to take over EGEE in April 2006**

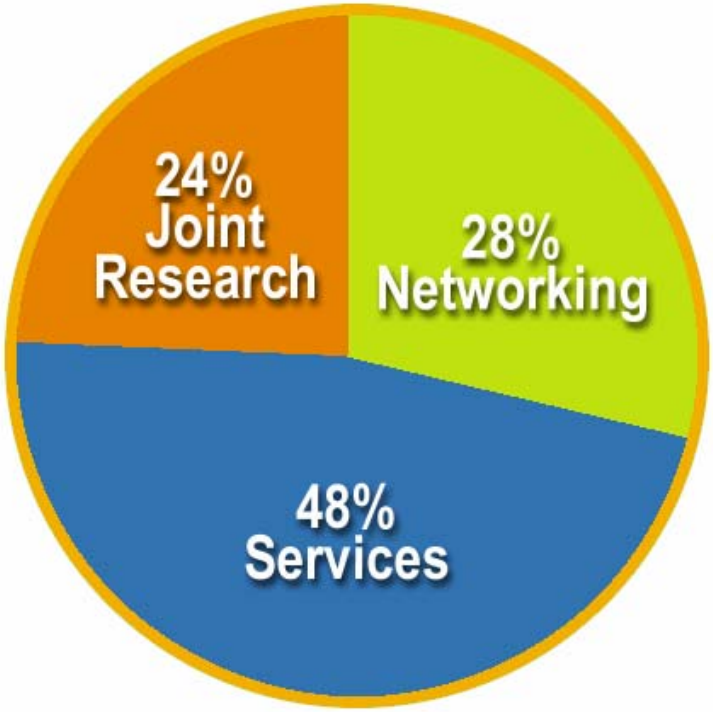


EGEE Organisation

- 70 leading institutions in 27 countries, federated in regional Grids
- ~32 M Euros EU funding for first 2 years starting April 2004 (matching funds from partners)
- Leveraging national and regional grid activities
- Promoting scientific partnership outside EU

EGEE Activities

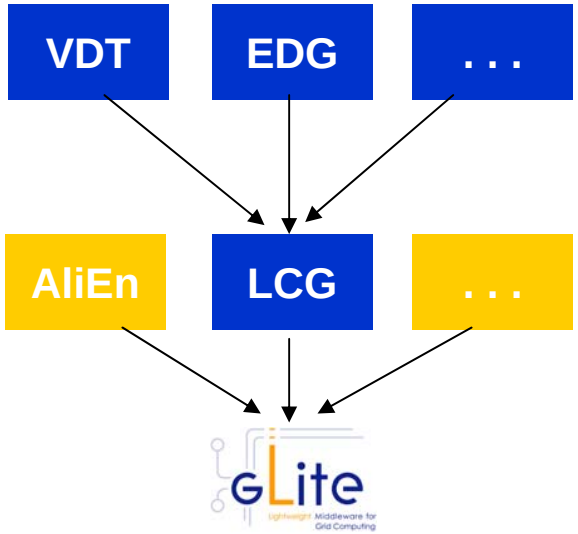
- 48 % service activities (Grid Operations, Support and Management, Network Resource Provision)
- 24 % middleware re-engineering (Quality Assurance, Security, Network Services Development)
- 28 % networking (Management, Dissemination and Outreach, User Training and Education, Application Identification and Support, Policy and International Cooperation)



Emphasis in EGEE is on operating a production grid and supporting the end-users

gLite: Guiding Principles

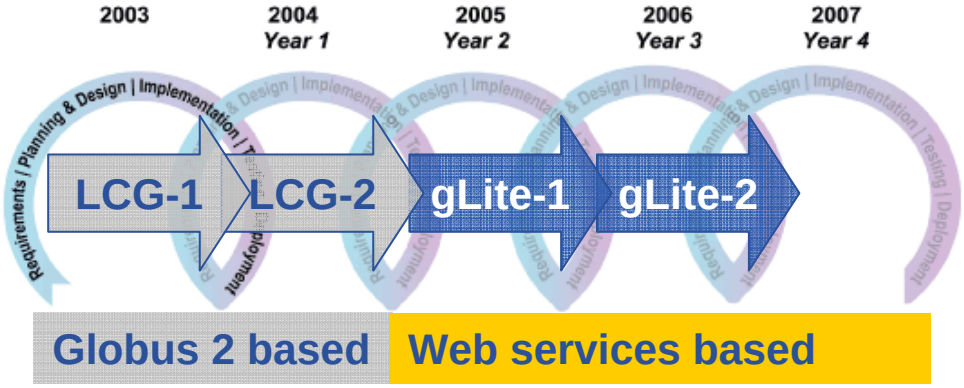
- **Service oriented approach**
  - Allow for multiple interoperable implementations
- **Lightweight (existing) services**
  - Easily and quickly deployable
  - Use existing services where possible
    - Condor, EDG, Globus, LCG, …
- **Portable**
  - Being built on Scientific Linux and Windows
- **Security**
  - Sites and Applications
- **Performance/Scalability & Resilience/Fault Tolerance**
  - Comparable to deployed infrastructure



- **Co-existence with deployed infrastructure**
  - Co-existence with LCG-2 and OSG (US) are essential for the EGEE Grid services
- **Site autonomy**
  - Reduce dependence on ‘global, central’ services
- **Open source license**

EGEE Middleware

- Intended to replace present middleware with production quality services
- Developed from existing components
- Aims to address present shortcomings and advanced needs from applications
- Prototyping short development cycles for fast user feedback
- Initial web-services based prototypes being tested

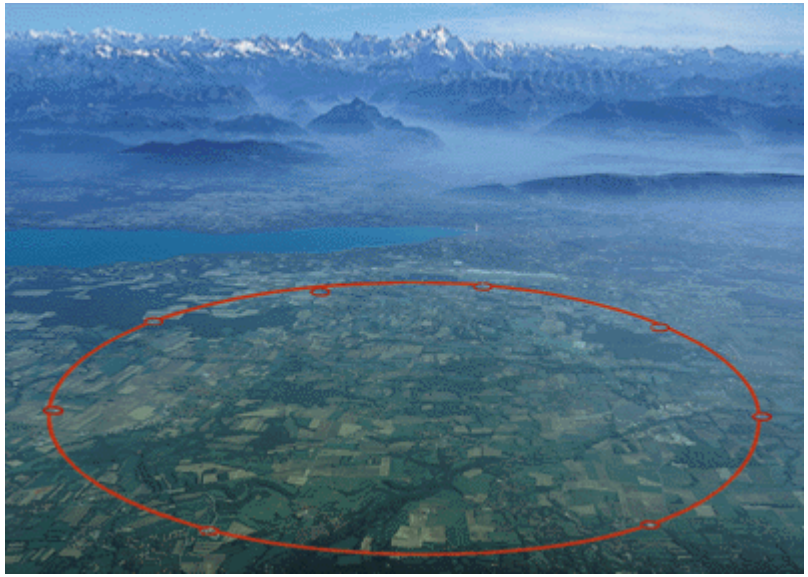


Application requirements http://egee-na4.ct.infn.it/requirements/

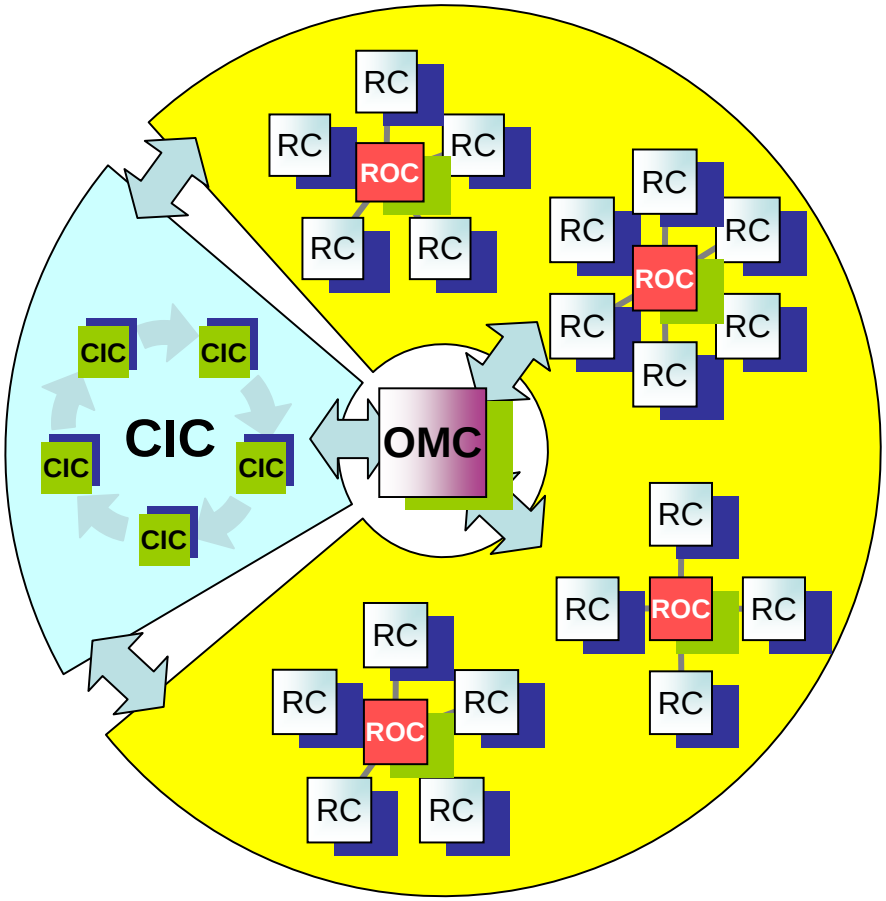
LCG and EGEE

- **EGEE committed to “hit the ground running”**
- **EGEE profits from the resources - no funded computing/data resources in EGEE**
  - Provided by the VOs
- **LCG obtains additional production and operation efforts**
- **LCG experiments now comprise several of the many VOs in EGEE**
- **Current service (“LCG-2”) based on work done in LCG**
  - Middleware components to be upgraded by “gLite” services as they are proven
  - “gLite 3” will be forged from LCG 2.7 + gLite services

LCG : Large Hadron Collider Compute Grid



Grid Operations

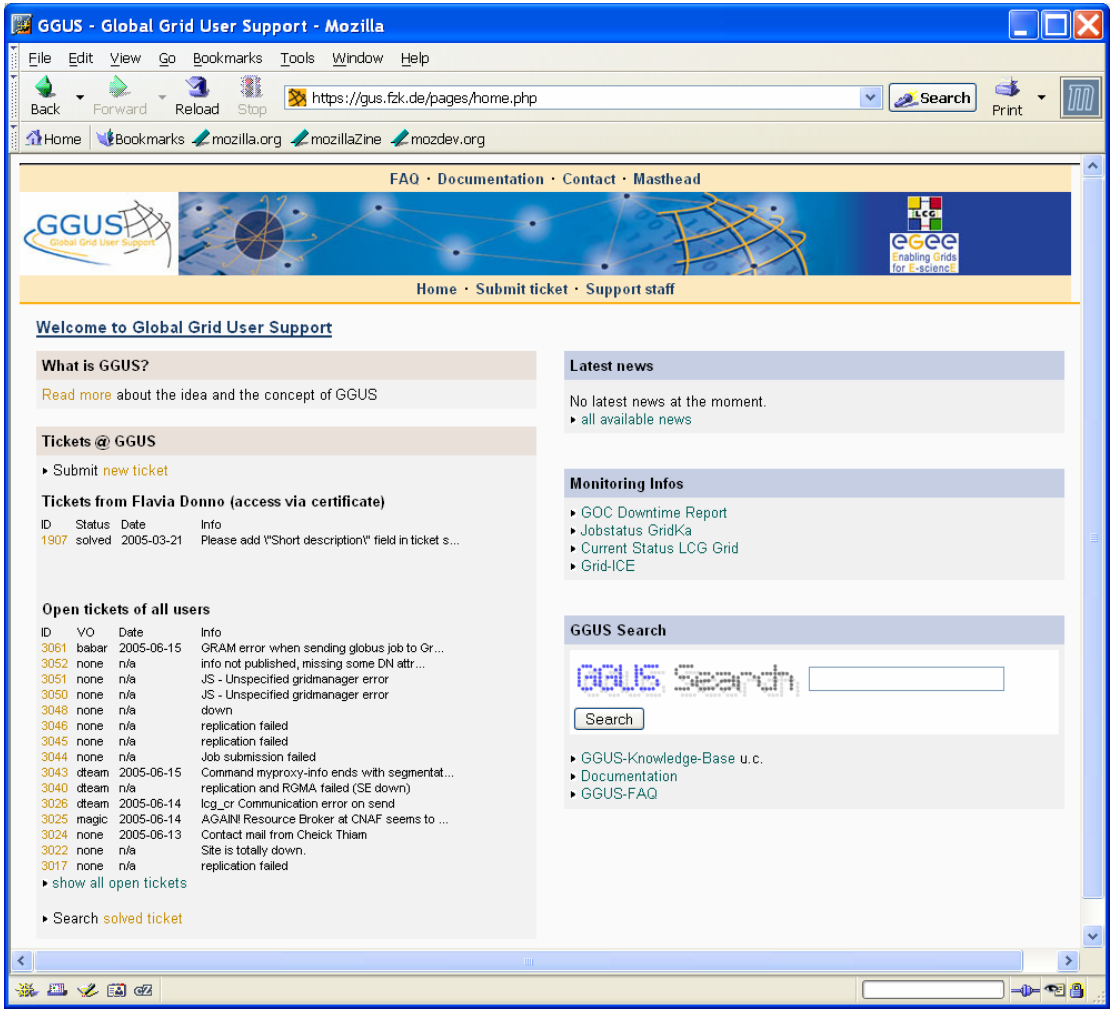


RC = Resource Centre
ROC = Regional Operations Centre
CIC = Core Infrastructure Centre
OMC = Operations Management Centre

- **The *grid* is flat, but**
- ***Hierarchy* of responsibility**
  - Essential to scale the operation
- **CICs act as a single Operations Centre**
  - Operational oversight ***(grid operator)*** responsibility
  - rotates weekly between CICs
  - Report problems to ROC/RC
  - ROC is *responsible* for ensuring problem is resolved
  - ROC oversees regional RCs
- **ROCs responsible for organising the operations in a region**
  - Coordinate deployment of middleware, etc
- **CERN coordinates sites not associated with a ROC**

The GGUS Portal

Global Grid User Support - first contact for users



http://www.ggus.org

You need to ***register*** in order to be able To use this portal (***GSI*** or password based)

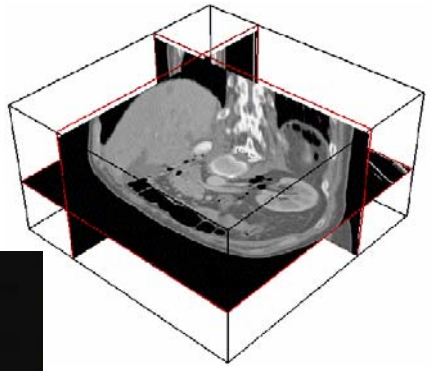
You can register as ***User*** or as ***Supporter***.

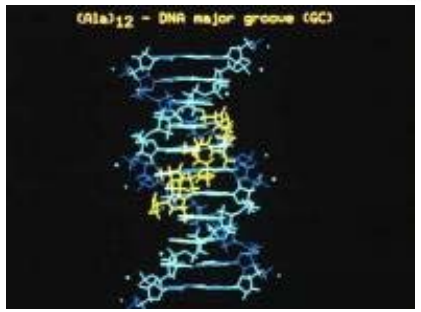
Supporter ?
If you think you have a good knowledge in Grid and have time to provide support, please contact your ROC or directly ESC at:

EGEE pilot applications

- **High-Energy Physics (HEP)**
  - Provides computing infrastructure (LCG)
  - Challenging:
    - thousands of processors world-wide
    - generating petabytes of data
    - 'chaotic' use of grid with individual user analysis (thousands of users interactively operating within experiment VOs)
- **Biomedical Applications**
  - Similar computing and data storage requirements
  - Major additional challenge:

    security & privacy
- **Chemistry, Earth Observation, Astronomy, Geophysics, ...**





EGEE is running…

- … the largest multi-VO production grid in the world!
- What's happening now?
  http://gridportal.hep.ph.ic.ac.uk/rtm/
- What resources are connected?
  http://goc.grid-support.ac.uk/gridsite/monitoring/

GILDA demonstrator and testbed (https://gilda.ct.infn.it)

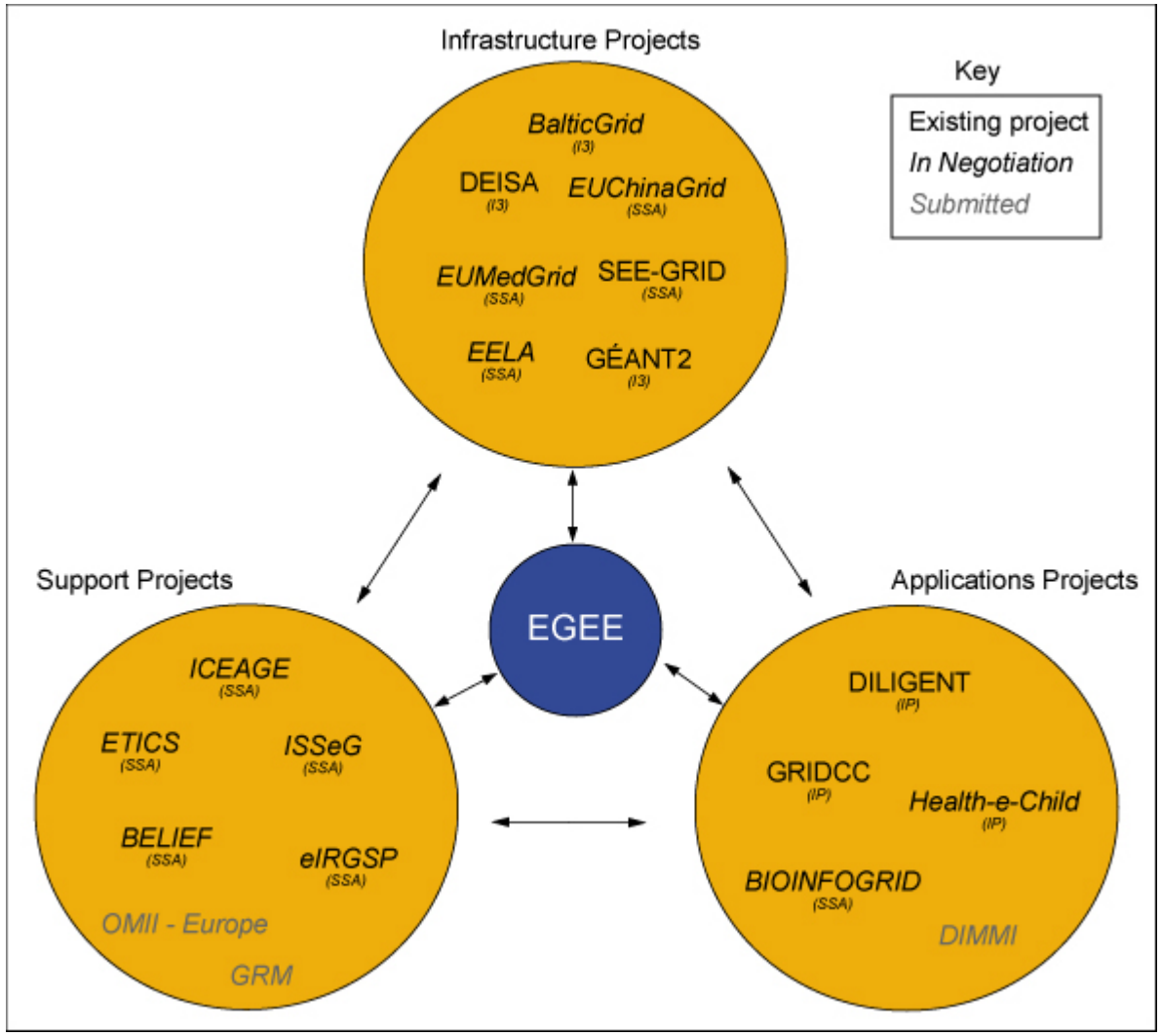
Establishing e-infrastructure

- **Note the contrast between**
  - **"best-efforts" and production grids** for international collaborations… with hundreds of sites providing resources
    - Operational infrastructure (>40% of EGEE budget on operations)
    - Quality of service / policy issues
    - Focus on stability of sites
    - Support for VO's
  - **Research and production middleware**
    - procedures for upgrading middleware
      - *Pre-production grid – running many VO's applications*
  - **Project grids and international production grids**
    - Extent of international cooperation, policy agreement...
    - Multiple VO's

Policy and International Cooperation

- **To foster cooperation between EGEE and other Grid activities around the world**
  - Globus Alliance, Condor
  - Training/workshop events
    (International Grid Summer School, Italy, July)
- **To participate in an eInfrastructure reflection group in Europe http://www.e-irg.org/**
- **To play a leading role in standard setting through attendance at global standard bodies such as the Global Grid Forum.**
  - Grid Storage Management GGF working group - http://sdm.lbl.gov/gsm/
  - Security, Authentication: US – EU cooperation
- **Mutual recognition of CA's**
  - Requires collaboration to establish policy - and mutuality

Related Projects



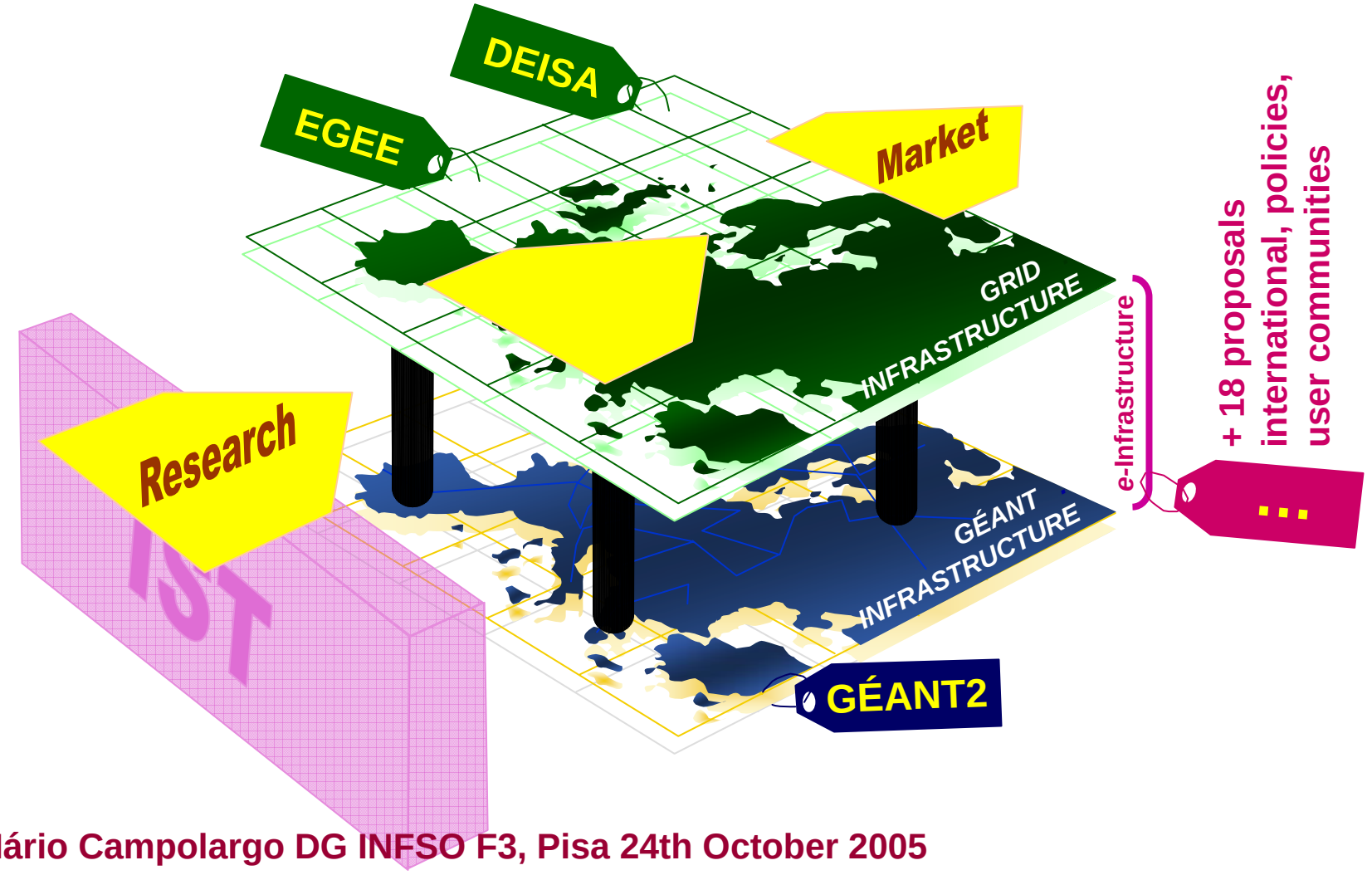
Related projects under negotiation – Aug 2005

Name	Description	Common partners with EGEE
BalticGrid	EGEE extension to Estonia, Latvia, Lithuania	KTH – PSNC – CERN
EELA	EGEE extension to Brazil, Chile, Cuba, Mexico, Argentina	CSIC – UPV – INFN – CERN – LIP – RED.ES
EUChinaGRID	EGEE extension to China	INFN – CERN – DANTE – GARR – GRNET
EUMedGRID	EGEE extension to Malta, Algeria, Morocco, Egypt, Syria, Tunisia, Turkey	INFN – CERN – DANTE – GARR – GRNET – RED.ES
ISSeG	Site security	CERN – CSSI – FZK – CCLRC
eIRGSP	Policies	CERN – GRNET
ETICS	Repository, Testing	CERN – INFN – UWM
ICEAGE	Repository for Training & Education, Schools on Grid Computing	UEDIN – CERN – KTH – SZTAKI
BELIEF	Digital Library of Grid documentation, organisation of workshops, conferences	UWM
BIOINFOGRID	Biomedical	INFN – CNRS
Health-e-Child	Biomedical – Integration of heterogeneous biomedical information for improved healthcare	CERN

Some Successes

- See press release: „EGEE battles malaria with Grid wisdom“ (over 46 million docked ligands)
- See press release: „EGEE makes rapid earth quake analysis possible“ (analysis of large indonesian earth quake 28.03.05 within 30 hours, showed that it was not an aftershock of the tsunami)

Summary



Mário Campolargo DG INFSO F3, Pisa 24th October 2005

Further information

- **EGEE Website**
  http://www.eu-egee.org
- **How to join**
  http://public.eu-egee.org/join/
- **EGEE Project Office**
  project-eu-egee-po@cern.ch
- **Global Grid Forum http://www.gridforum.org/**
- **Globus Alliance http://www.globus.org/**
- **Condor http://www.cs.wisc.edu/condor/**
- **VDT http://www.cs.wisc.edu/vdt/**
- **Open Science Grid http://www.opensciencegrid.org/**
- **Grid Center http://www.grids-center.org/**
- **LCG http://lcg.web.cern.ch/LCG/**