

e-IRG Workshop
Uppsala, 14-15 October 2009

The Grand Challenges of a changing global landscape and the role of European e-Science

The World in 2025



World in 2025: trends, tensions & challenges

EC-Report: The World in 2025

- Rising Asia
 - 8 billion people by 2025; 2/3 in Asia, 7% in EU (decrease in EU population as of 2012)
 - Centre of gravity of world production will move to Asia (35% vs 32% of EU)
 - By 2025 USA & Europe could lose S&T supremacy for benefit of Asia (India & China could account for 20% of world's R&D; Asia main destination for location of business R&D)
- In crucial areas to Europe's future welfare (energy, sustainable development & climate change, health, food safety..) at stake is access to global knowledge, development of global standards, diffusion of new technology..
- Move from "brain drain" to "brain circulation"

Towards a socio-ecological transition

EC-Report: The World in 2025

- Increasing scarcity of natural resources (potential “oil peak”, 3 billion people missing water by 2025) & vulnerability of planet (c.f. potential Climate Change impacts), tensions between:
 - Production & consumption patterns
 - Production/consumption patterns & natural resources (energy, water, agricultural land, materials science)
- Demographic & resource challenges could lead to:
 - a new “socio-ecological” production & consumption model (renewable energy, nuclear power & hydrogen & fuel cells)
 - Changes in social behaviour supported by economic incentives for drastic reduction in energy consumption

Are current National & EU policies up to the challenge?

National & EU Research policies in the post-2010 period



Taking stock of current situation

- Mixed picture at MS level
 - Of the 14 'catching up' MS, only 5 have taken important steps towards knowledge economy and none have managed to close gaps in terms of R&D & other knowledge indicators
 - Considerable gaps, therefore, vis-à-vis the EU-27 average
- Multi-dimensional policy at EU-level – emphasis on both excellence & cohesion
 - EU added value via support for collaborative R&D
 - Strengthening the ERA
 - Launching of European Research Council (ERC) – emphasis on competition & excellence
 - Catalysing activities at MS level (Art.169), increasing R&D investments by public & private sectors (Joint Technology Initiatives)

Swedish proposed orientations for future EU R&D

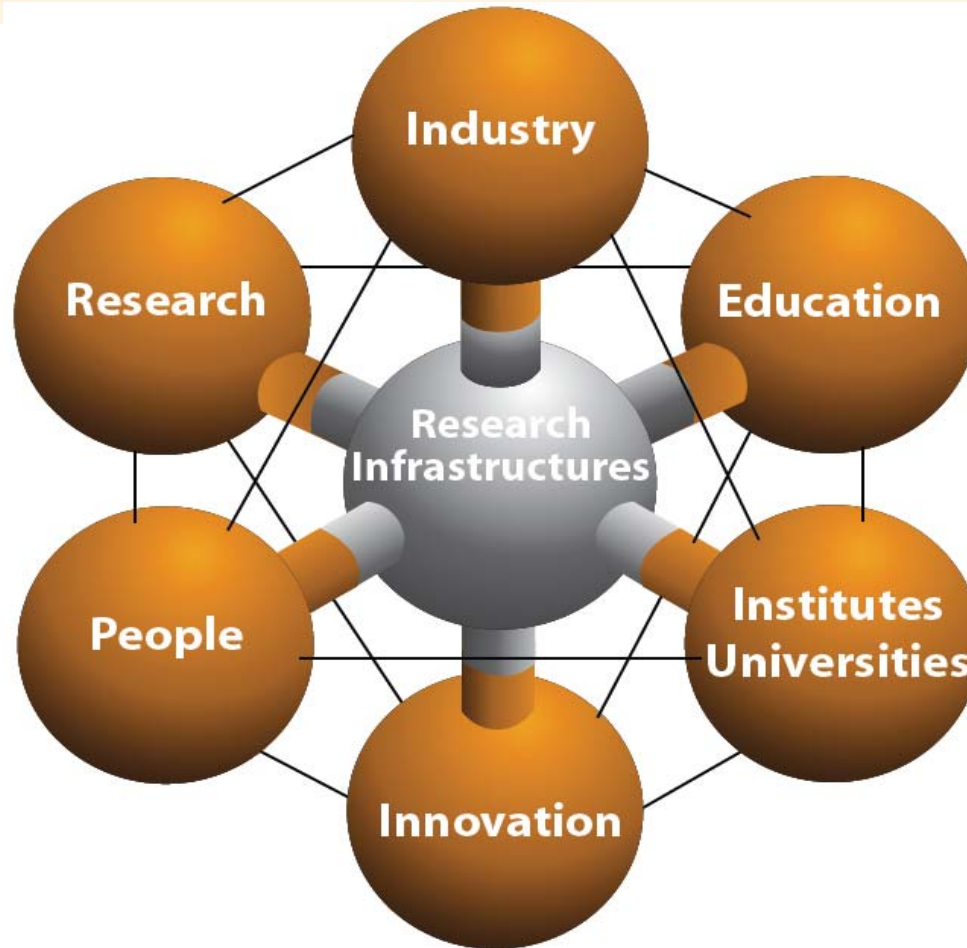
- **“Bolder”**
 - Orienting R&D to the resolution of societal/grand challenges & development of new markets
- **“Better”**
 - Improving the efficiency & effectiveness of national research systems and the ERA
- **“Bigger”**
 - Investment in research & research infrastructure to be expanded

Preparing society to meet Grand Challenges

Lund Declaration, July 2009

- Strengthening frontier research & competition
- Taking a global lead in development of enabling technologies (e.g. bio, info, materials, nano)
- Bringing together supply- and demand- side measures to support both business development & public policy goals
- Excellence & well-networked knowledge institutions
- The creation & maintenance of world class research infrastructures
- A risk-tolerant & trust based approach in research funding

The centrality of RI for innovation



Trends in science & the e-Science paradigm - the role of e-Infrastructures -

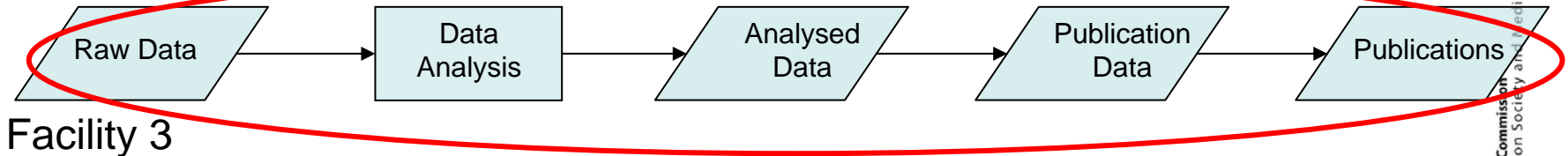
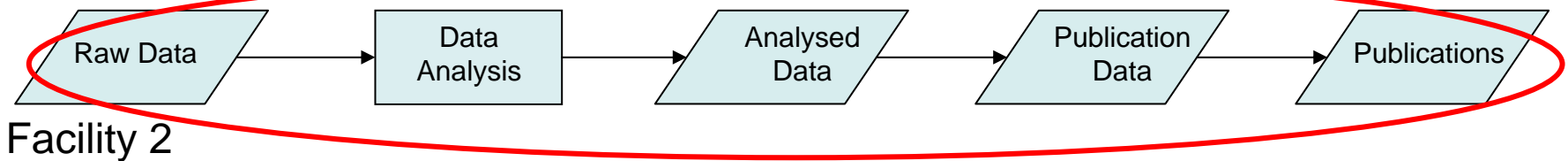
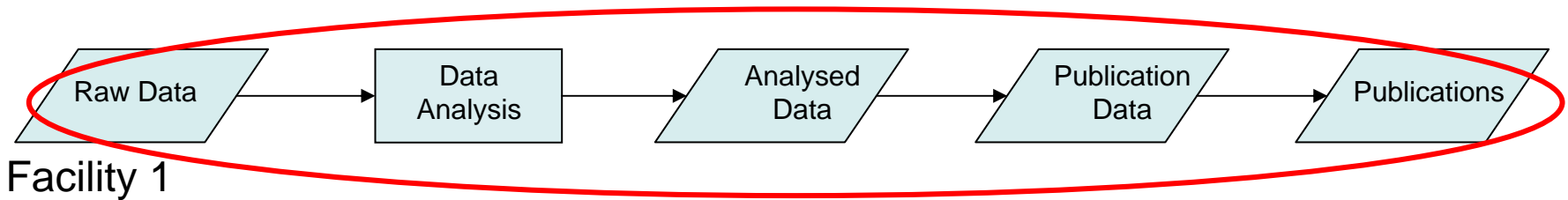
Vision: science in 2030

Source: Prof. John Wood ("*Science in 2030*")

- Multi-disciplinarity; no longer one technique in one place;
- Emerging role of informal scientific collaborations in a networked world (vs established bureaucracies of research)
- Open Access to data
- New emphasis on research process itself rather than single, perfect new innovation (as innovations come in unpredictable ways through continuous interactions) – *towards "science as a service mentality"*

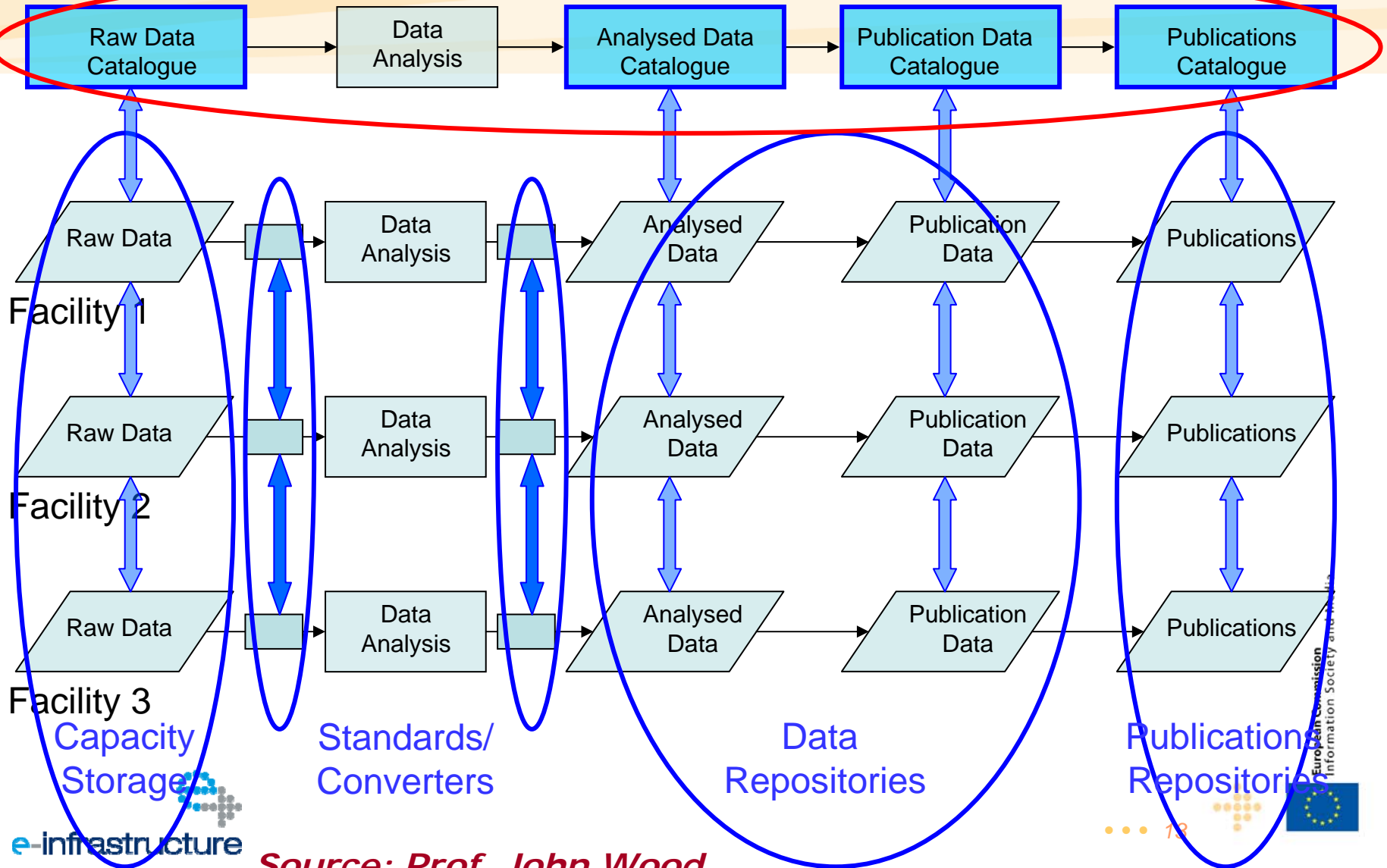
Current view

Distinct Infrastructures / Distinct User Experiences



Future view (e-Infrastructure enabled)

Common Infrastructure / Common User Experience



Source: Prof. John Wood

ESFRI Roadmap - Implementation Report (draft - Oct 2009)

e-Infrastructures: fundamental aspect of all Roadmap RI..

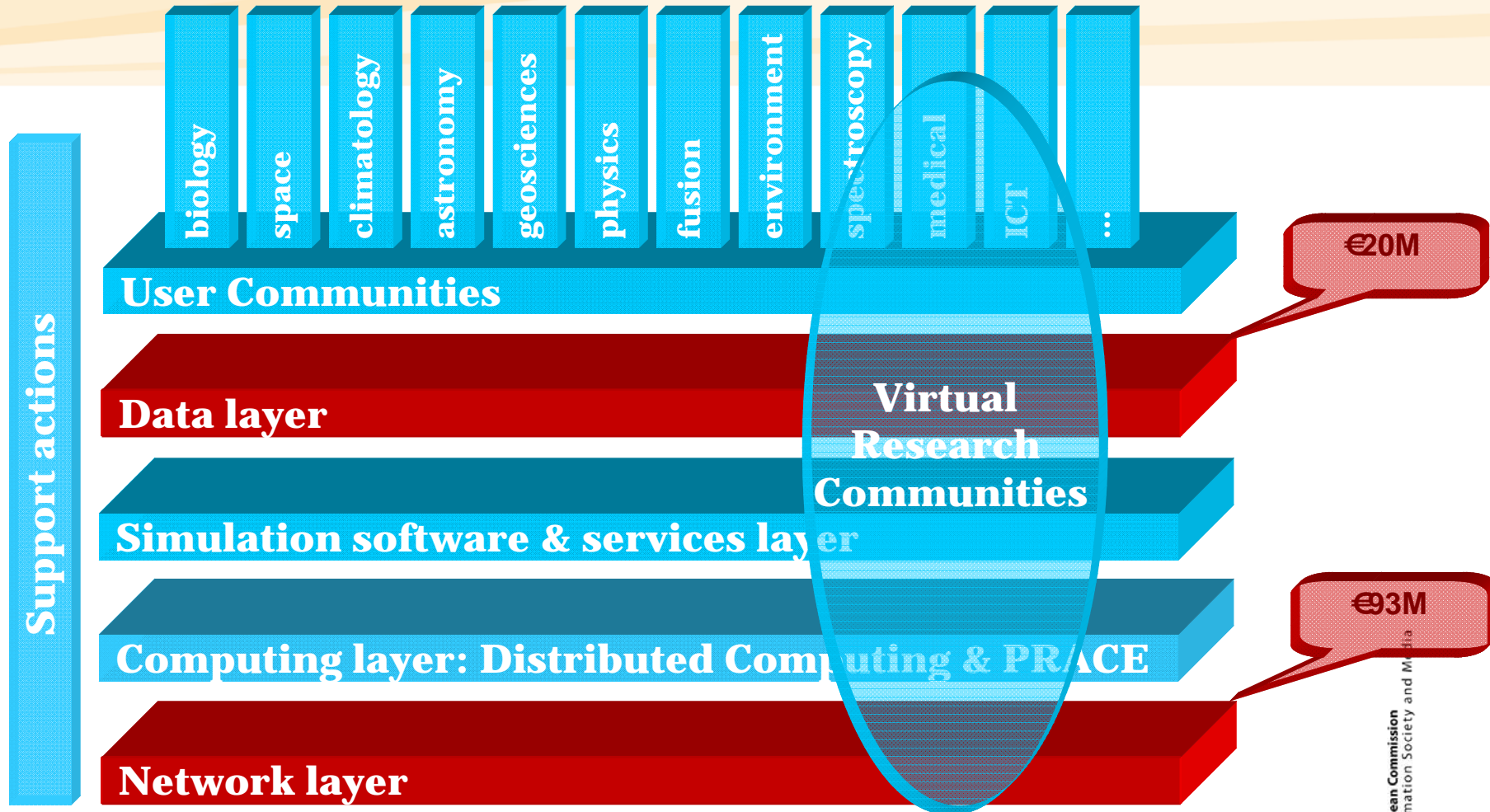
Three groups of facilities distinguished:

- Those which fundamentally are e-Infrastructure - based (e.g. all Social Sciences & Humanities, ELIXIR, EPOS) - *therefore e-Infrastructure aspects key to address*
- Distributed facilities, which need e-Infrastructures to work (e.g. interlink their parts)
- Those for which e-Infrastructures will be important at least for data acquisition, processing & distribution to users

Update on e-Infrastructures



Call 4 - closed on 11.09.2008



The GN3 Mission

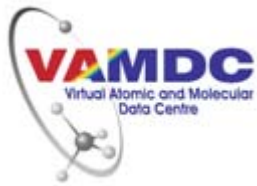
- To create an innovative **multi-domain hybrid networking** environment, using advanced transmission & switching technologies
- To enable R&E users through their Organizations with **flexible and scalable production quality services** via their constituent NRENs
- To be an enabler for Global R&E networking supporting international e-Science initiatives, creating a **Global Virtual Village** to house researchers & educators around the world
- To contribute to standards as a key participant in European & Global efforts towards the **Network of the Future**

Source: Prof. Vasilis Maglaris

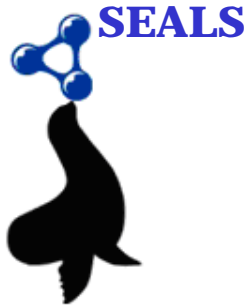
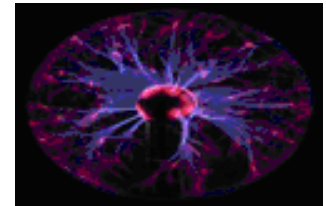
New data infrastructure projects - Call-4 (1)



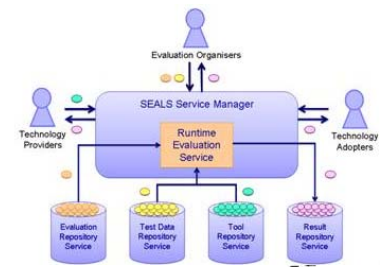
Reengineering the 'Catalog of Life' (CoL); leading infrastructure in the field of taxonomy of living organisms



Work towards making the access to atomic and molecular data simpler and more integrated



Provides an infrastructure to allow the remote evaluation of semantic technologies



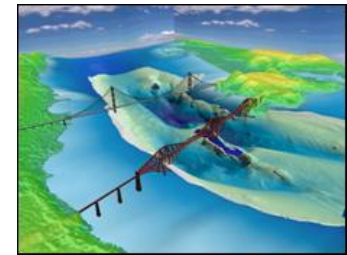
New data infrastructure projects - Call-4 (2)



d4SCIENCE II Enables interoperability of data e-infrastructures, in biodiversity, fisheries and high energy physics



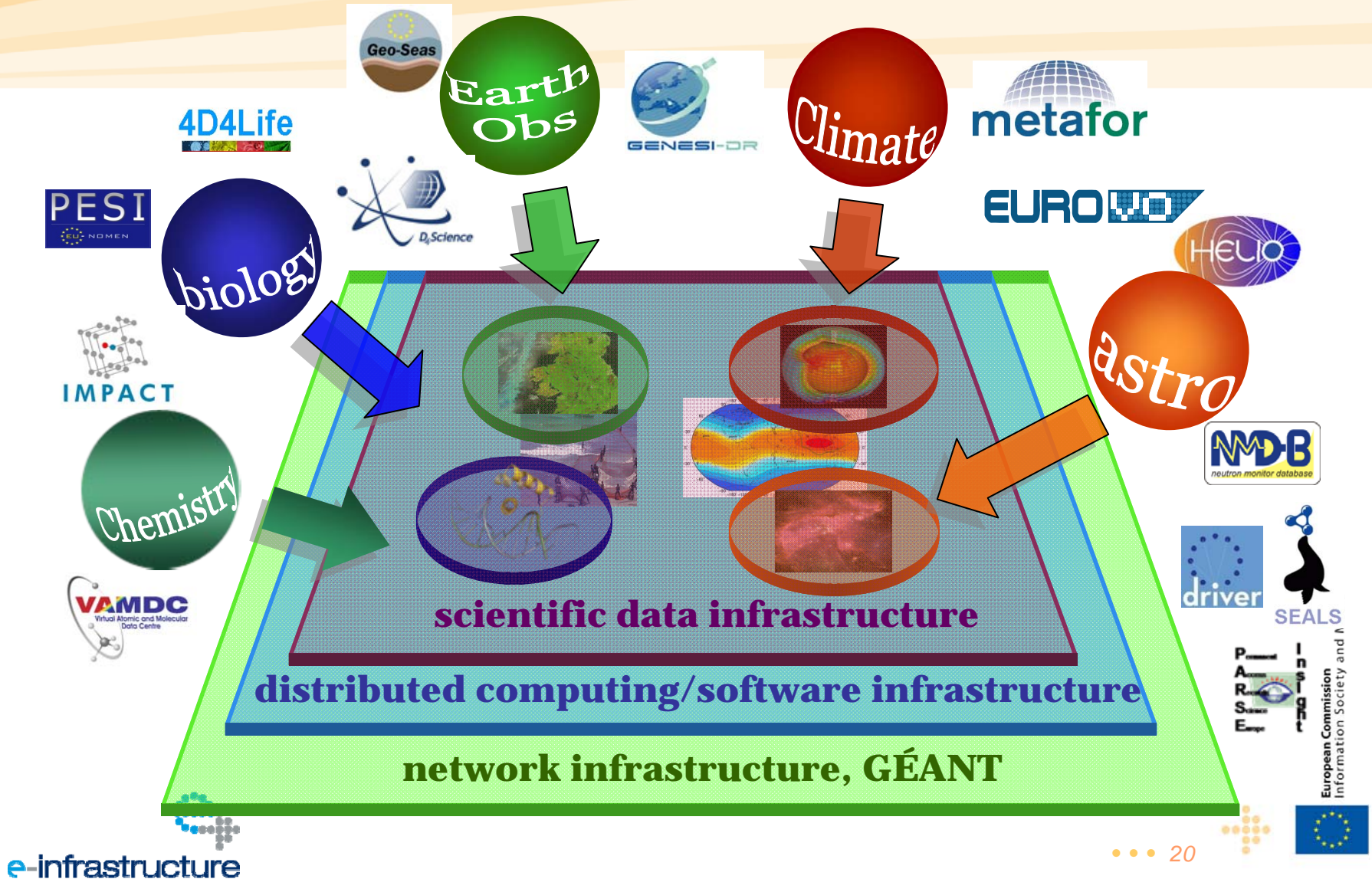
Access to marine and geophysical data from national geological and marine research institutes



Deploys services for heliophysics researchers, exploring the sun-solar system connection



Overview: scientific data e-Infrastructure



Call 5 - closed on 17.03.2009

ERA-NET €1.6M
OTHER €4M

- biology
- space
- climatology
- astronomy
- geosciences
- physics
- fusion
- environment
- spectroscopy
- medical
- ICT
- ...

User Communities

Data layer

Virtual
Research
Communities

Simulation software & services layer

Computing layer: Distributed Computing & PRACE

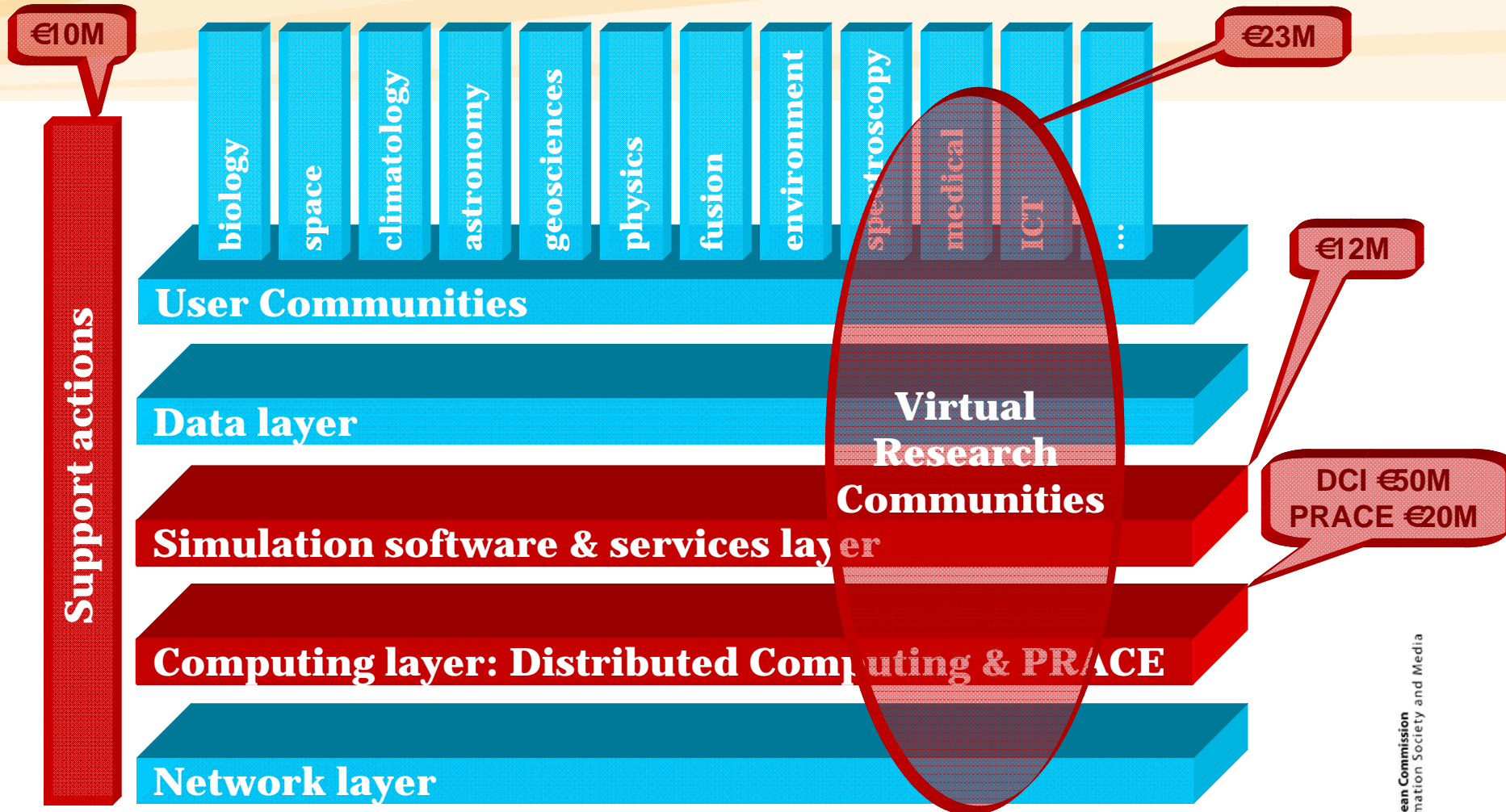
Network layer

Support actions

€4M



Call 7 - closing date 24.11.2009



http://cordis.europa.eu/fp7/dc/index.cfm?fuseaction=UserSite.CapacitiesDetailsCallPage&call_id=263



Looking ahead



Strategy: ICT Infrastructures for e-Science

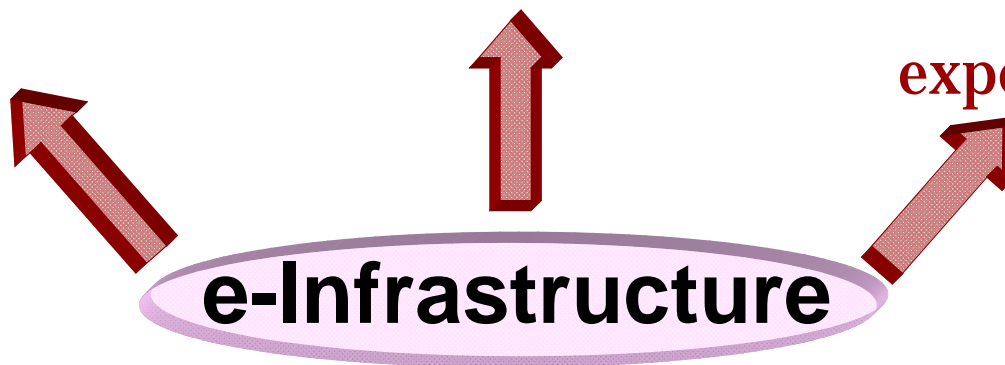
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Three vectors of a renewed European strategy:

Europe as hub
of excellence in
e-Science

**Sustainable and
continuous services**
of production quality
24/7

Innovation by
exploiting know-how
beyond science
(public services,
large scale
experimentation,...)



e-Infrastructure - future directions

- Strengthen service and user orientation
- Some key users: ESFRI-roadmap projects, Future Internet experimentation platform, public services..
- Addressing the data deluge, heterogeneity
- Reflect on governance, ensure sustainability
 - GEANT, EGI, PRACE,...
- Strengthen global dimension

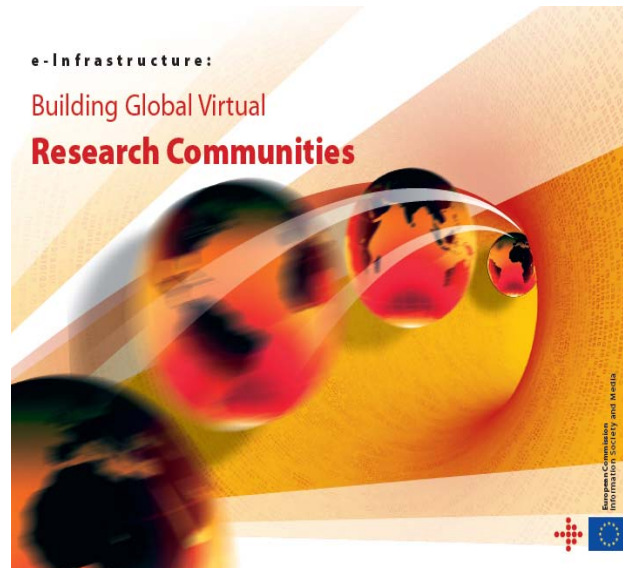
7th e-Infrastructures Concertation/Consultation meeting
Brussels, 12-14 Oct 2009

Summary

- Grand challenges calling for new orientations of our research policies if we want to sustain our living standards & world position
- RI are playing a central role in supporting the knowledge triangle (research-education-innovation)
- Transition to e-Science (e-Infrastructure enabled) will accelerate over the next years
- e-Infrastructures triggering a scientific renaissance

“Europe will not be made all at once or according to a single plan. It will be built through concrete achievements, which first create a de facto solidarity.”

Schuman Declaration, 1950



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

Thank you!