

e-IRG Workshop
Zurich, 24-25 April 2008

e-Infrastructures fostering the building of Global Virtual Research Communities

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European Commission
Information Society and Media

Political context



EU Council Spring 2008 – economic outlook

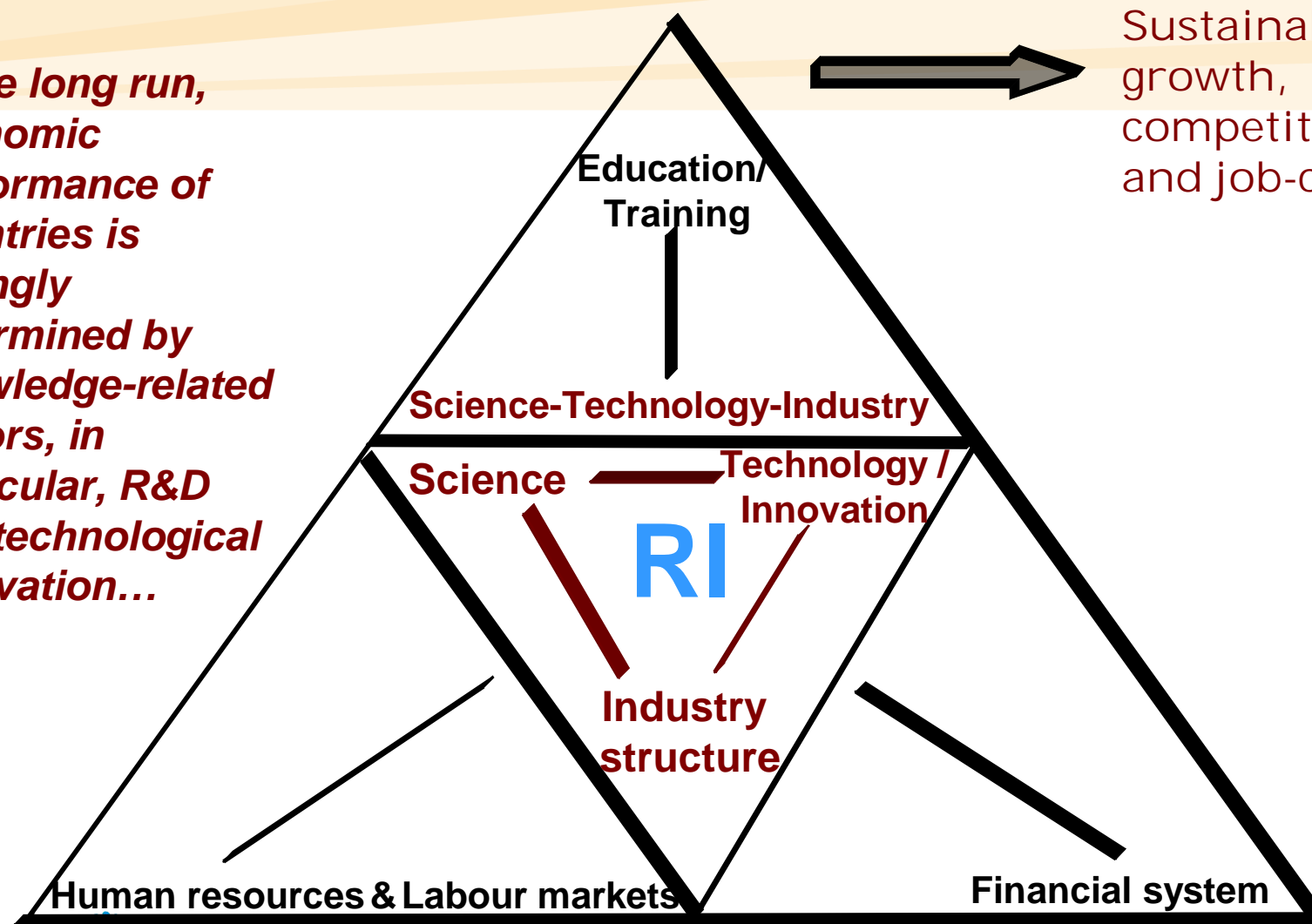
- Fundamentals of EU economy sound:
 - public deficits more than halved since 2005
 - public debt declined to just under 60%.
 - Economic growth reached 2,9% in 2007 (but likely to be lower this year)
 - 6,5 million jobs created in the last two years
- However, global economic outlook deteriorated recently (slowdown economic activity in US, higher oil & commodity prices, ongoing turbulence on financial markets)
- Essential for EU to sustain reform efforts:
 - complete and deepen internal market
 - Economic & financial policies to be geared towards ensuring macro-economic stability; further improve supervisory & regulatory environment at national, EU & global level
 - Address challenges like ageing populations, climate change and energy

EU Council Spring 2008 - political agenda

- Launching of 2008-2010 cycle of Lisbon Strategy for growth and jobs - four priority areas:
 - investing in people and modernising labour markets;
 - unlocking business potential;
 - investing in knowledge and innovation;
 - energy and climate change
- Focus on implementation measures on:
 - “Fifth freedom” – removing barriers to free movement of knowledge
 - Small Business Act
 - Flexicurity, lifelong learning
 - Climate and energy: unbundling internal energy market, greenhouse gas reductions, new emissions trading scheme, renewable energies

Science, Technology & Innovation system

*In the long run,
economic
performance of
countries is
strongly
determined by
knowledge-related
factors, in
particular, R&D
and technological
innovation...*



Sustainable
growth,
competitiveness,
and job-creation

References to RI /e-Infrastructure

EU Council, Spring 2008

- Scientific e-infrastructure and high-speed internet usage must be significantly increased
- Particular attention should be given to further initiatives for joint programming of research, mutually complementary international S&T cooperation strategies and the strengthening of research infrastructure of pan-European interest

EU Council, Dec 2007

- CALLS on Member States to engage more actively in the implementation of pan-European research infrastructures

References to RI /e-Infrastructure

EU Competitiveness Council, Nov 2007

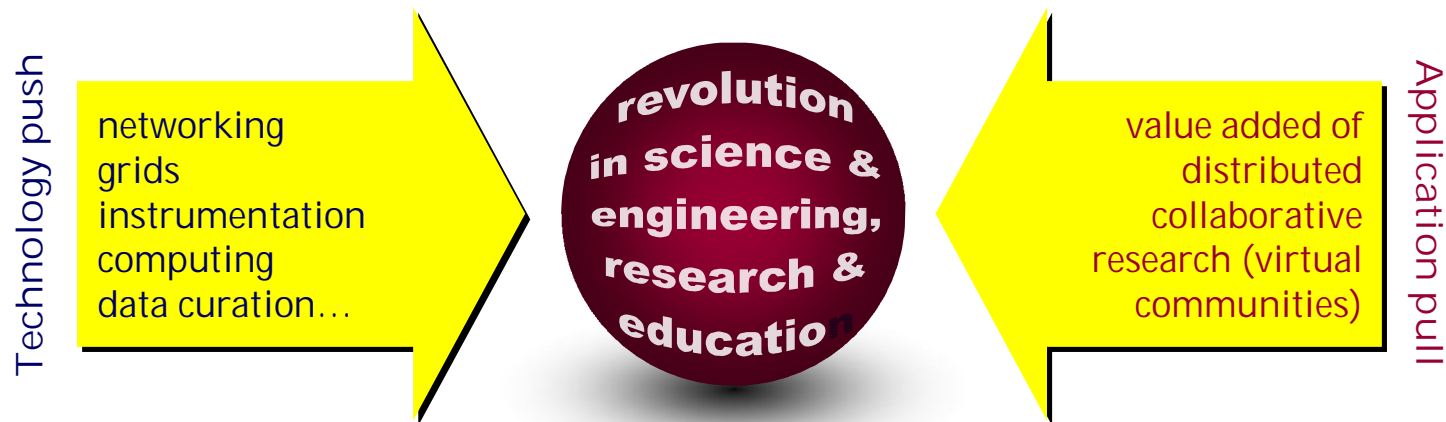
- INVITES Member States to encourage public and private research institutions to make full use of the emerging distributed forms of research activity (namely eScience) based upon international research networks made possible by the availability and world-class unique quality of distributed European network infrastructures like GEANT and GRID
- INVITES co-funding of research infrastructures, in particular by linking digital repositories at European level and co-funding research on digital preservation within FP7; supporting experiments with open access with a clear cross-border added value
- INVITES Member States, with support from the Commission where appropriate, to develop and strengthen their national roadmaps and strategies on RI taking into account a long-term vision of European science and the work undertaken by the ESFRI and considering, when appropriate, an efficient use of the structural funds to this objective



e-Infrastructure - Drivers and Vision

Science in 21st century

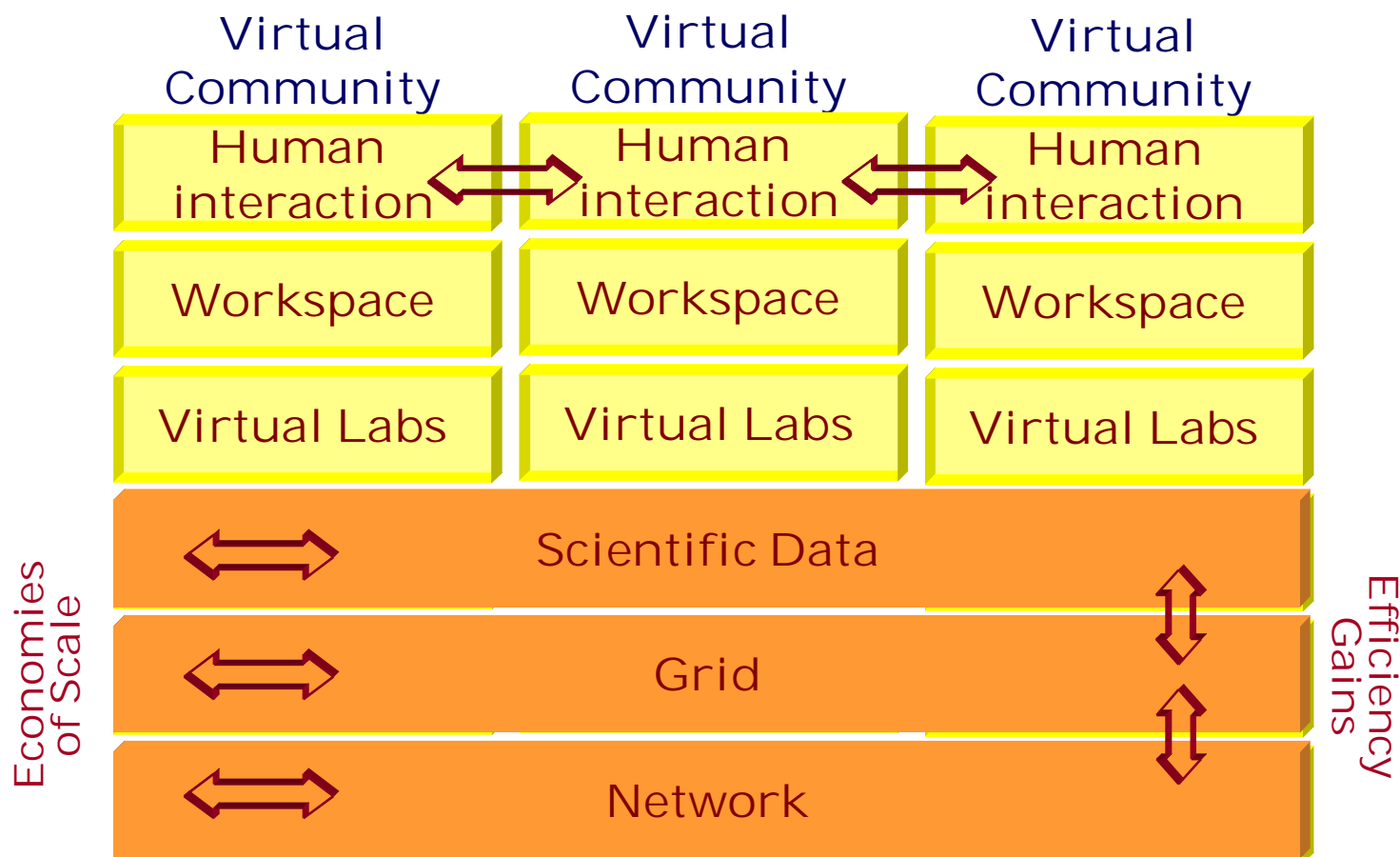
- Global challenges with high societal impact - important role of collaboration/globalisation in research
- Data deluge...
- Need of new scientific process - enabling role of technology
- Cross-disciplinarity, distributed versus centralised, virtual-labs versus wet-labs
- Building of global virtual research communities



Global Virtual Research Communities

Research Community-1	Research Community-2	Research Community-3
Human interaction	Human interaction	Human interaction
Workspace	Workspace	Workspace
Labs	Labs	Labs
Scientific Data	Scientific Data	Scientific Data
Computing, Grid	Computing, Grid	Computing, Grid
Network	Network	Network

Global Virtual Research Communities



ICT for Science: e-Infrastructures

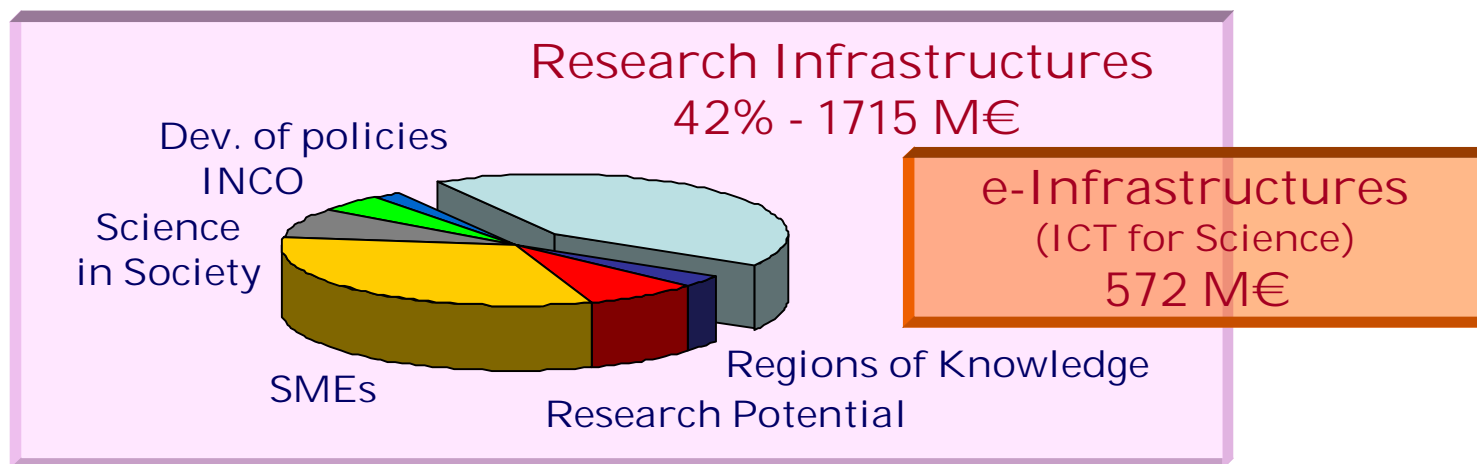
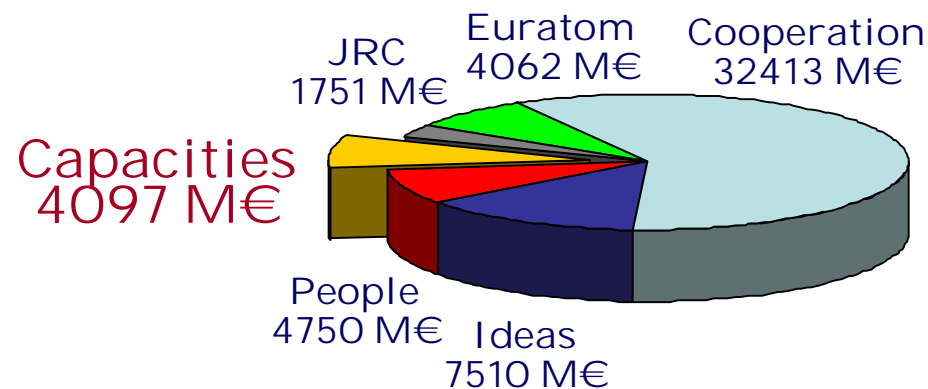
- *main concepts and principles* -

Connecting the finest minds
Sharing and federating the best scientific resources
Building global virtual communities

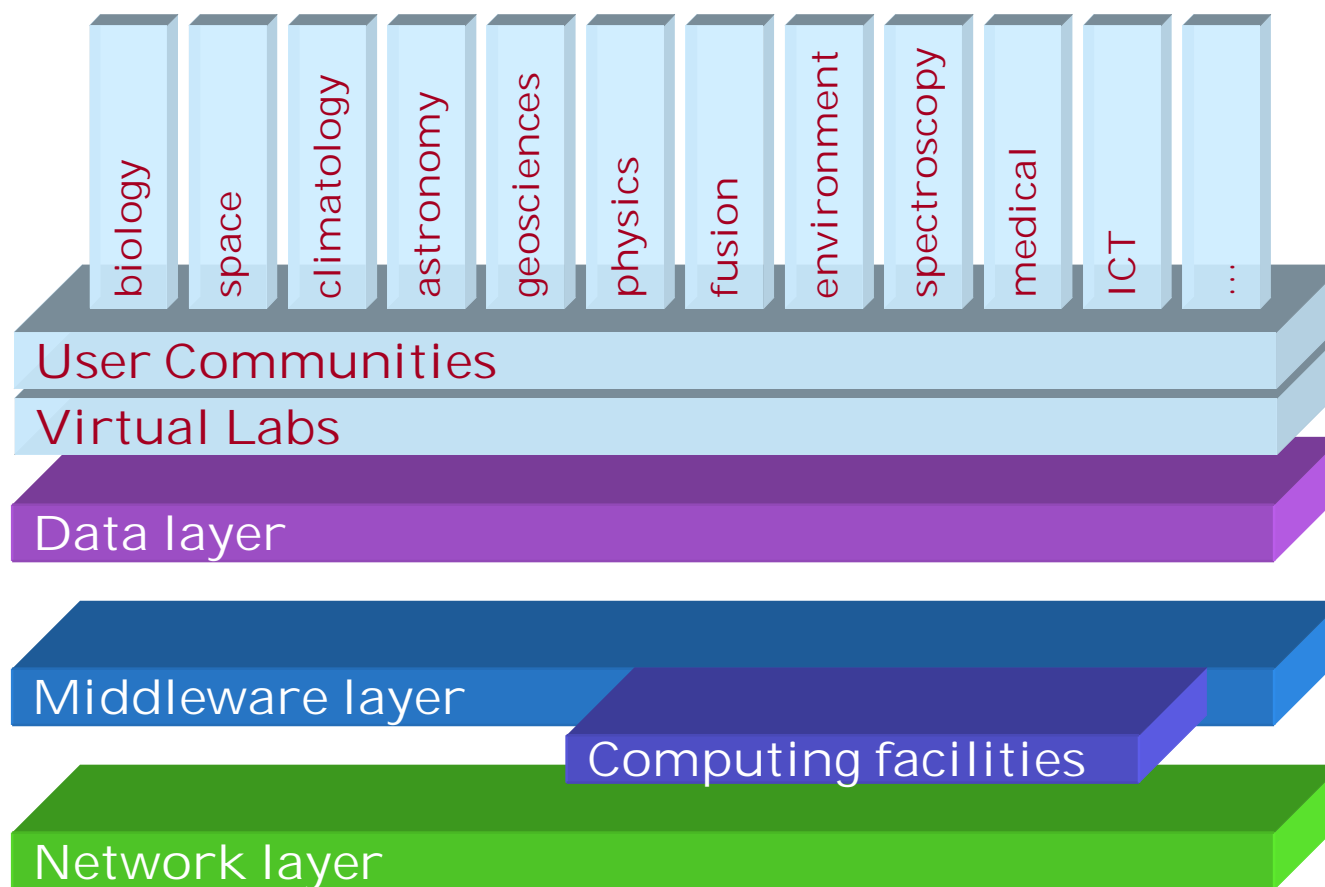


e-Infrastructures in FP7

Framework Programme 7 (2007-13)



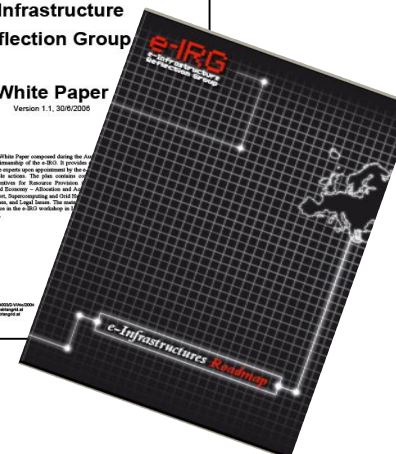
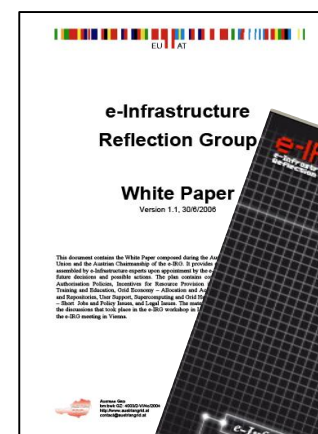
e-Infrastructure: main building blocks



Relevant policy bodies

European Strategy Forum
on Research Infrastructures

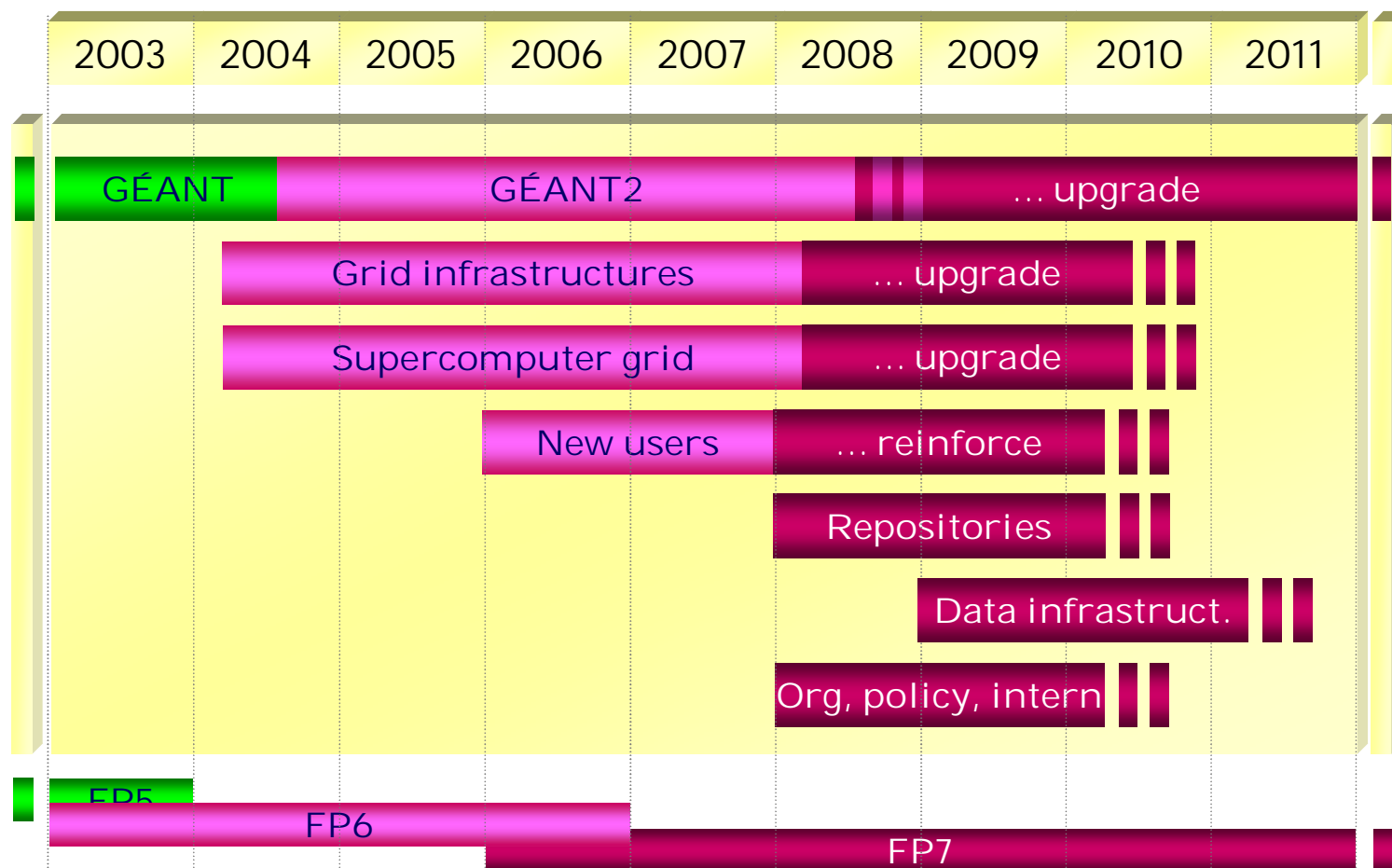
ESFRI



European Commission
Information Society and Media



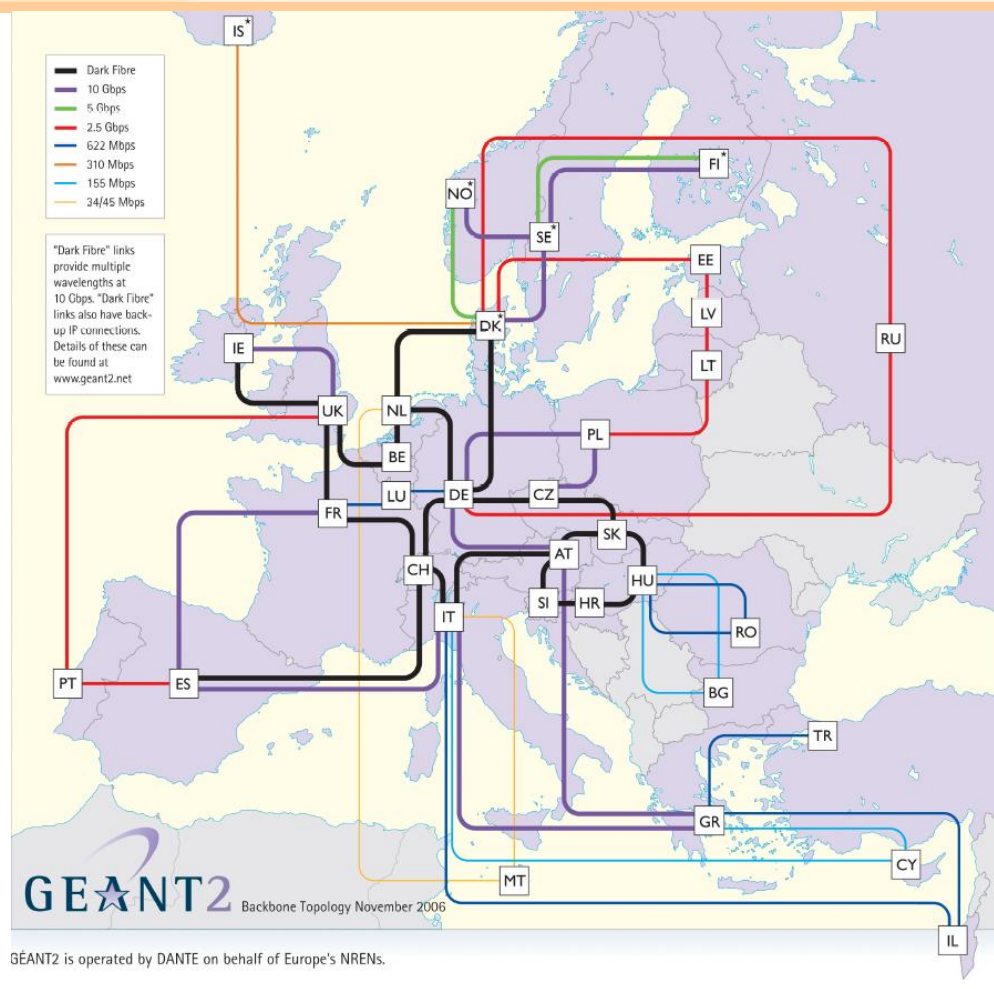
e-Infrastructure: evolving approach



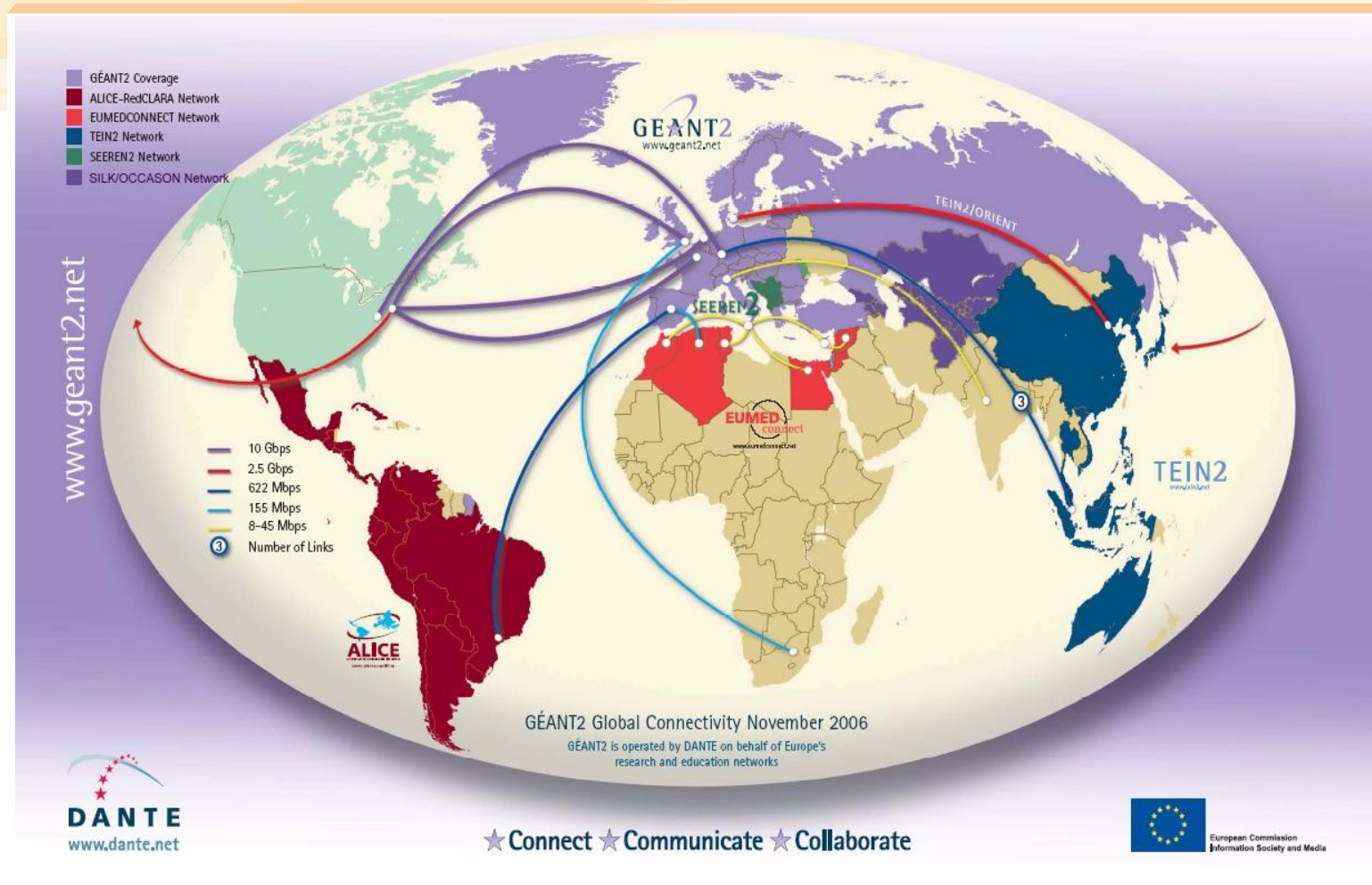
Examples of e-Infrastructure initiatives

GÉANT: connecting Europe

- Pan-European coverage
(40+ countries / 3900 universities / 30+ million students)
- Hybrid architecture:
 - connectivity at 10 Gb/s (aggregated traffic)
 - dark fiber wavelengths (demanding communities)



GÉANT: global reach



EGEE: large multi-science grids

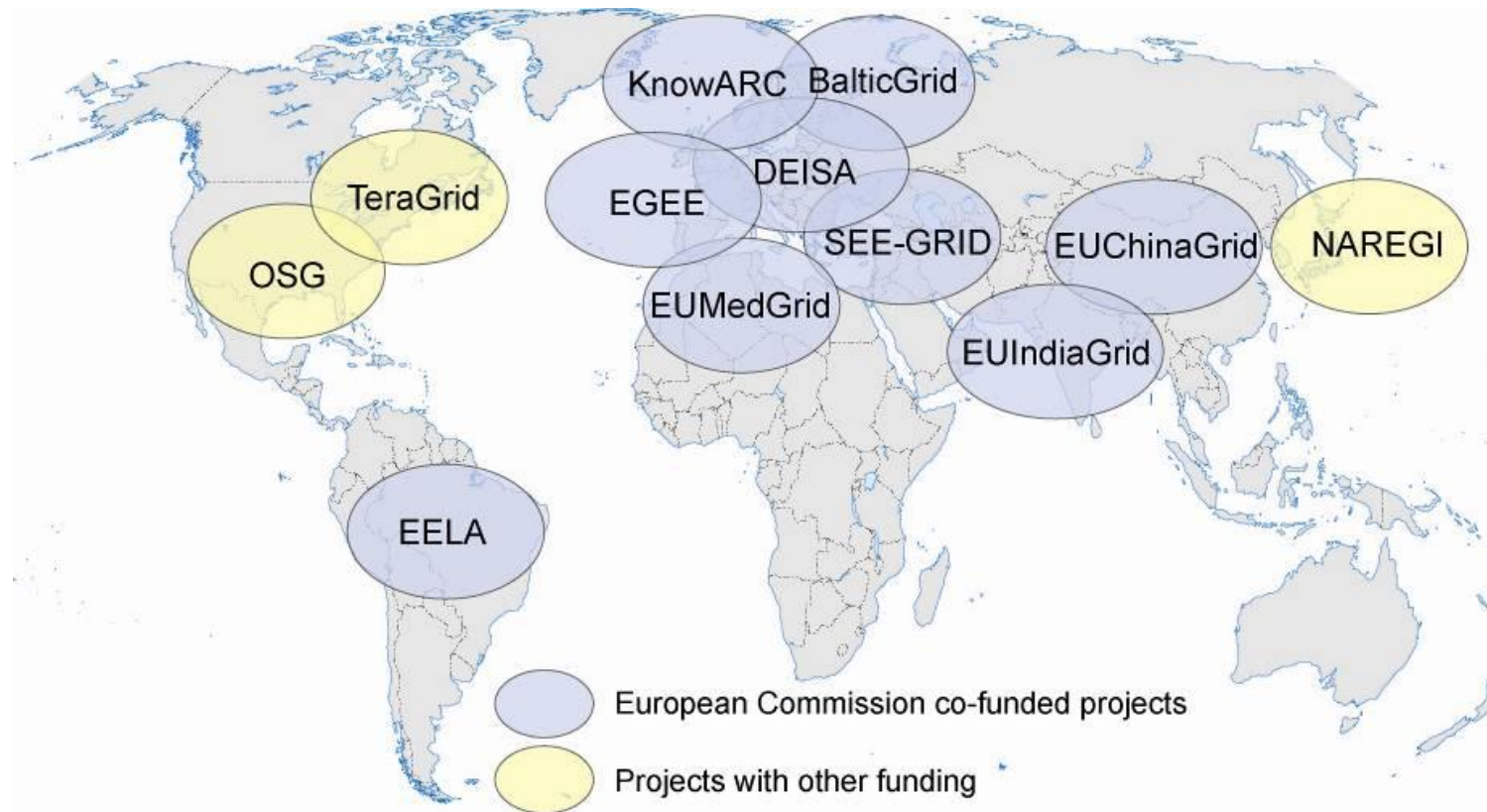
eGEE
Enabling Grids
for E-science

Scheduled = 17356
Running = 18359

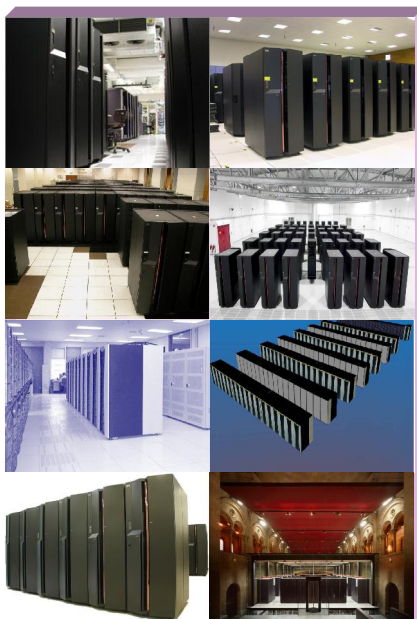
- >240 sites
- >37 000 CPUs, 15 Pbyte of storage
- ~100 000 jobs successfully completed per day
- 200 Virtual Organisations
- >2000 registered users, representing 1000s of scientists

European Commission
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EGEE: promoting interoperability



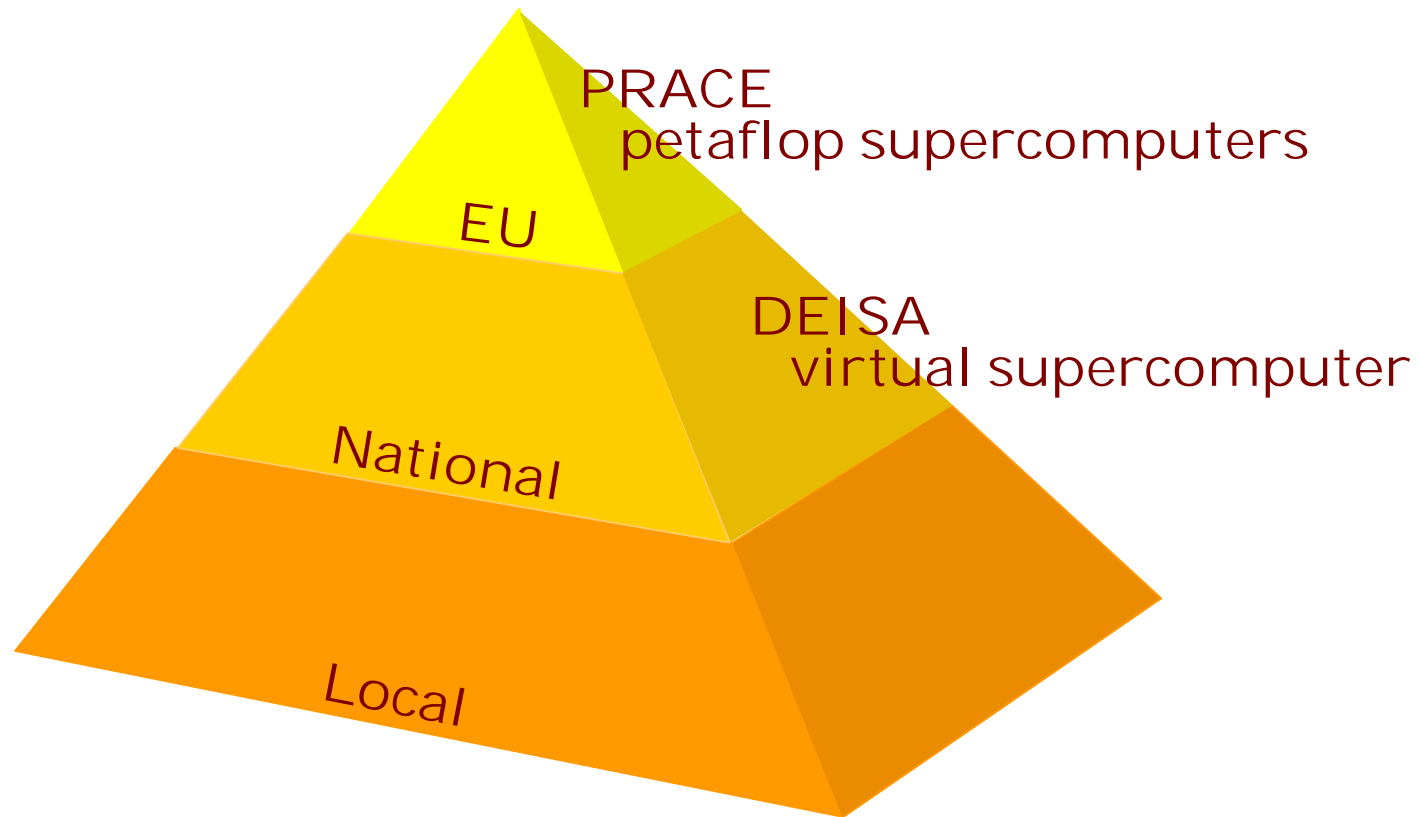
DEISA: virtual HPC services



- 11 sites in 7 countries connected at 10 Gb/s
- Over 22,000 CPUs sporting 200 TFlop
- Running larger parallel applications in individual sites
- Enabling workflow applications with grid technologies
- Providing a global data management service
- Extreme Computing Initiative



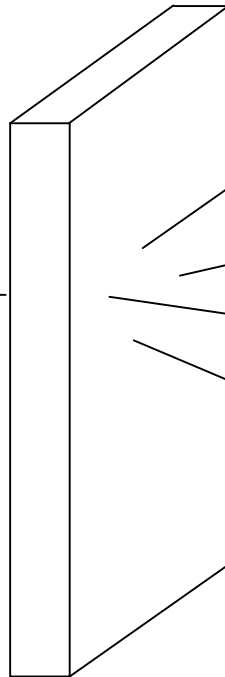
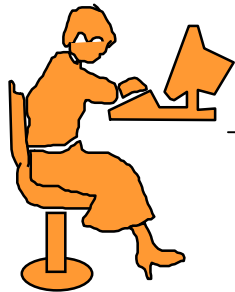
new “petaflop” supercomputers



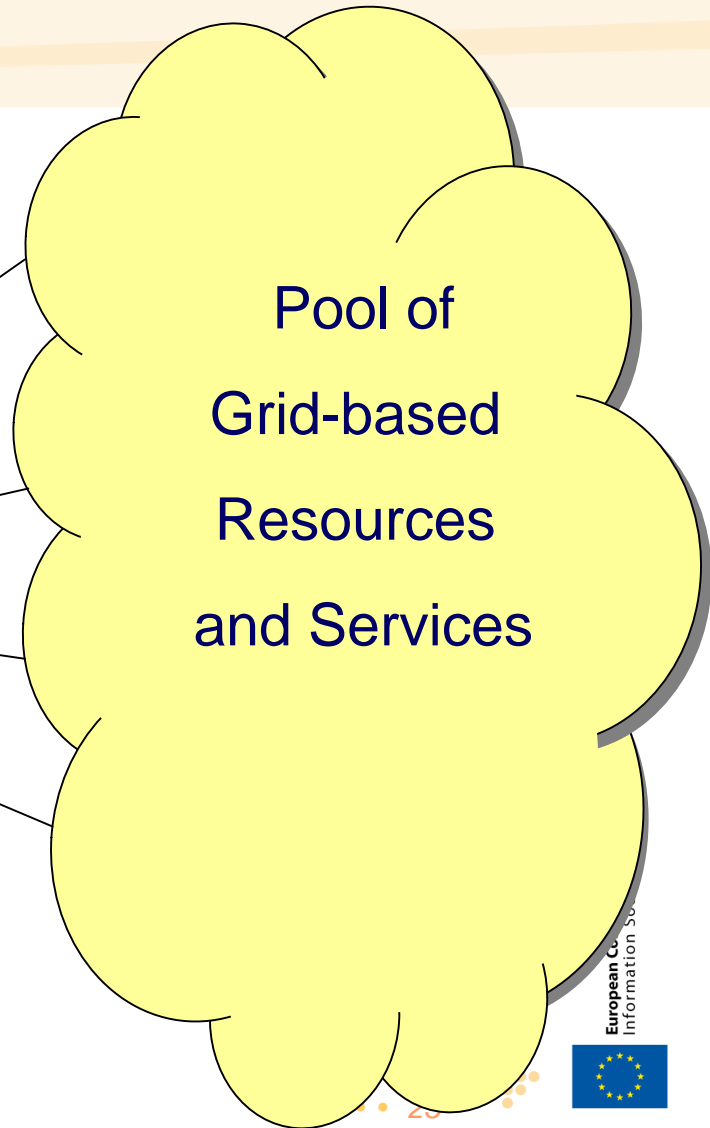
new resource-provisioning model

Service entry point for basic
services provided by a
national entity called National
Grid Initiative (NGI)

User



Pool of
Grid-based
Resources
and Services



new resource-provisioning model

EGI_DS (Design study)



NGI-
Nordic States

Key elements of new scheme:

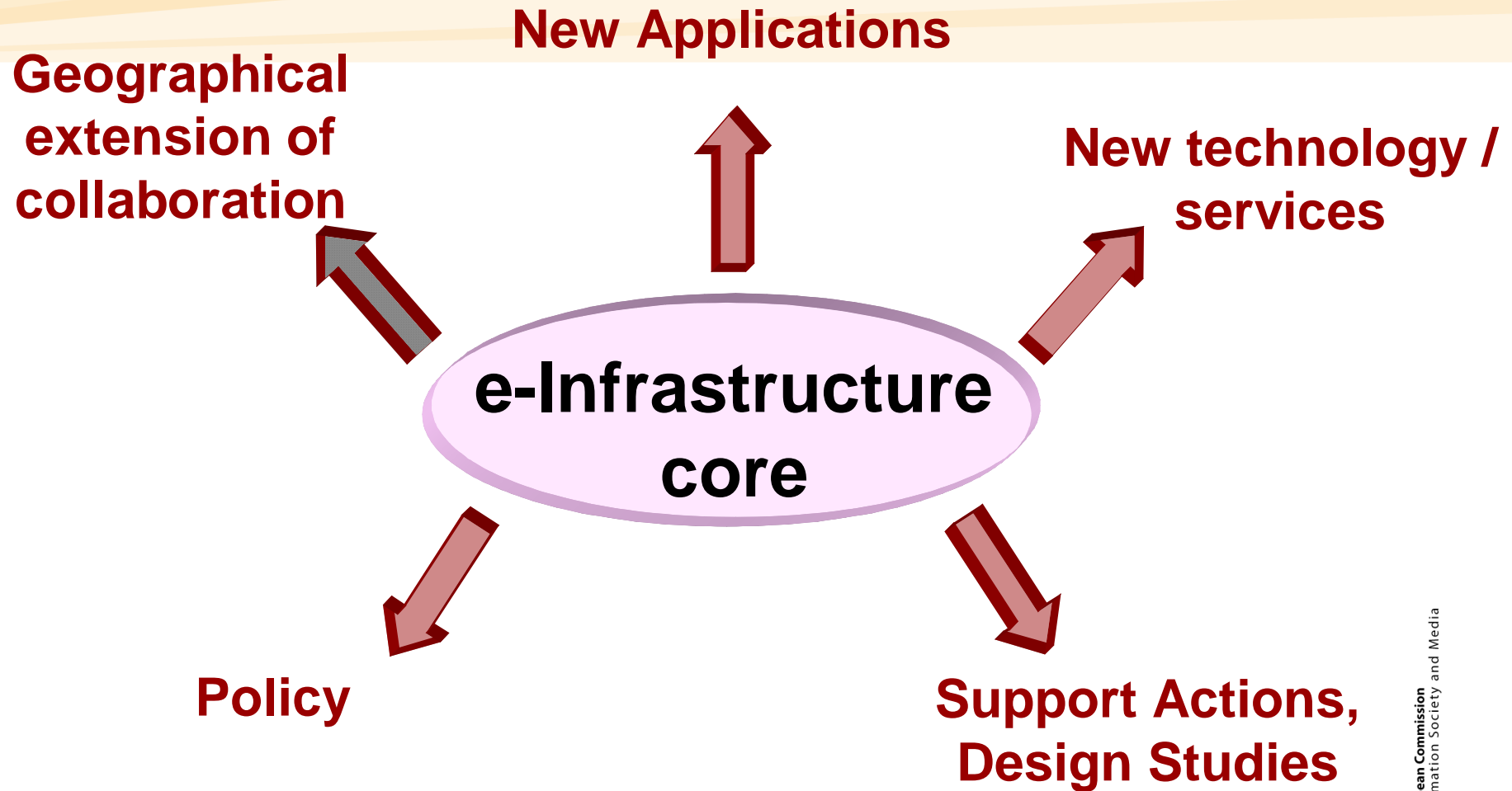
- One-stop-shop service (including training) to users who want to access grid-based and data resources
- Service provisioning beyond project cycles
- More efficient use of resources on the national/regional level
- Better planning of new investments, economies of scale

NGI-GR

Project space



Multidimensional evolution



Support Actions, Design Studies:

Synergy, Outreach,
Policy support,
Deployment of IPv6,
Virtual Conference Service

Geographical extension:

Eastern Europe, NIS, Caucasus,
Baltic States, Mediterranean,
South-Eastern Europe,
North & Latin America,
Asia (China, India, SE Asia etc),

Core projects:

Network layer

Pan-European Research
& Education Network,
Experimental facility for new
Internet architectures & protocols

New technology /services:

End-to-End QoS,
Wireless data Test-beds on GÉANT

Support Actions, Design Studies:

BELIEF-II, e-IRGSP2,
6DISS, 6DEPLOY,
GLOBAL

Geographical extension:

OCCASION, Porta Optica Study,
BSI, EUMedConnect, SEEREN-2
ALICE, AUGERACCESS,
EVALSO,
TEIN2, EC-GIN, Orient, 6CHOICE

Core projects:

GÉANT,
FEDERICA



e-infrastructure

Network layer

New technology /services:

Phosphorus, WEIRD

Support Actions, Design Studies:

Synergy, Outreach, Training,
Policy support, Sustainable
service provisioning,
Support to Standards

Geographical extension:

Eastern Europe, NIS,
Baltic States, Mediterranean,
South-Eastern Europe,
North & Latin America,
Asia (China, India, SE Asia etc)

Core projects:

European Grid infrastructure
for support of the ERA,
Supercomputing Grid
infrastructure
Petaflop Supercomputing
facility

Middleware layer

Computing facilities

New technology /services:

Security, SW-interoperability,
SW-test-facility, Interactive service,
workflow-centric service, quasi-
supercomputing service, remote
instruments control, Desktop Grids

Support Actions, Design Studies:

BELIEF-II, GridTalk, ICEAGE,
e-IRGSP2, EGI_DS,
OGF-EUROPE

Geographical extension:

EUMedGrid, SEEGRID-SCI,
LinkSCEEM, BalticGrid-II, EELA-
2, EUChinaGrid, EC-GIN,
EUIndiaGrid, EUAsiaGrid

Core projects:

EGEE-III, DEISA2,
PRACE



New technology /services:

ISSeG, OMII-Europe, ETICS2,
int.eu.grid, KnowARC,
Chemomentum, QosCosGrid,
GridCC, RINGrid, EDGeS



e-infrastructure

Support Actions, Design Studies:

Synergy, Outreach,
Policy support, Access to
records of Science

New Applications:

Life sciences – Biology,
Astronomy, Earth sciences,
Space, Climate

Geographical extension:

USA, Russia,
NIS, Israel, South
Africa



Core projects, common technology /services:

European Infrastructure of
Digital Repositories,
European Digital Libraries
Service

Support Actions, Design Studies:

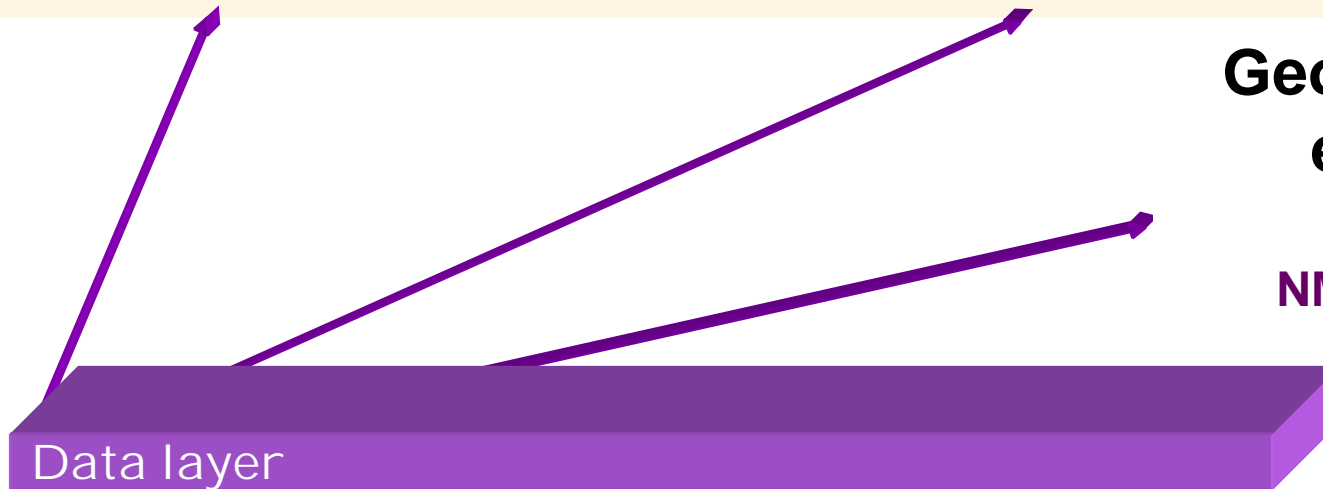
BELIEF-II, e-IRGSP2,
PARSE.Insight

New Applications:

IMPACT, EuroVO-AIDA,
GENESI-DR, NMDB,
METAFOR

Geographical extension:

METAFOR,
NMDB, IMPACT

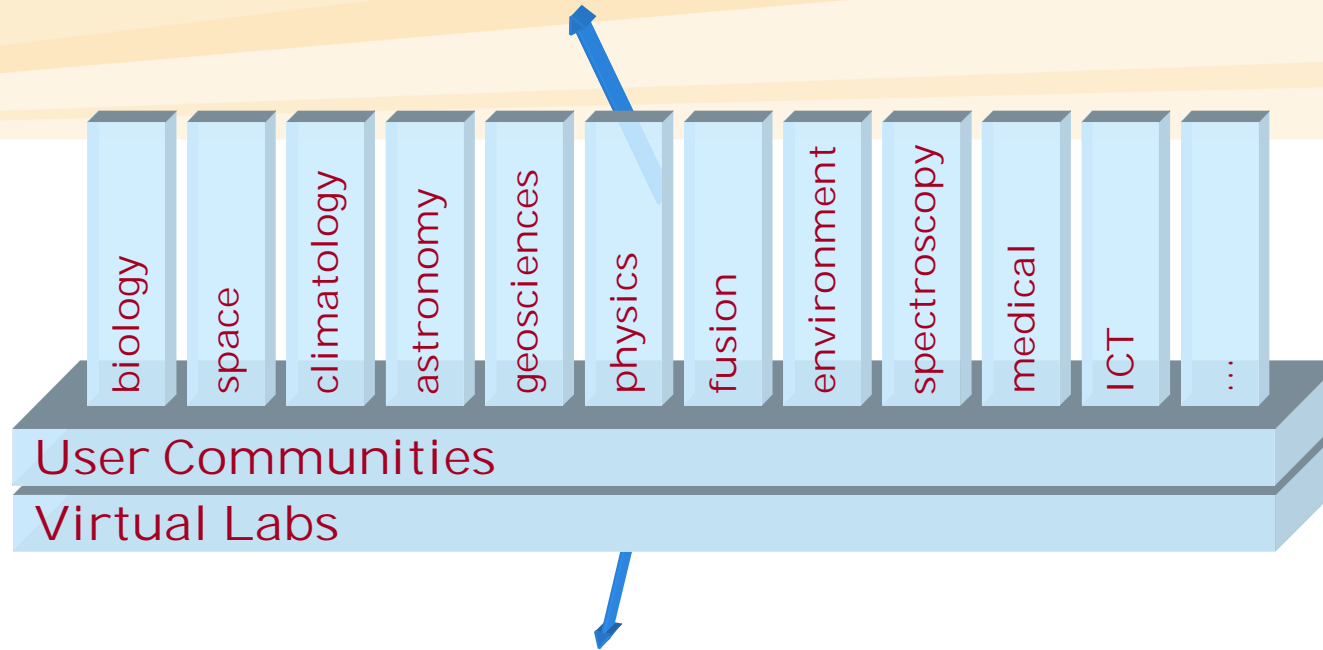


Core projects, generic technology /services:

DRIVER-II, D4Science

Support Actions, Design Studies:

Synergy, Outreach, Policy support



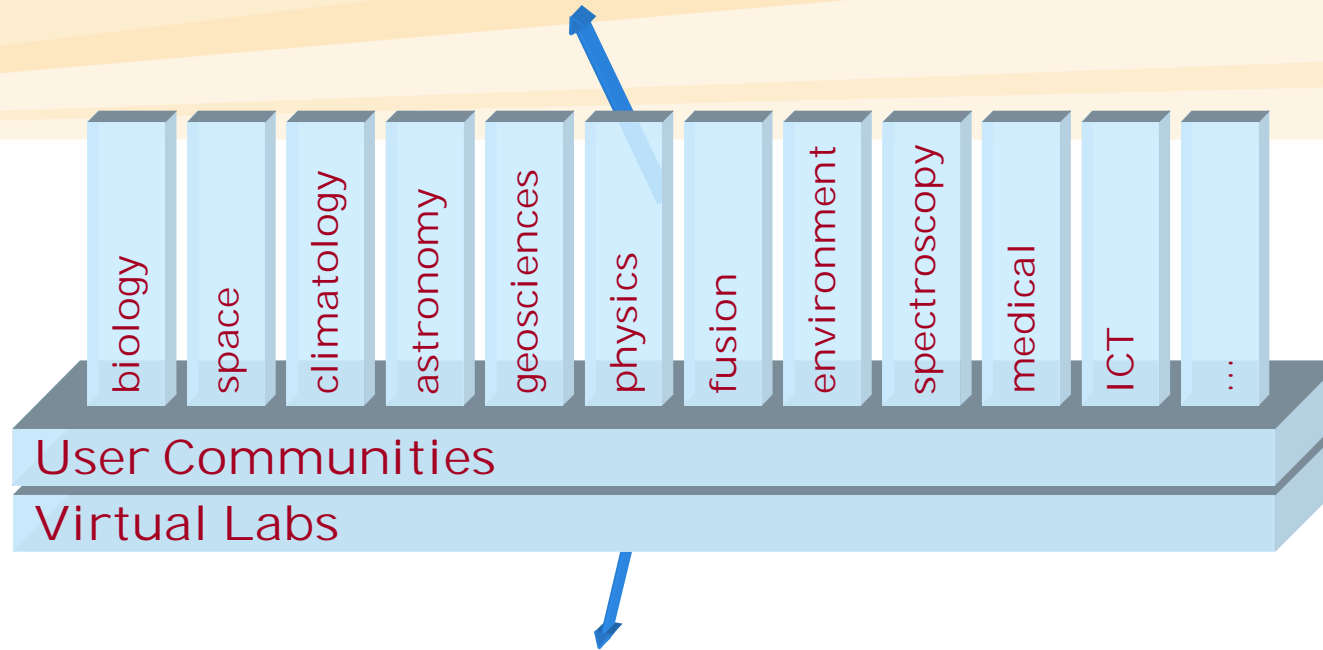
New Applications:

Physics, Molecular, Chemical, Medical -
Clinical, Bioinformatics, Life sciences –
Biology, Fisheries, Civil protection,
Astronomy, Environment, Earth
sciences, Space, Climate, Industrial
applications, Applications on IPv6



Support Actions, Design Studies:

BELIEF-II, e-IRGSP2



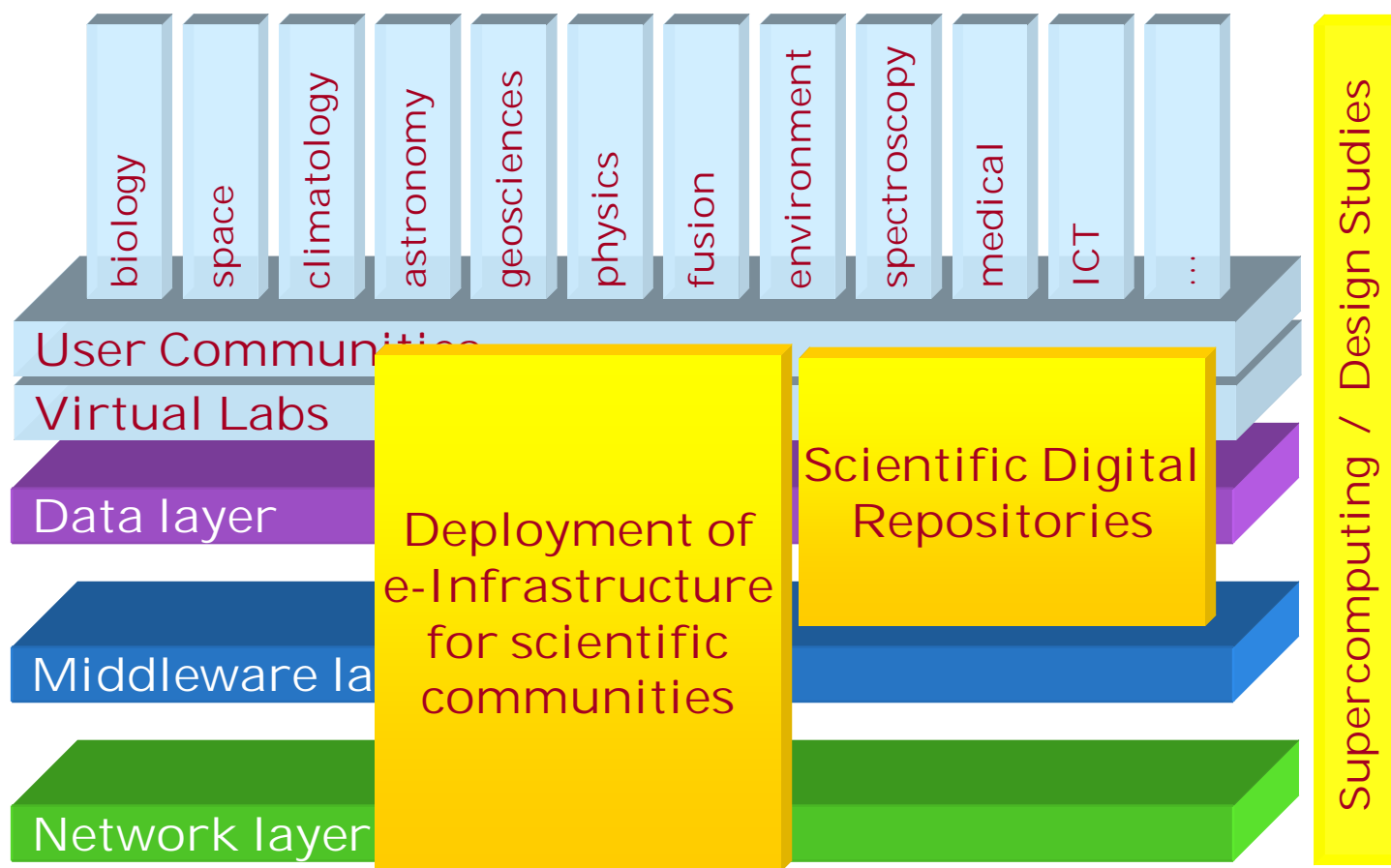
New Applications:

EUFORIA, ETSF, ITHANET, neuGRID,
BioInfoGrid, IMPACT, PESI, D4Science, e-
NMR, CYCLOPS, EuroVO-DCA, Euro-VO-
AIDA, EXPRES, DEGREE, DORII, GENESI-
DR, NMDB, METAFOR, Chemomentum,
SIMDAT, Go4IT

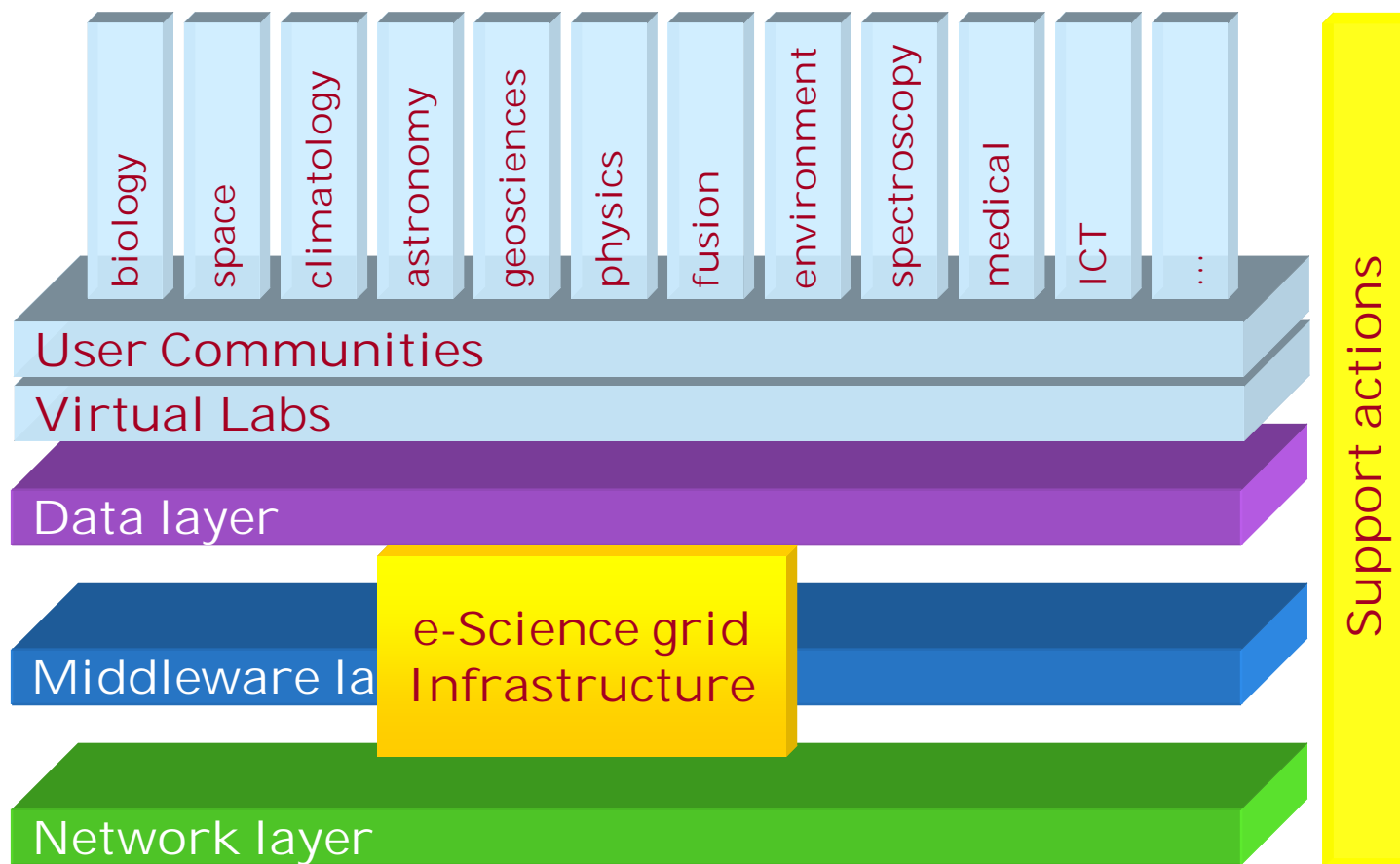


Calls in FP7

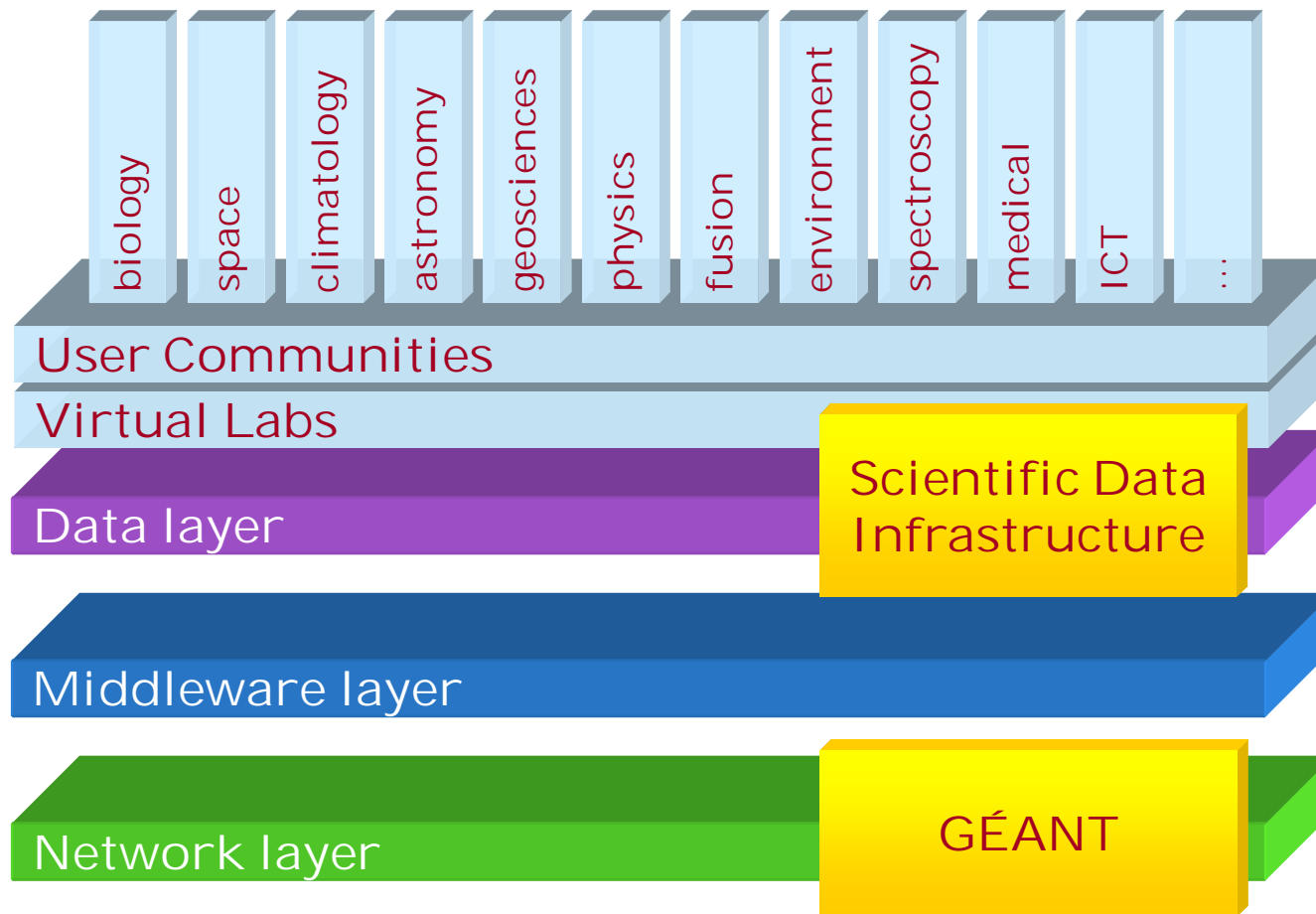
e-Infrastructure Call 1 (May 2007, €58m)



e-Infrastructure Call 2 (Sep 2007, €64m)



e-Infrastructure Call 4 - *CURRENT CALL!* - (Sep 2008, €113m)



e-Infrastructure Call 4 - *CURRENT CALL!* - (Sep 2008, €113m)

Deployment of a broad European multidisciplinary scientific data infrastructure able to be easily federated with other knowledge infrastructures in other parts of the world, building upon the achievements of network and grid infrastructures and opening its benefits to other potential research areas such as e-health, e-learning and others

User Communities

Virtual Labs

Scientific Data
Infrastructure

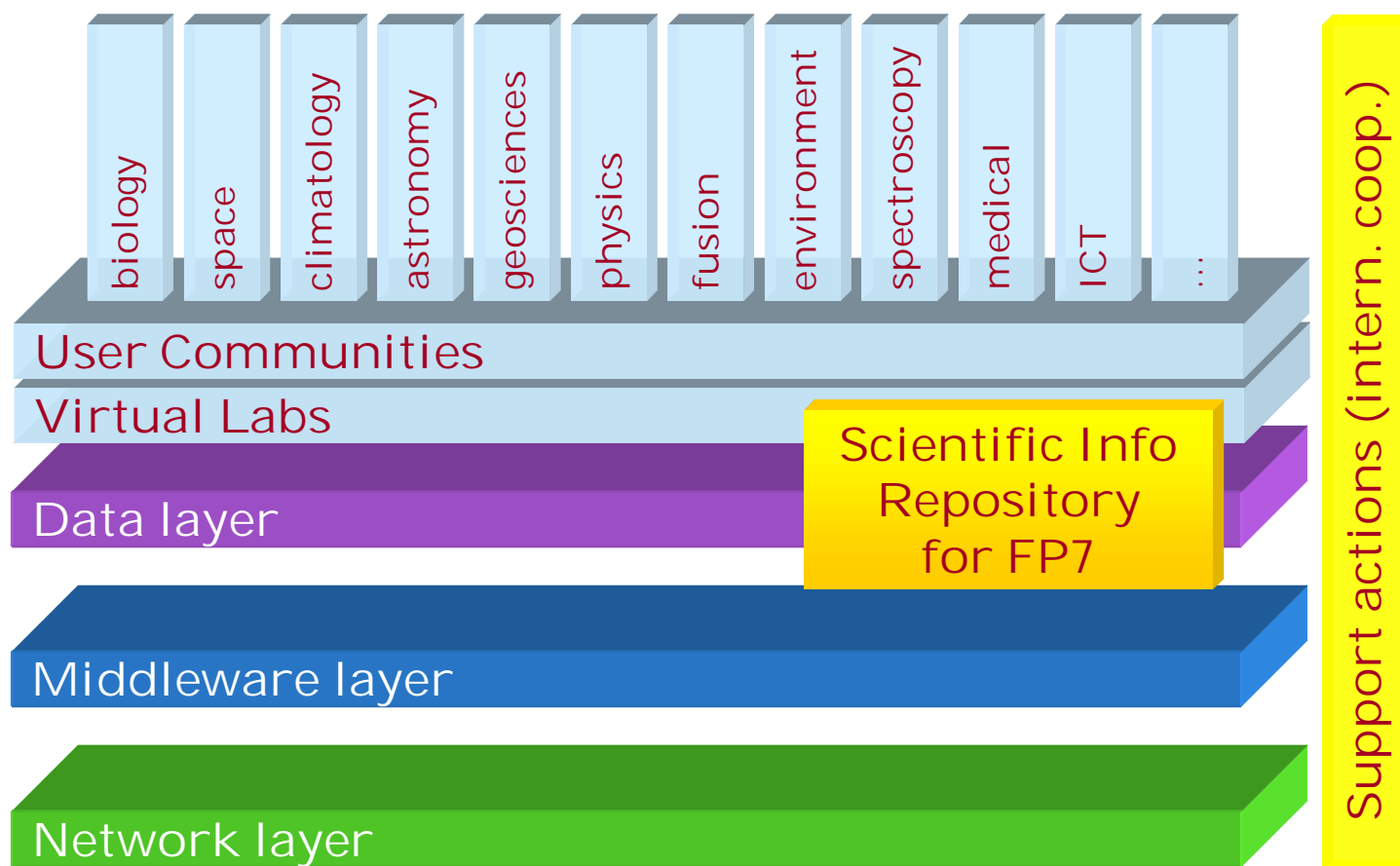
Further deployment and evolution of the pan-European high-capacity and high-performance communication network (GÉANT), in close articulation with the (NRENs), building upon the current world leadership and addressing the ever growing requirements of advanced scientific communities

GÉANT

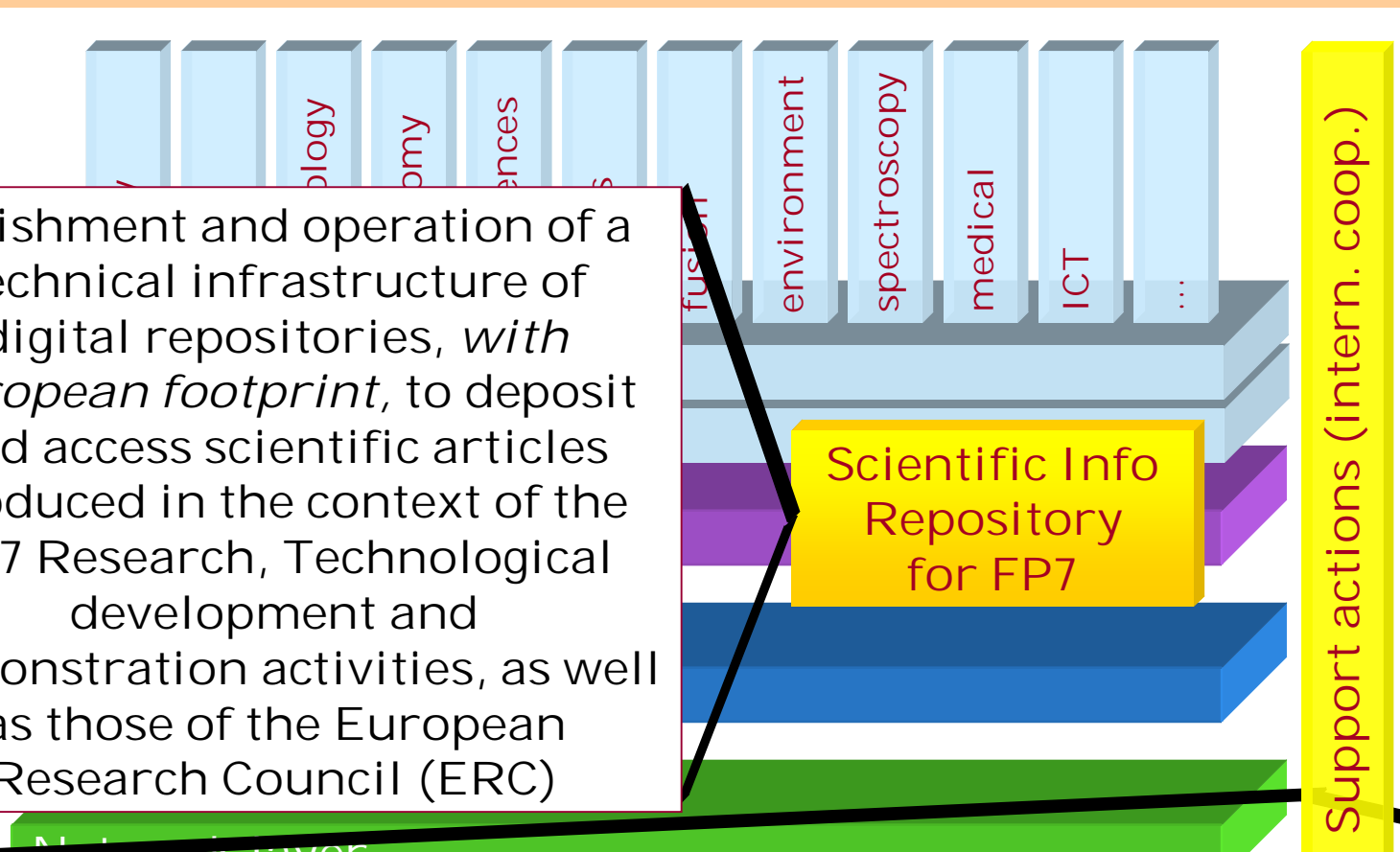
European Commission
Information Society and Media



e-Infrastructure Call 5 - *DRAFT!* – (Mar 2009, €8m)



e-Infrastructure Call 5 - *DRAFT!* – (Mar 2009, €8m)



The diagram illustrates the components of e-Infrastructure Call 5. It features a central stack of four horizontal bars: a green base bar, a blue bar, a yellow bar labeled 'Scientific Info Repository for FP7', and a light blue top bar. Above this stack are several vertical blue bars representing different scientific domains: 'biology', 'chemistry', 'physics', 'astronomy', 'fusion', 'environment', 'spectroscopy', 'medical', 'ICT', and '...'. To the right of the stack is a tall yellow vertical bar labeled 'Support actions (intern. coop.)'. A black arrow points from the text box on the left to the yellow 'Scientific Info Repository for FP7' bar. Another black arrow points from the text box at the bottom to the green base bar.

Establishment and operation of a technical infrastructure of digital repositories, *with European footprint*, to deposit and access scientific articles produced in the context of the FP7 Research, Technological development and Demonstration activities, as well as those of the European Research Council (ERC)

Promotion of international interoperation between the e-Infrastructure and similar infrastructures from other regions (e.g. USA, China, India, Mediterranean etc) with the aim of reinforcing the global relevance and impact of European e-Infrastructures

further information

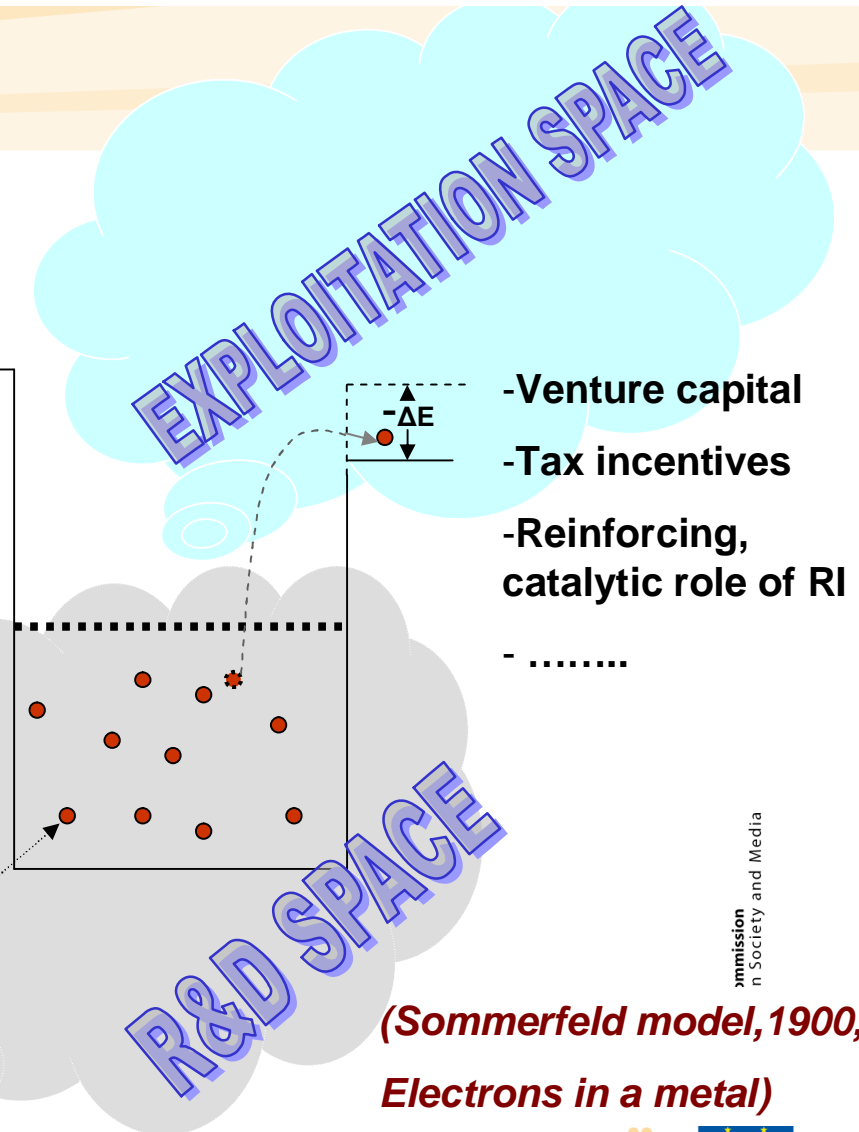
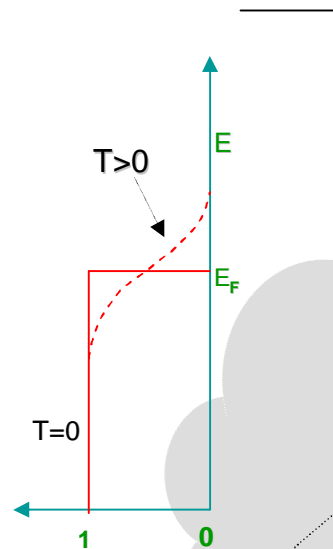
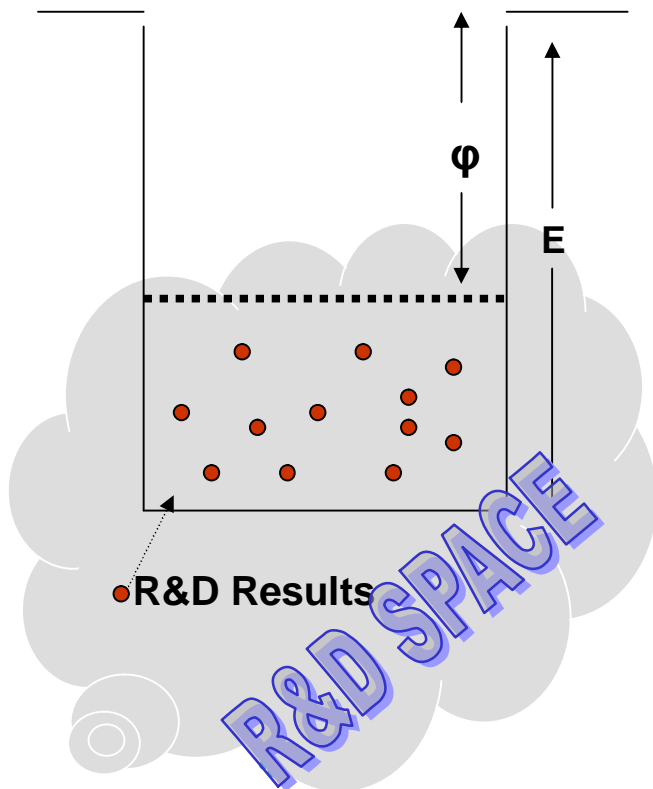


www.cordis.europa.eu/fp7/ict/e-infrastructure/

Closure

Exploitability model of R&D, role of RI

- **N** : Number of R&D results
- E** : Energy
- ϕ** : Potential barrier
- $-\Delta E$** : Reduction of Potential Barrier



(Sommerfeld model, 1900,
Electrons in a metal)

Thank you!

