The European Grid Initiative – Rationale for a Sustainable Grid Infrastructure in Europe

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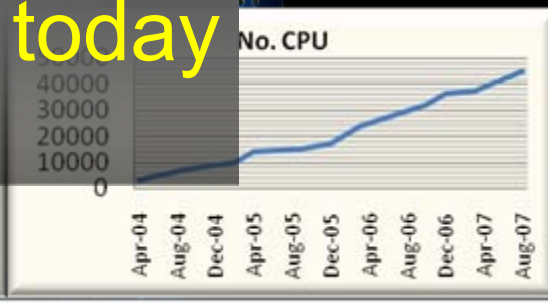
lrz

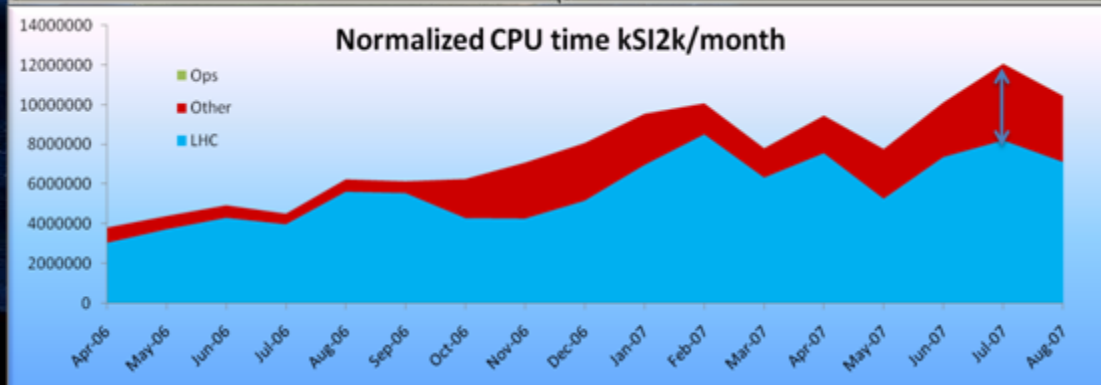
Enabling Grids for E-sciencE

250 Sites
48 Countries
50,000 CPUs
13 PetaBytes
>5000 Users
>200 VOs
>140,000 Jobs/Day

Archeology
Astronomy
Astrophysics
Civil Protection
Comp. Chemistry
Earth Sciences
Finance
Fusion
Geophysics
High Energy Physics
Life Sciences
Multimedia
Material Sciences
...

Production Grids are reality today but …





Today's Challenges

- **Project-based funding**: Typical funding cycles of today's grid infrastructures => 2-4 years
- **Protection of Investment**: Investments in grids, both from funding organizations and from users, need to be protected
- **Dependency**: Some application domains depend on production grids already today
- **Long-term perspective**: Grid users ask for a longer term perspective

Grid Stakeholders Today

on Grids

International Scientific and Research Collaboration

European Commission

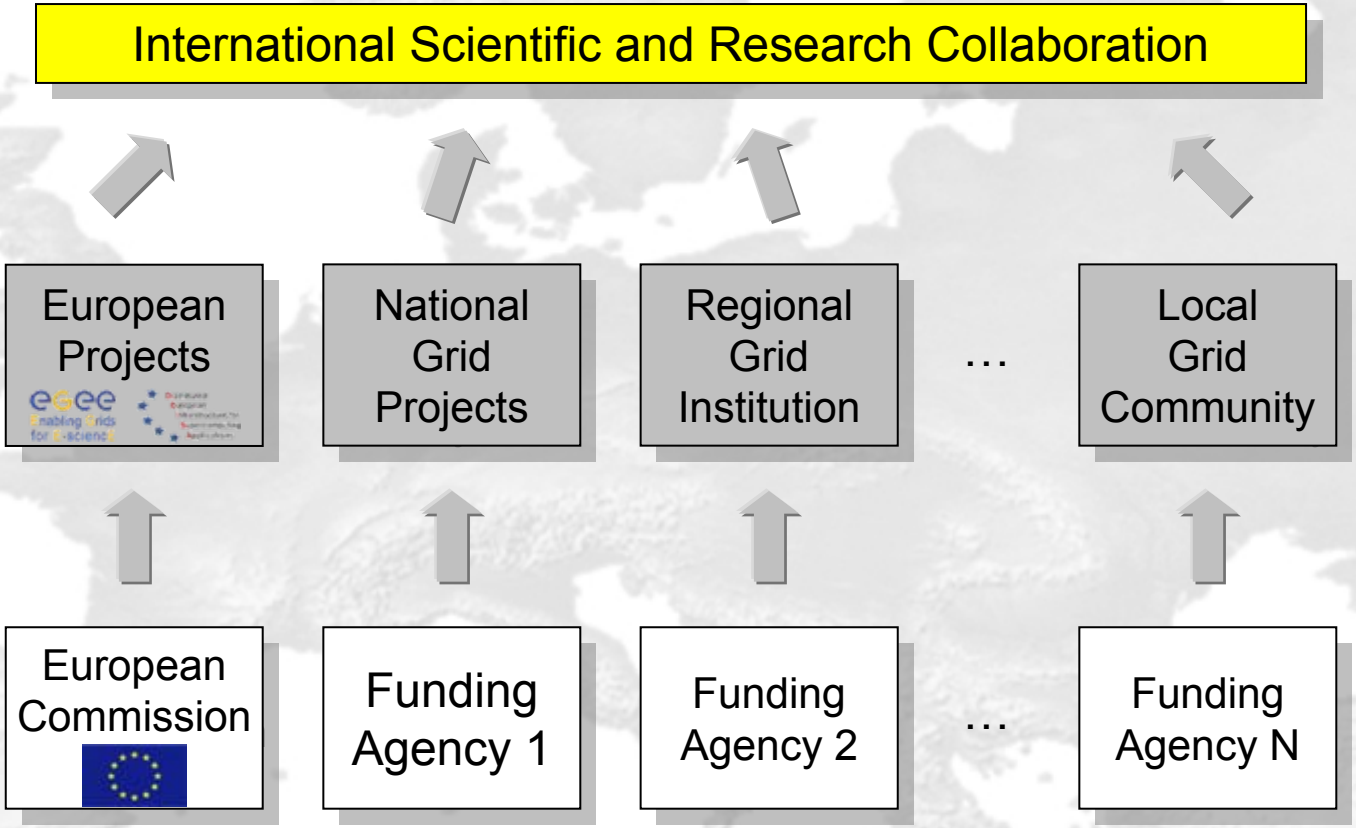
Funding Agency 1

Funding Agency 2

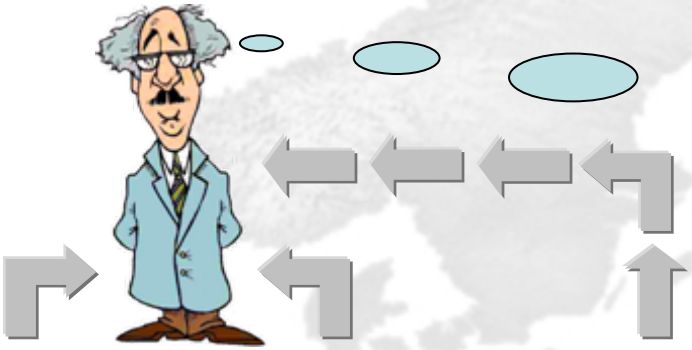
…

Funding Agency N

Grid Stakeholders Today



Grid Users Today



- Dependency
- Protection of Investment
- Long-term Perspective

European Projects

National Grid Projects

Regional Grid Institution

…

Local Grid Community

European Commission

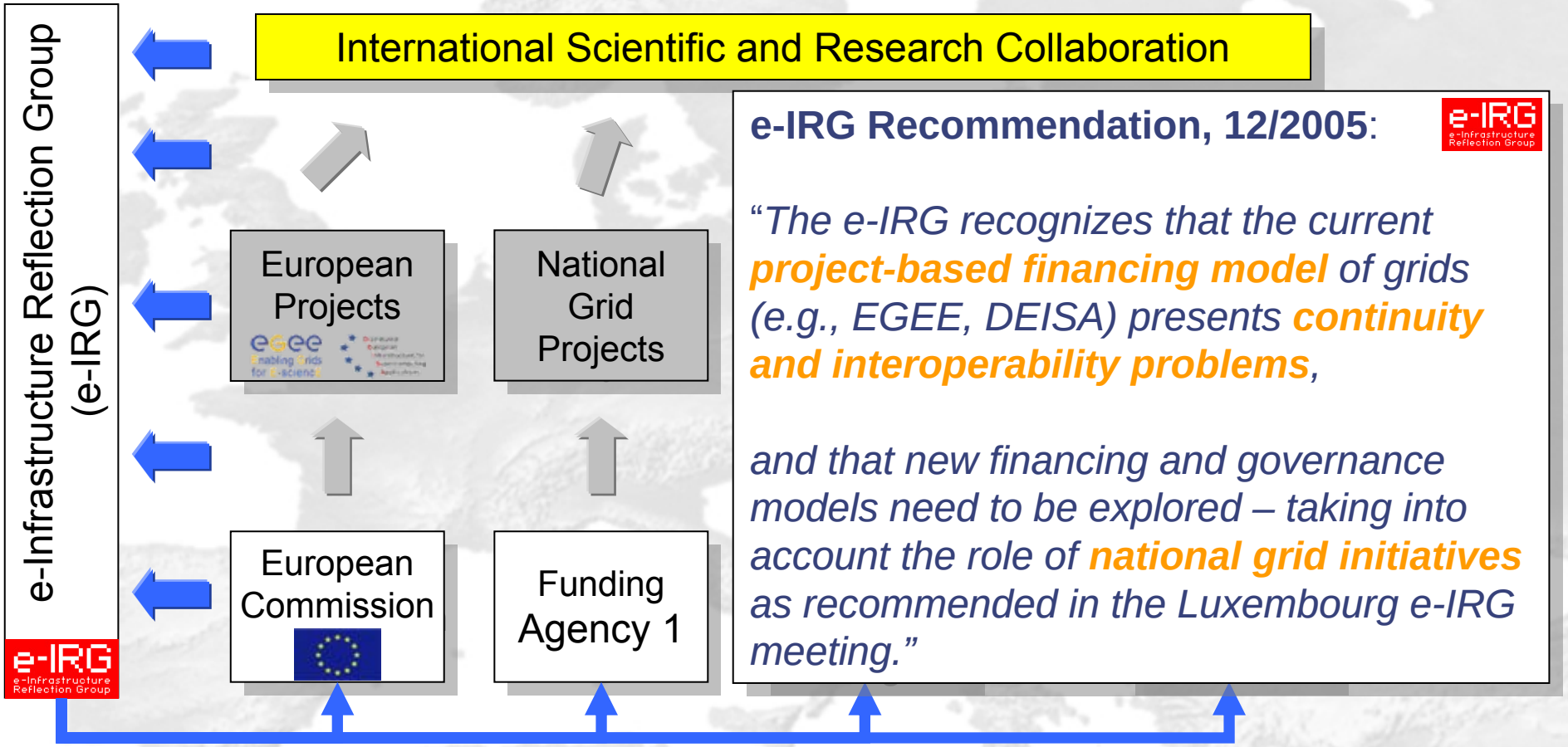
Funding Agency 1

Funding Agency 2

…

Funding Agency N

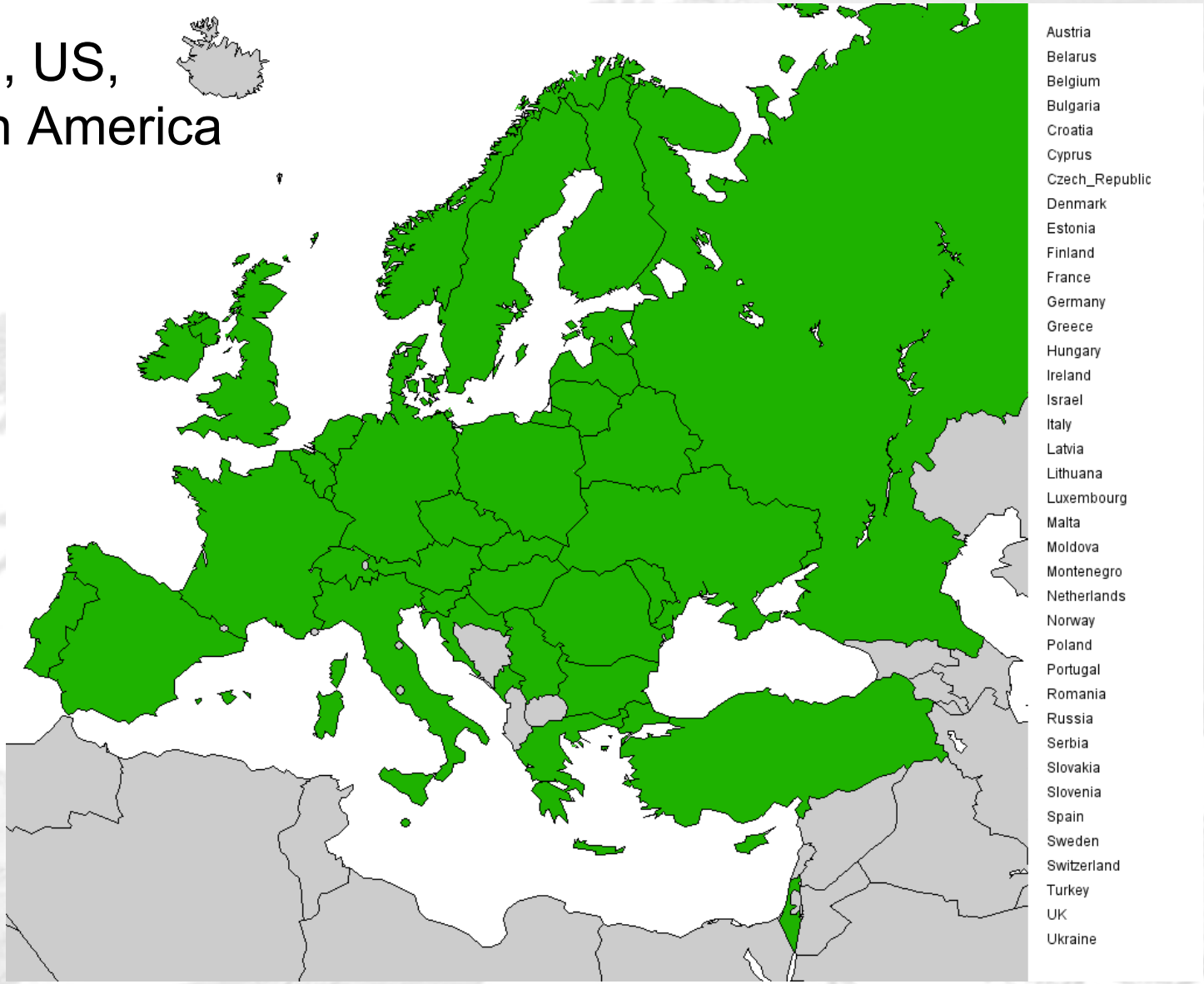
Grid Stakeholders Today



38 European NGIs

+ Asia, US,
  Latin America

+ …



EGI Policy Board

European Grid Initiative

»Towards a sustainable production grid infrastructure«

National Grid Initiatives

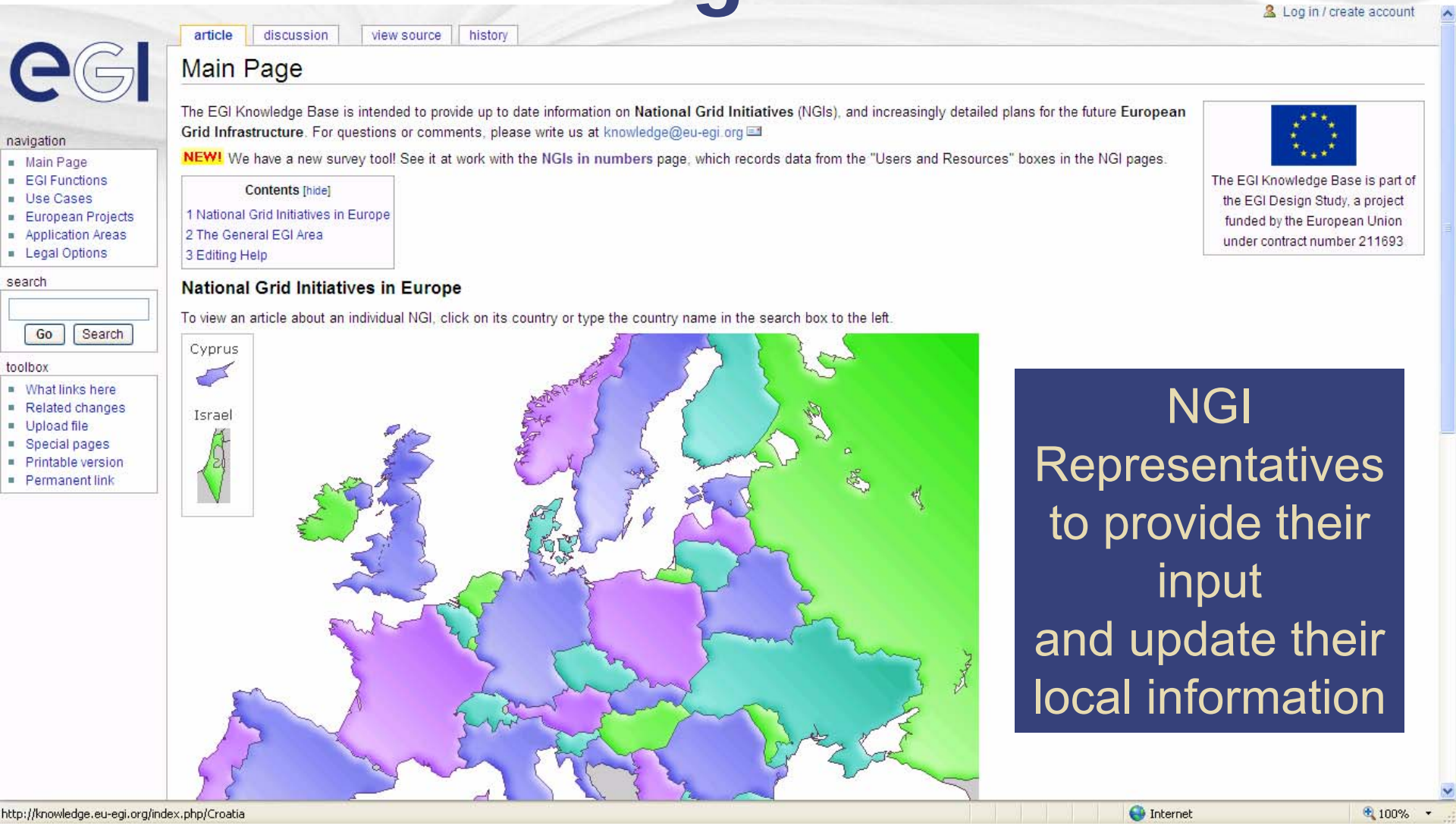
EGI Advisory Board Chairman

Prof. Gaspar Barreira
LIP, Portugal
ab-chair(at)eu-egi.org

EGI Advisory Board

No.	Country	Institution	AB member(s)	Date[1]
1	Austria	GUP, Joh. Kepler University Federal Ministry of Science and Research	Jens Volkert Stefan Hanslik	April 24, 2007
2	Belarus	Research Division of Belarusian National Technical University	Ihar A. Miklashevich	August 15, 2007
3	Belgium	BELNET	Rosette Vandenbroucke	April 16, 2007
4	Bulgaria	Institute for Parallel Processing, Bulgarian Academy of Sciences	Kiril Boyanov	March 6, 2007
5	Croatia	SRCE, University computing centre, University of Zagreb	Ivan Maric	April 13, 2007
6	Cyprus	University of Cyprus, Dept. of Computer Science	Marios Dikaiakos	February 24, 2007
7	Czech Republic	CESNET z.s.p.o.	Ludek Matyska	April 17, 2007
8	Denmark	DCSC - Danish Center for Scientific Computing NDGF - Nordic Data Grid Facility	Rene Belso Michael Gronager	April 27, 2007 March 11, 2008
9	Estonia	NICPB - National Institute for Chemical Physics and Biophysics	Martti Raidal	April 26, 2007
10	Finland	CSC - Scientific Computing Ltd.	Leif Laaksonen	March 5, 2007
11	France	CNRS - Centre National De La Recherche Scientifique	Guy Wormser	April 30, 2007
12	Germany	DFN-Verein - Deutsches Forschungsnetz (on behalf of D-Grid)	Klaus Ullmann	April 10, 2007
13	Greece	GRNET S.A. - Greek Research & Technology Network	Panayiotis Tsanakas Fotis Karagiannis	April 25, 2007
14	Hungary	NIIF - National Information Infrastructure Development Institute	Tamás Máray	April 27, 2007

EGI Knowledge Base - Main



NGI Representatives to provide their input and update their local information

http://knowledge.eu-egi.eu

Polish NGI – PL-Grid

- PL-Grid is a national programme to be funded by the Polish Ministry of Science and Higher Education.
- Formally established on 9 November 2006
- Agreement signed by the 5 largest Polish HPC and Networking Centres:
  - CYFRONET AGH Academic Computer Centre, Krakow (chair)
  - ICM UW Interdisciplinary Centre for Mathematical and Computational MOdelling, Warsaw University
  - PSNC Poznań Supercomputing and Networking Centre
  - WCSS Wrocław Centre for Networking and Supercomputing of the Wrocław University of Technology
  - Gdansk Academic Computer Centre TASK

Poland

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Poland

NGI Full Name: PL-Grid

Acronym:

URL: http://plgrid.pl

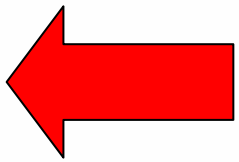
Users and Resources

Number of **users** with valid Grid Certificate:	400+
Number of **sites** (Resource Centres):	5 biggest HPC centres
Number of **CPUs**:	2000+
Total **storage** (in TB):	800+

EGI Functions: Current Rating [edit]

Functions proposed in survey of late 2006 [edit]

Coordination of infrastructure operations	Very Important
Testing, certification and validation service including middleware	Quite Important
Managed resource centers to provide initial resources for new user communities	Not Important
Coordination of user and application support	Quite Important
Coordination of dissemination and training efforts	Quite Important
Representation of European Grid efforts on standards bodies	Quite Important
Representation of European Grid efforts with similar bodies from other continents	Very Important



Grids in Europe

www.eu-egi.eu

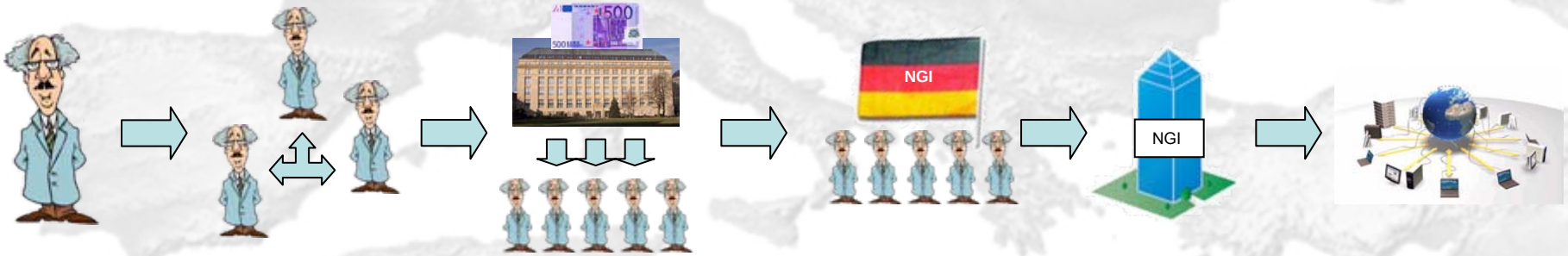
Each NGI

… should be a recognized national body
with a **single point-of-contact**
… should mobilize national funding and resources
… should ensure the operation of a national e-Infrastructure
… should support user communities
… should contribute and adhere to intl. standards and policies

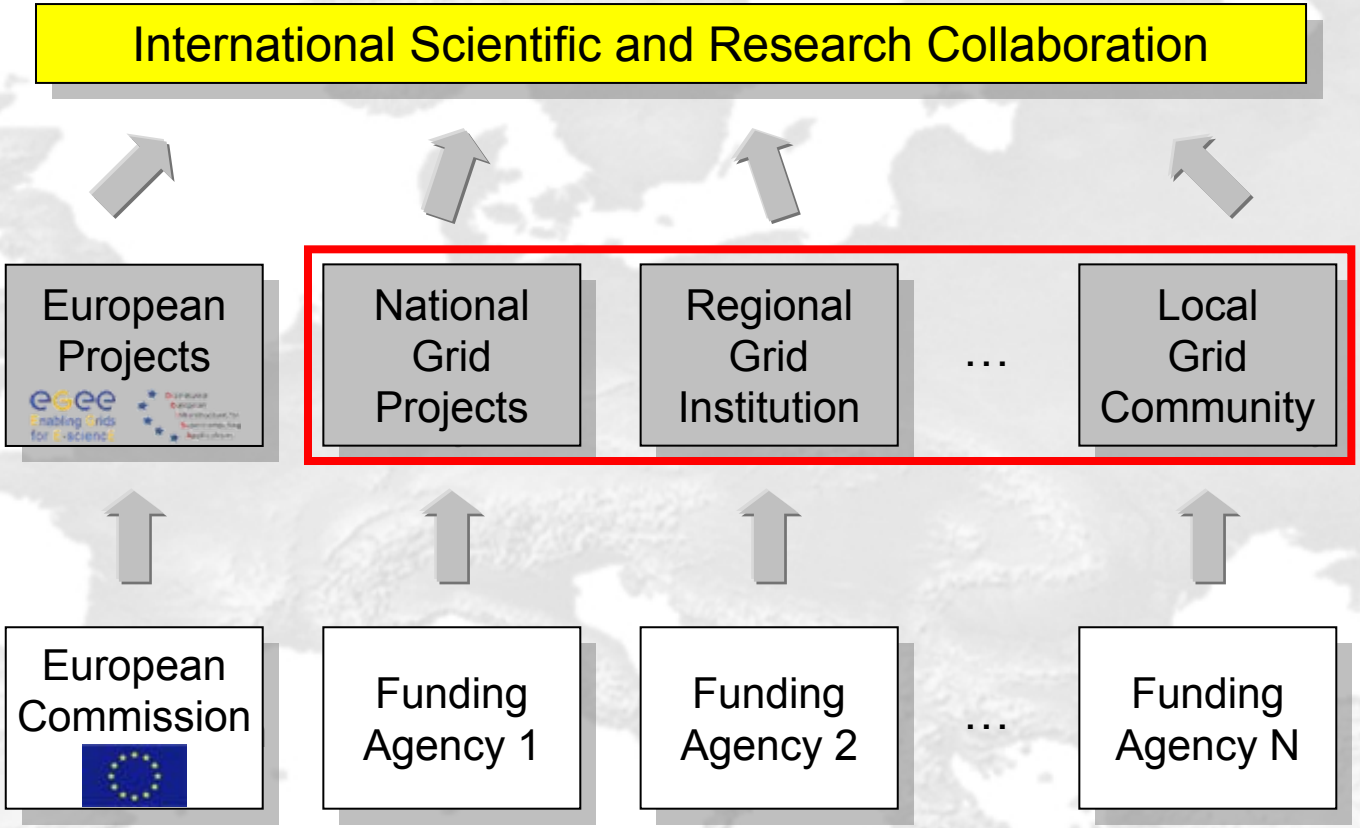
Evolution of NGIs

- Individual
- Group of people
- Project funding
- National initiative
- Legal entity
- National infrastructure

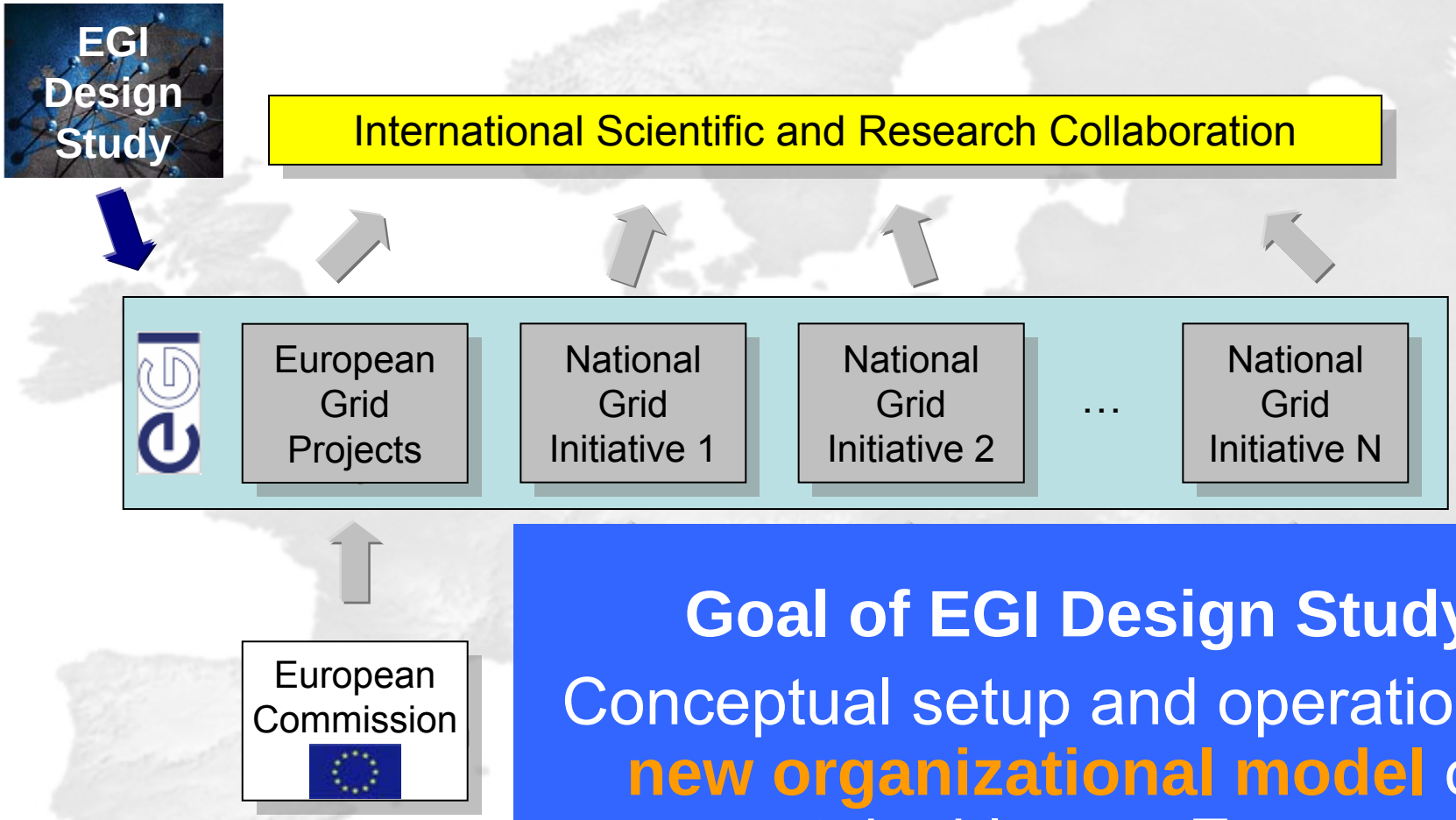
- Single resources
- Institutional resources
- Project resources
- National resources



Grid Stakeholders Today



Future Grid Stakeholders



Goal of EGI Design Study:

Conceptual setup and operation of a **new organizational model** of a sustainable pan-European **grid infrastructure**

EGI Model

- **NGIs**
  - ensure the operations of grids in each country
  - constitute the EGI Council, the governing body of EGI
- **EGI.org**
  - central coordination part
  - the “glue” between the NGIs to link existing NGIs and to support evolution of NGIs

EGI_DS Deliverables

- D4.3 **Guidelines for NG**
  - How to set up an NG
  - Minimum require
- D4.4 **EGI P** **osal**
  - Struc nancing of EGI
- D3. **ions Definition**
  - Deta ictional description of EGI

Please provide your input
http://www.eu-egi.eu
contact@eu-egi.eu

Objectives of EGI

- **Ensure** the **long-term sustainability** of the European e-infrastructure
- **Coordinate** the integration and interaction between national grid infrastructures
- **Operate** the European level of the production grid infrastructure for a wide range of scientific disciplines to link national grid infrastructures

EGI Grid Infrastructure

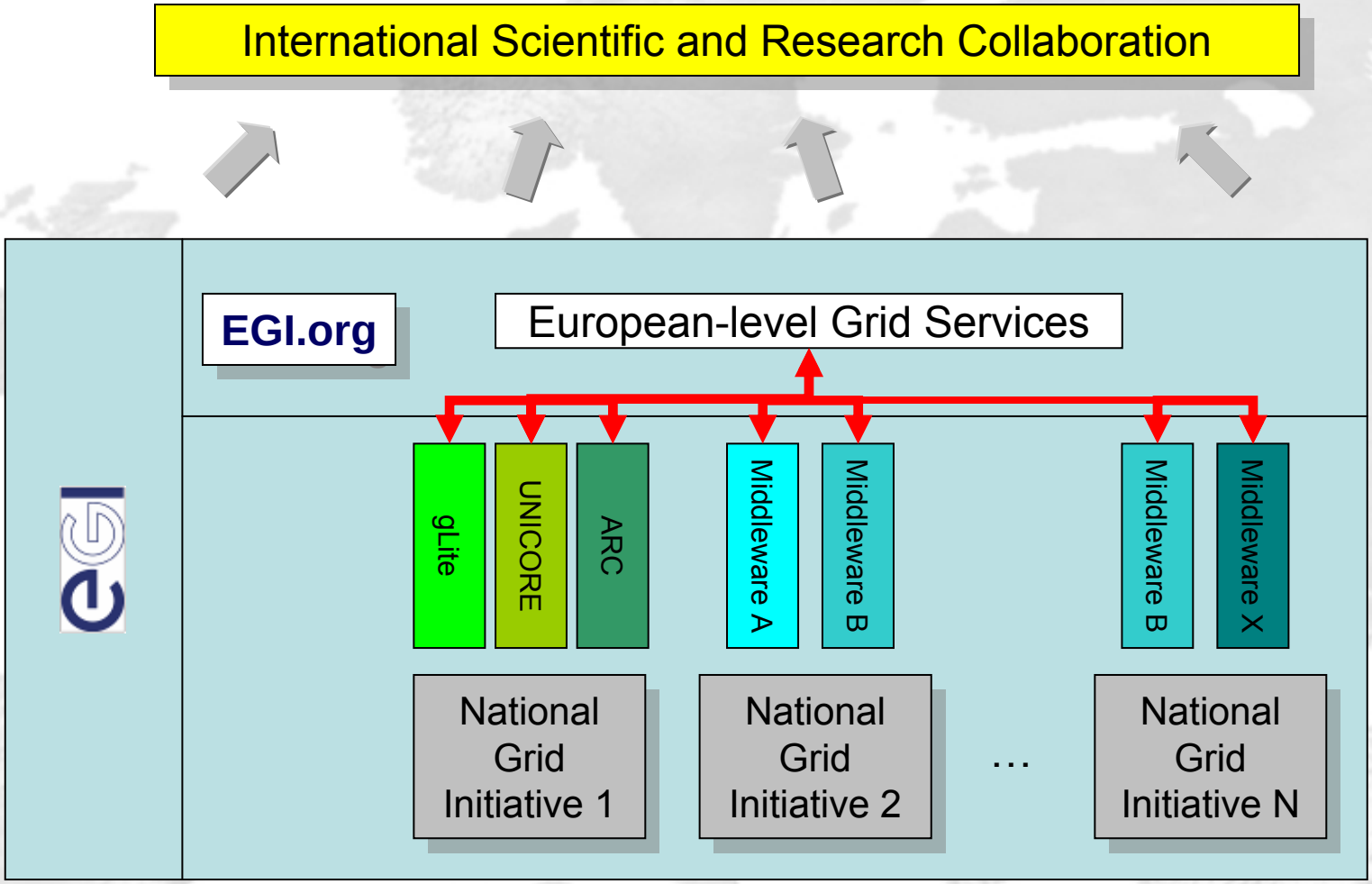
… should be

- a large-scale, **production Grid** infrastructure
- built on national grids that **interoperate** seamlessly at many levels,
- offering **reliable and predictable services** to a **wide range of applications**

Tasks within EGI

- Authentication of users
- Allocation of users to virtual organizations
- Allocation of computing resources
- Authorization of VOs to run jobs, …
- Distribution and scheduling of jobs, …
- Monitoring of submitted jobs, …
- Accounting of users and VOs
- Reporting usage allocation to NGIs
- Other centrally coordinated functions

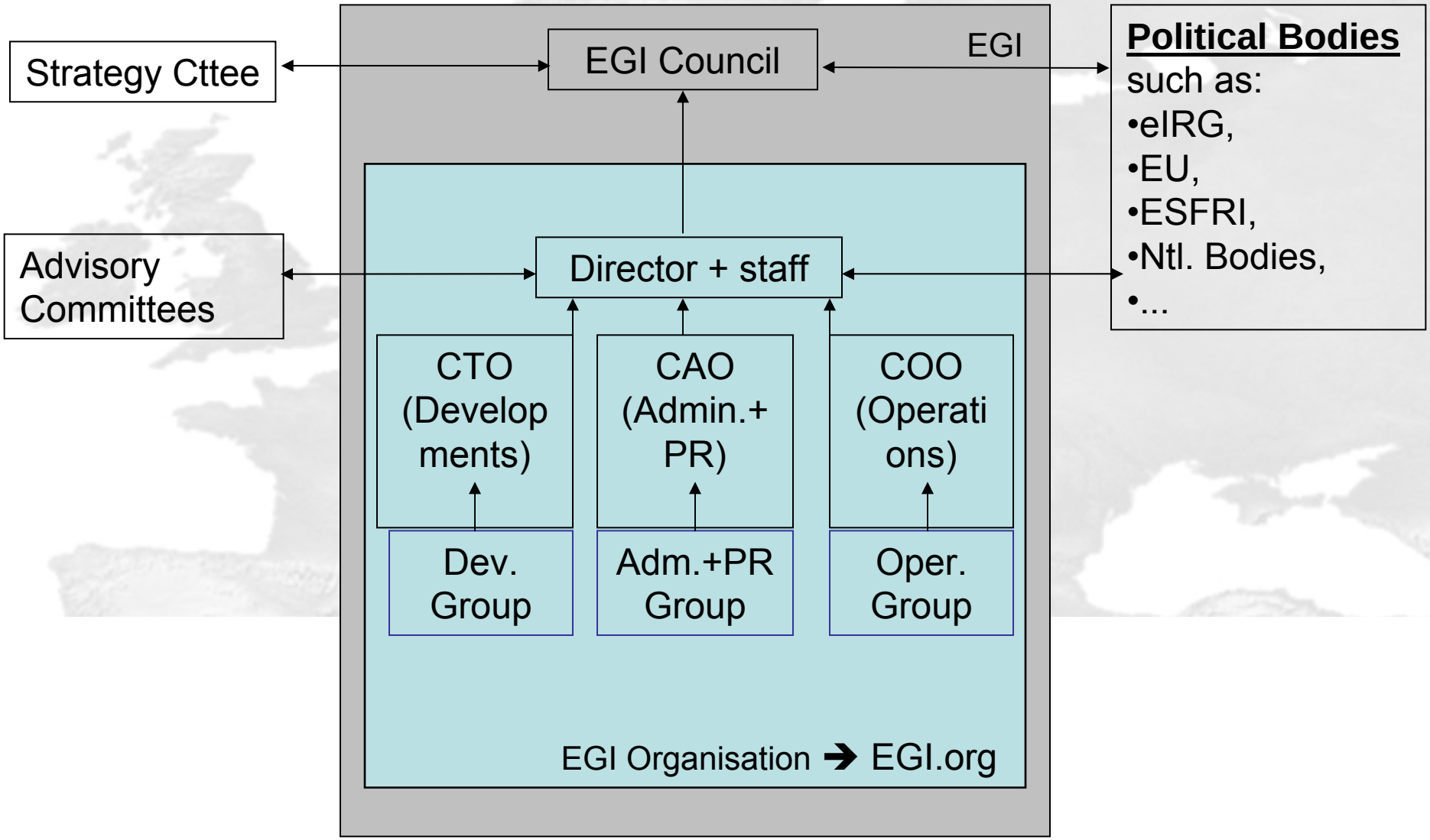
EGI Infrastructure



EGI Organization = EGI.org

- **EGI.org** does not directly own any grid infrastructure
- **EGI.org** provides central functions for
  - Management
  - Operation of the grid infrastructure
  - Middleware interfaces and certification
  - User support and application development

EGI Management Structure



External Liaison Function

- **Dissemination and outreach**:
  Content production and coordination activities
- **Other external relations**:
  - Grids outside Europe
  - Commercial grids
  - Large-scale international research collaborations
  - Networking organizations
  - Policy and standard shaping bodies
  - Private sectors

EGI Organization = EGI.org

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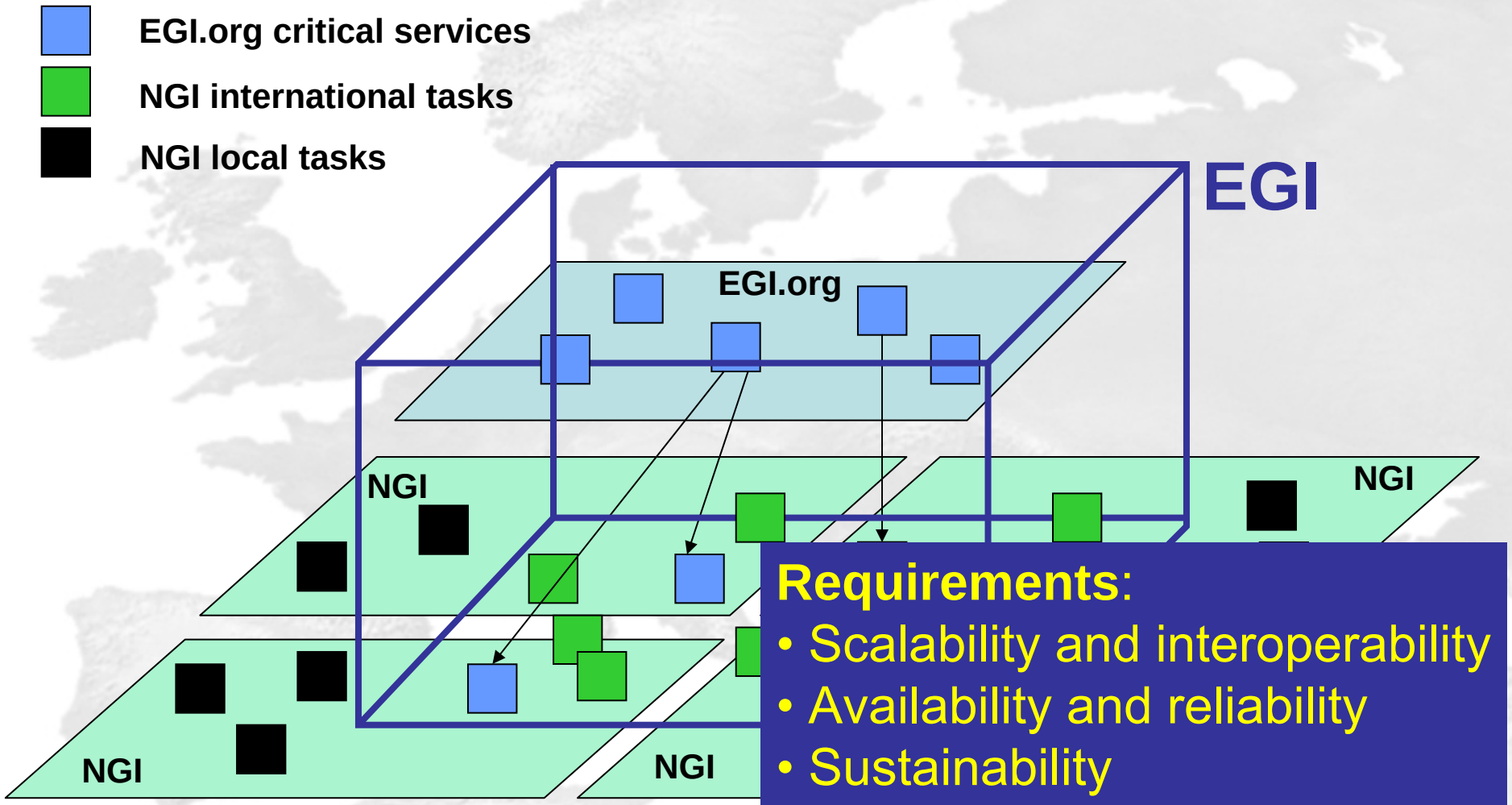
EGI Operations =
EGI.org critical services + NGI international tasks



Requirements:
- Scalability and interoperability
- Availability and reliability
- Sustainability
- Autonomy of NGIs

EGI Operations Tasks

Operation of tools and services
- Grid configuration repositories
- Grid accounting repositories
- Grid repositories for SLA compliance and performance monitoring
- Grid operations portal
- NGI Grid oversight

Security
- Security policy development and maintenance
- Coordination of security and incident response
- Expert team for security vulnerabilities

User support
- Central ticket handling system
- Gathering requirements for user support tools

Other international tasks
- MW deployment/roll-out and support
- Resource allocation&brokering support
- Interoperations between NGI's and with other grids
- Network support
- Definition of best practises, procedures, requirements
- Catch-all production grid core services

EGI Organization = EGI.org

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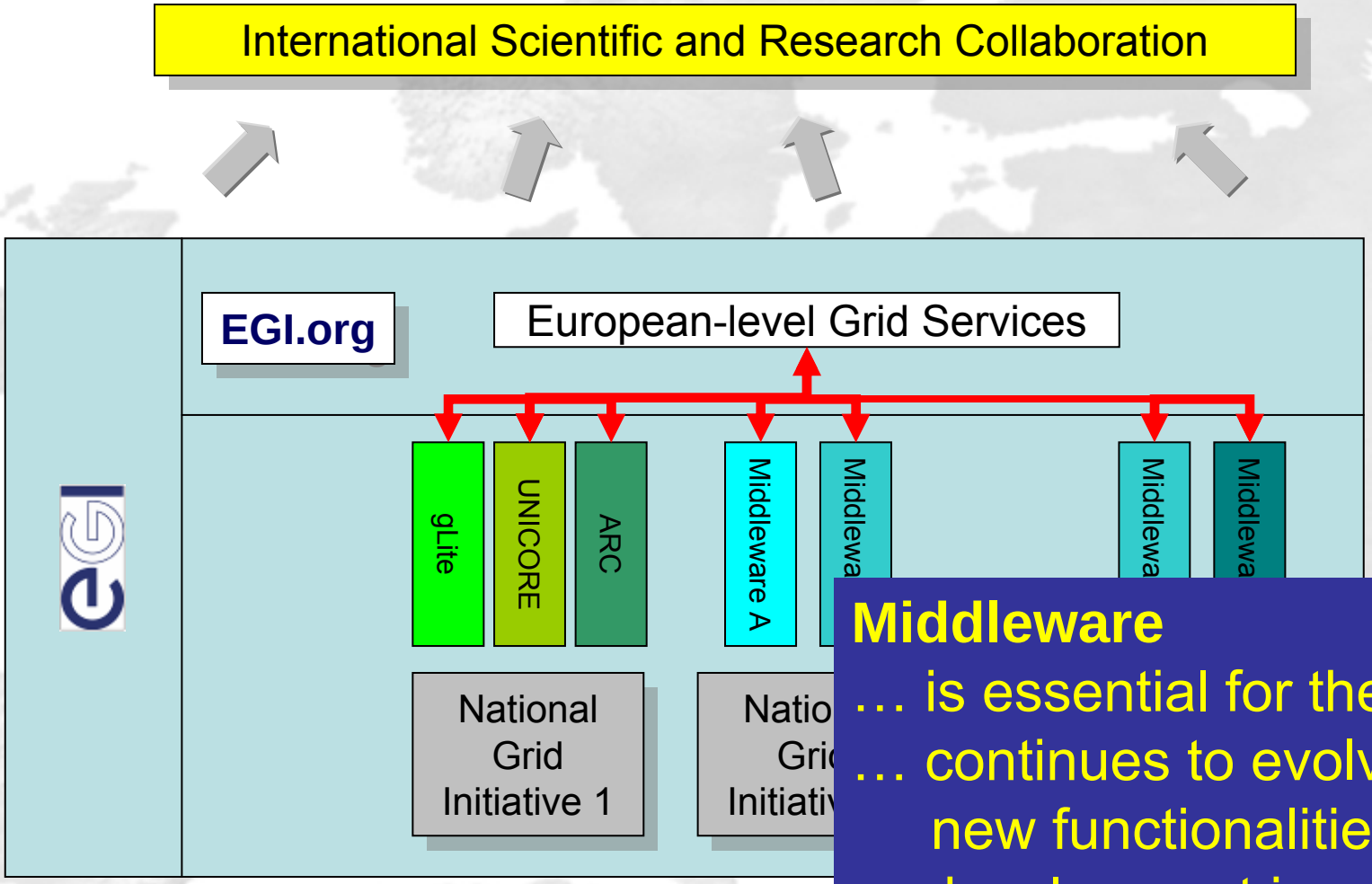
EGI Infrastructure



Middleware

… is essential for the grid

… continues to evolve with new functionalities

… development is a long-term process

EGI Middleware

EGI.org

- should ensure continuity
- should steer the process of providing the necessary requirements and feedback to the middleware developers
- should certify selected components
- should promote interaction with standardization bodies

Role of EGI.org in Middleware

- Central technical coordination by EGI.org middleware unit (led by CTO)
- **Objectives**: EGI middleware
  - Procurement
  - Maintenance
  - Support
  - Certification
  - Establishment of common requirements for interoperability and new developments
- No development of middleware within EGI.org

UMD (Universal Middleware Distribution):
A proposal from ARC, gLite, and UNICORE consortia to foster convergence of current MW stacks

EGI Organization = EGI.org

- **EGI.org** provides central functions for
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EGI Application Support & Training

- Goal: To provide significant added value for existing and new applications

EGI.org:

- Provides overall coordination point for application support and community building
  - Event organization
  - Services for new communities
  - Coordination of SSC interfacing activities
  - Grid planning
  - Training tasks

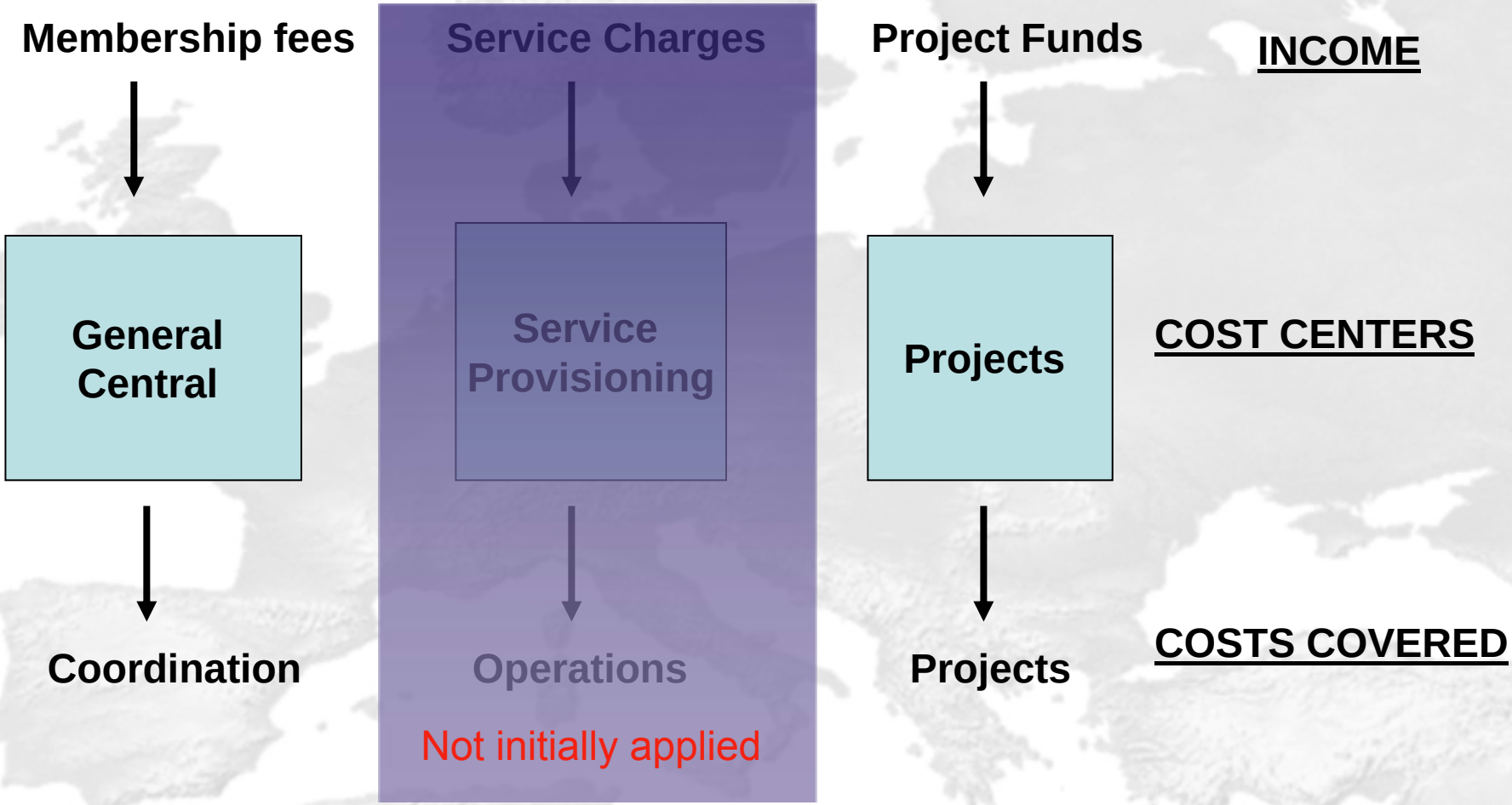
SSC – Specialized Support Centres

- Evolutionary entities to provide continued support for current and new projects
  - Reducing the load on EGI.org
  - Allowing NGIs to support their interests
  - Hosted by the NGIs close to the user
  - Manpower provided by NGIs with EC co-funding
  - Formation of SSC carried out under assessment by EGI governing bodies

EGI Organization = EGI.org

- **EGI.org** provides central functions for
  - Management ✓
  - Operation of the grid infrastructure ✓
  - Middleware interfaces and certification ✓
  - User support and application development ✓

EGI Funding Model



EGI Financing

3 Sources:

- National funding of national grid infrastructure and resources
- EC funding ensuring coherence across NGIs to create the European grid infrastructure
- Project oriented funding, focused on short-term specific goals

Estimate:

- 90 MEuro/year for 900 FTEs
  (incl. less 5 MEuro/year for EGI.org)

Resources for EGI.org

Costs for	EGI.org Costs (in FTE/a)
Operations	17
Middleware interfaces and final certification	8
Application Support and training	12
External functions	4
EGI.org Management and Administration	10
Total	**51**

For details see EGI Blueprint Proposal
http://www.eu-egi.eu/blueprint.pdf

EGI – European Grid Initiative

- **EGI** consists of NGIs + EGI.org
- **EGI.org** represents the **"Glue"** between various grid communities in Europe and beyond

Evolution

EGI is not a simple continuation of EGEE, but should offer a possible solution for all European Grid infrastructure projects to achieve sustainability

EGI – European Grid Initiative

- **EGI** consists of NGIs + EGI.org
- **EGI.org** represents the **“Glue”** between various grid communities in Europe and beyond
- **Your input** is required to define **mechanisms and functionalities** of EGI

Consensus is only possible
if **compromises** are made

http://www.eu-egi.eu

contact@eu-egi.eu