Scientific Data e-Infrastructures in the European Capacities Programme

PV 2009
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Krystyna Marek
European Commission

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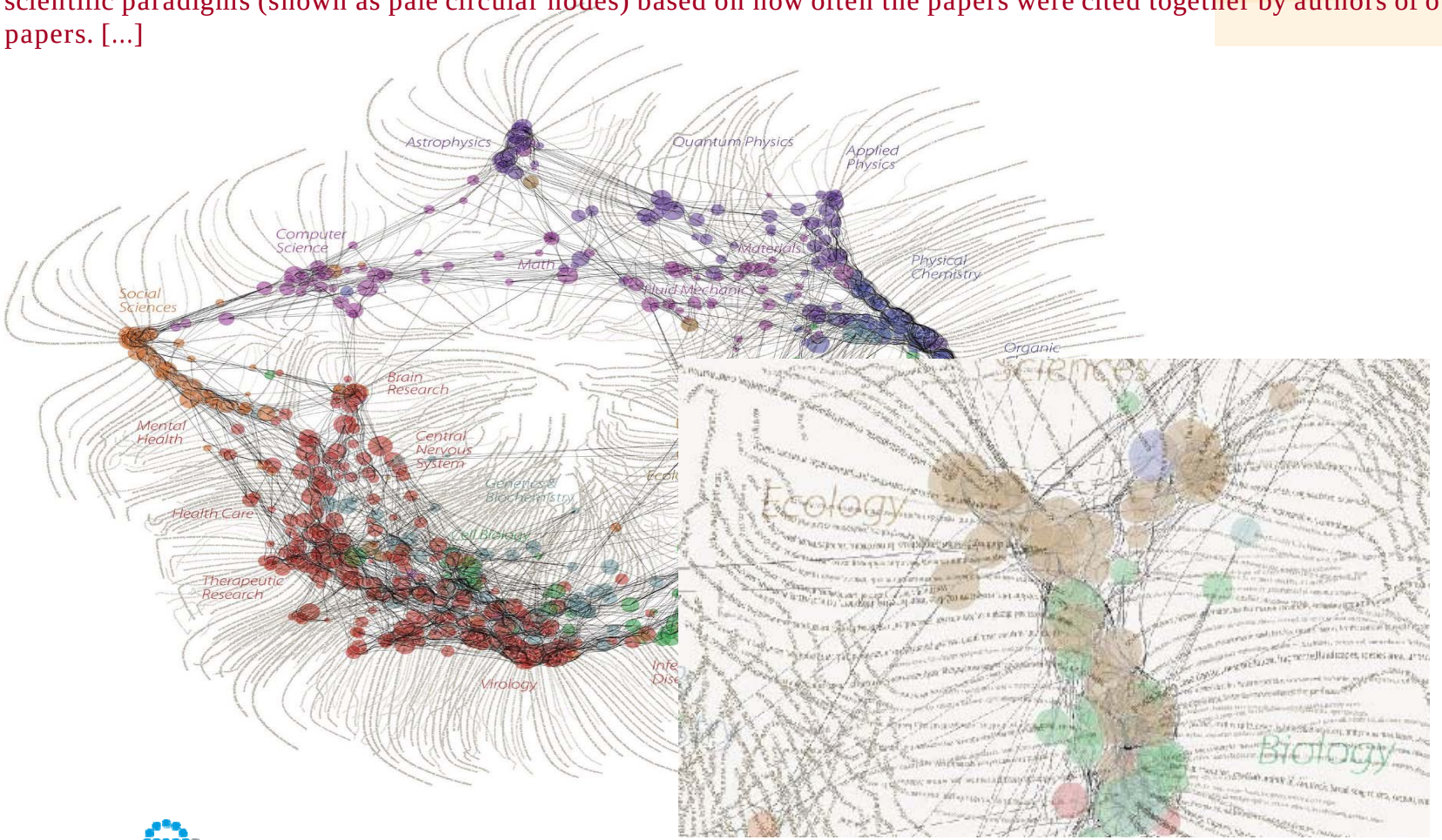
The ‘map of science’

Journal Nature (Dec 2006): This map was constructed by sorting roughly 800,000 published papers into 776 different scientific paradigms (shown as pale circular nodes) based on how often the papers were cited together by authors of other papers. [...]



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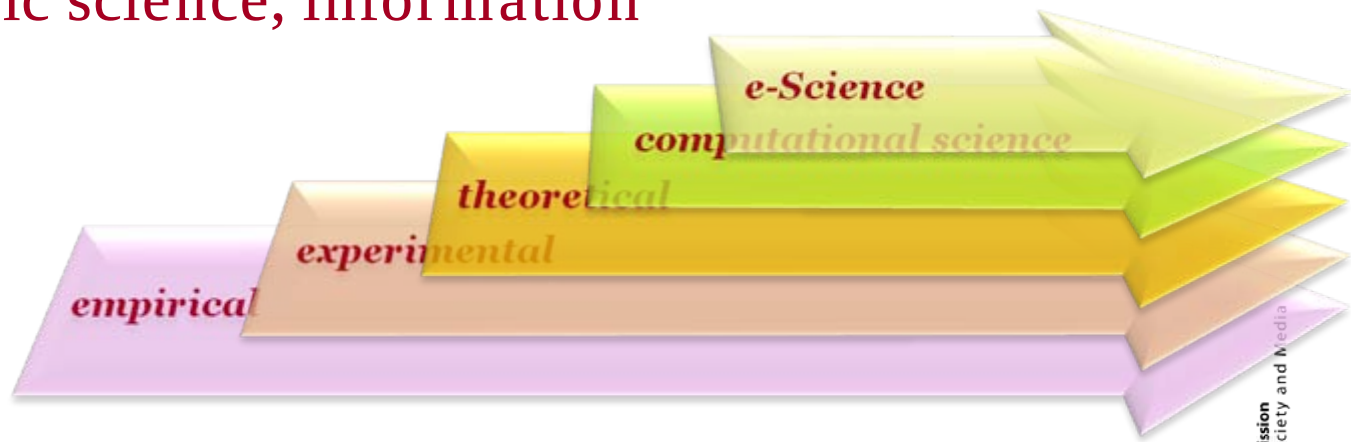
e-Science

- Cross-disciplinary, cross-border...
- New problems, new science ...
- From *wet-labs* to *virtual labs* ...
- Data-centric science, information flood...



- Science is changing ICT and ICT is changing Science

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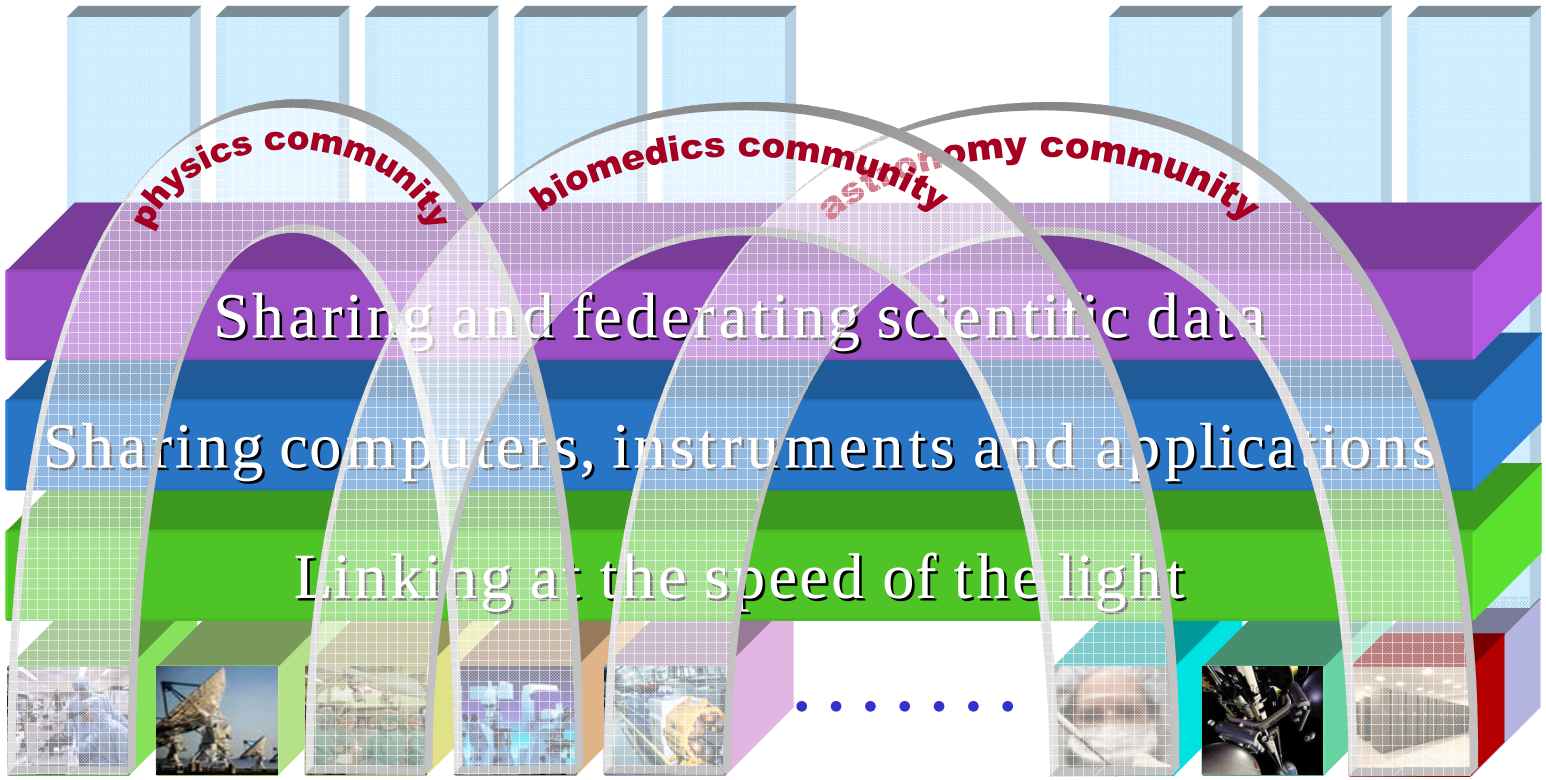
e-Infrastructures for science
environments where research resources can be readily shared and accessed



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Fostering Global Virtual Research Communities

Scientific Communities

- Geographically spread
- Culture heterogeneity
- Problem Complexity
- Volumes of information
- Quality of information
- Incentives to share
- Organisational barriers

e-Infrastructures

- Connectivity
- Collaboration
- Processing, Simulation
- Repositories of data
- Curation/Review
- Trust
- Knowledge advantage

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What can we do for Science...

To facilitate a rapid transition to **e-Science**, the European Commission and Member States have made significant investments in **e-Infrastructures...**

Innovating the scientific process:
global virtual research communities

Linking the ideas at the speed of the light:
GÉANT

Sharing the best computational resources:
e-Science grid, supercomputing

Accessing knowledge:
scientific data

Designing future facilities:
novel e-Infrastructures

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ICT infrastructures for e-Science:
a Communication to European Institutions
COM(2009) 108

- Highlighting the importance of embracing the **e-Science** paradigm shift.
- Highlighting the strategic role of **e-Infrastructures** as a crucial asset underpinning European research and innovation policies.
- Calling on Member States and the scientific communities, in cooperation with the EC for a reinforced and coordinated effort to further develop world class e-Infrastructures.

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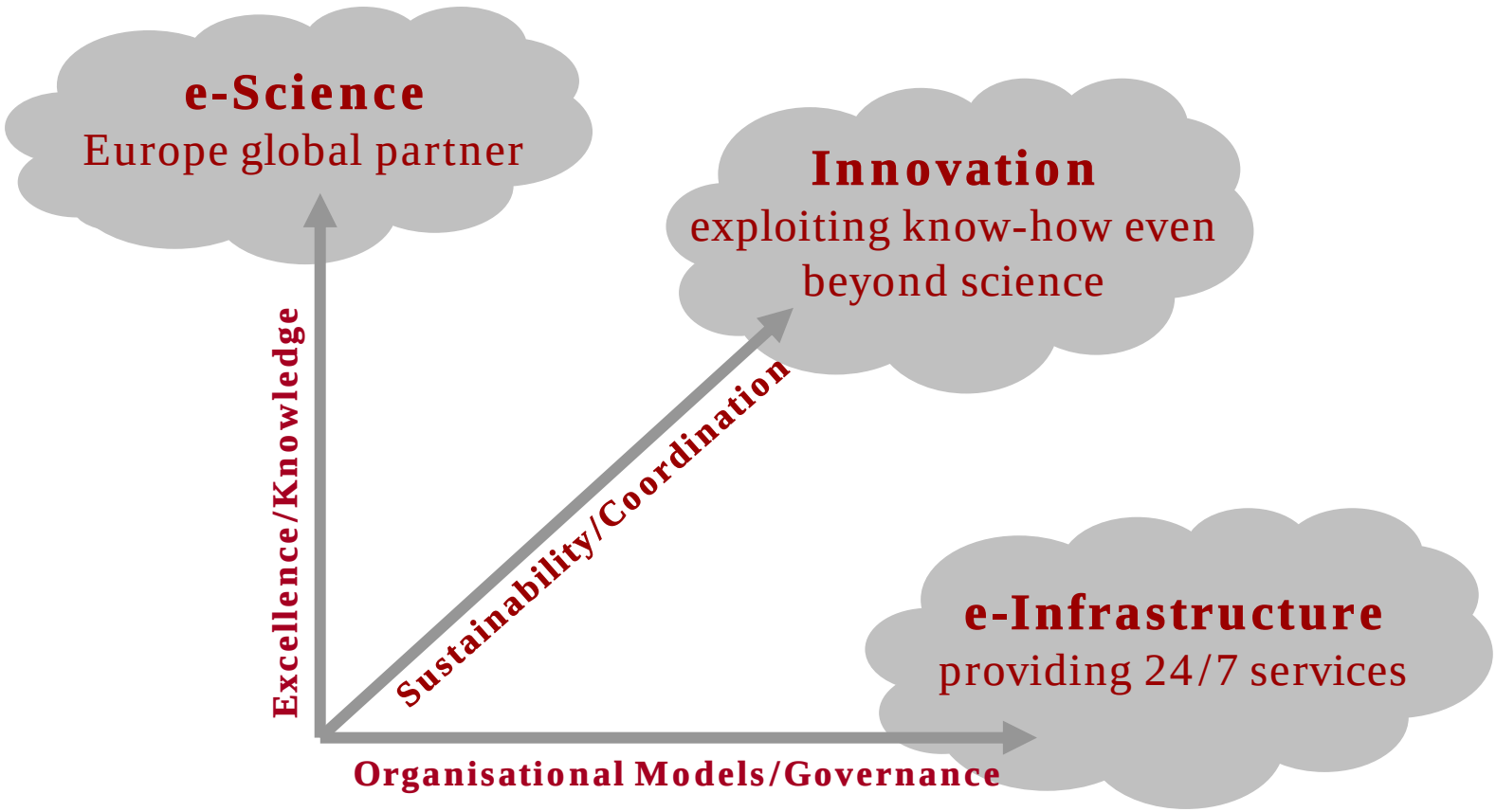
ICT infrastructures for e-Science:
renewed strategy
COM(2009) 108



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On Scientific Information in the Digital Age:
Access, Dissemination and Preservation
COM(2007) 56

"The Internet [...] opened new ways to use masses of data resulting from experiments and observations in the scientific process and to extract meaning from this data stored in repositories in combination with other scientific information resources. This leads to a 'continuum' of scientific information space from raw data to publications across different communities and countries".

- In the Communication "On Scientific Information in the Digital Age (...)“ the EC has pointed out that building in Europe a dynamic information society requires **providing wide access and ensuring long term preservation of scientific information.**

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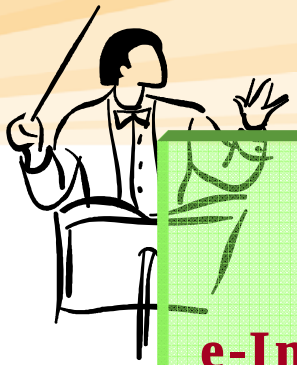
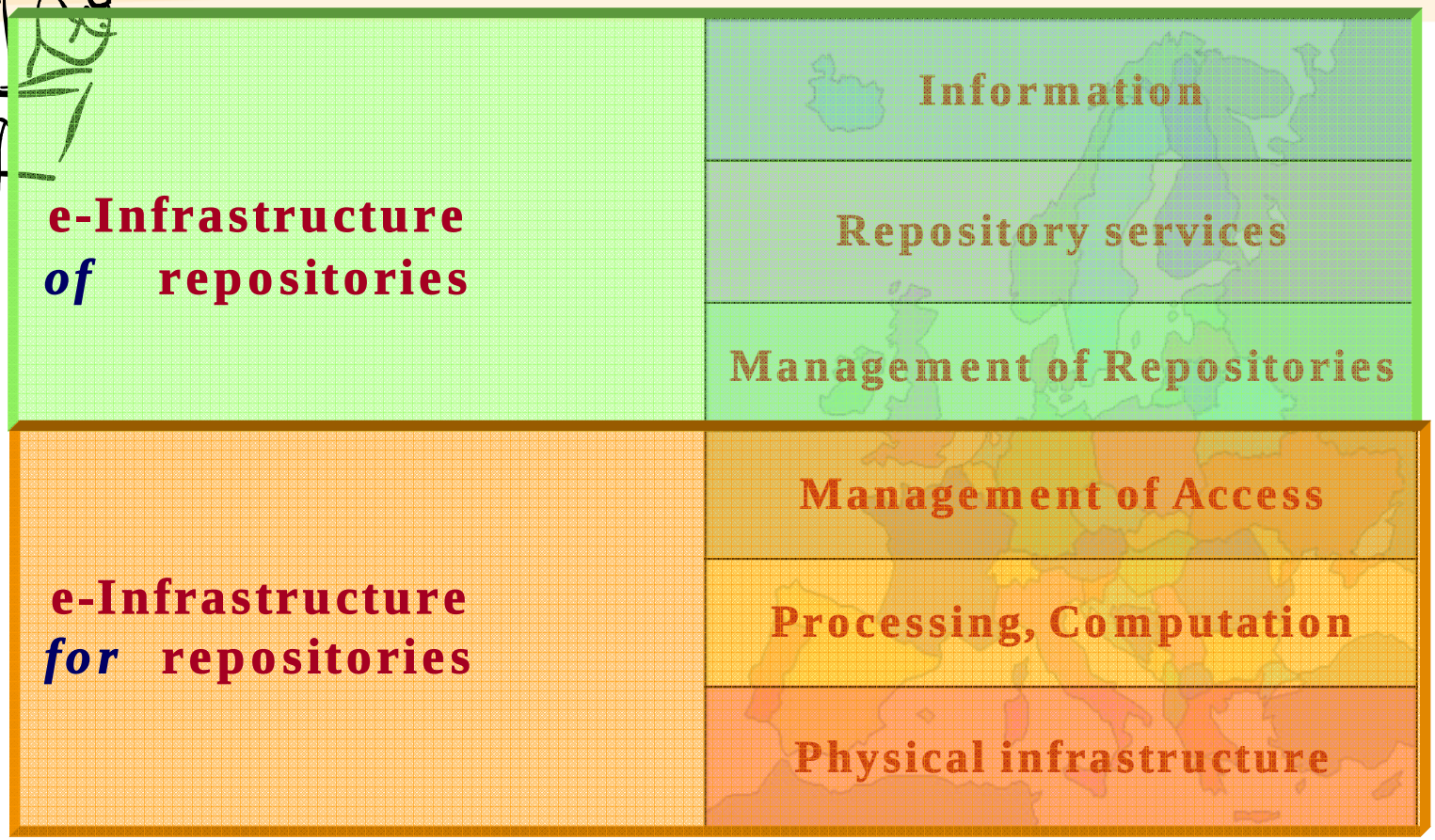
Orchestration within the e-Infrastructure:
need for coordinating all elements and layers





Adapted from e-SciDR study

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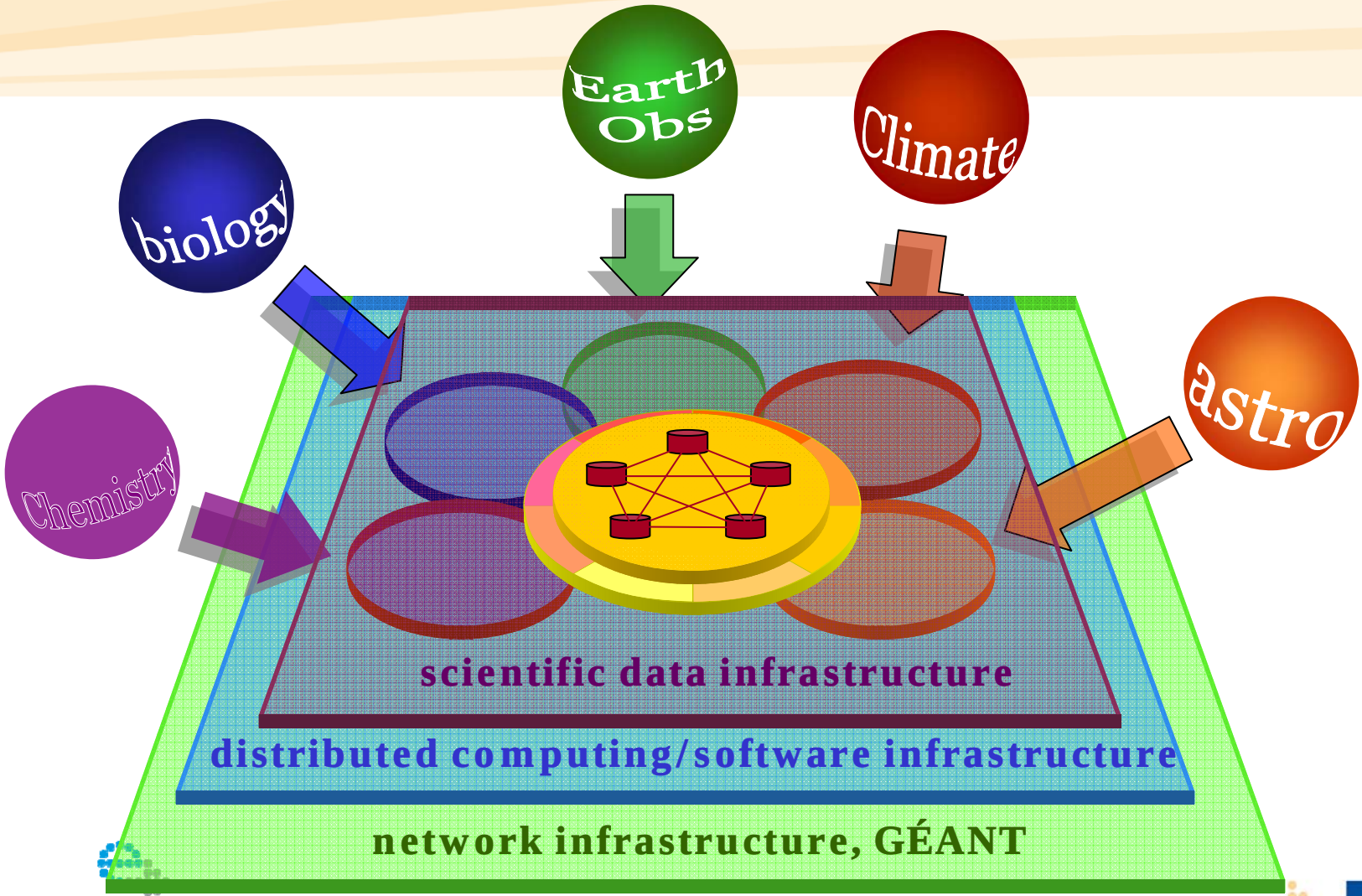
Scientific Data Infrastructure



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First SDI calls in FP7

INFRA-2007-1.2.1:
Scientific Digital Repositories
EU funding = 15 Million Euro

INFRA-2007-1.2.2: Deployment of e-Infrastructures for Scientific Communities

INFRA-2007-3.3:Studies, conferences and coordination actions supporting policy development

INFRA-2008-1.2.2:
Scientific Data Infrastructure
EU funding = 20 Million Euro

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European Virtual Observatory

- With EuroVO-AIDA we have learnt how concept of a “Virtual Observatory” embraces the paradigm shift in science to cope with the progress of astronomical discoveries
- VOs enable making new science by developing a federated repository of astronomical data conforming to globally agreed access protocol standards
- VOs boost the research potential in astronomy, increase its efficiency and democratise access to astronomic data

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e-infrastructure for OA pilot

- FP7 Open Access pilot follows the Conclusions of the EU **Competitiveness Council** of 22 and 23 November 2007
- Its key objective is to enable fast and reliable access to EU-funded research results, in particular **peer reviewed research articles**
- Projects from **7 areas of FP7** are required to deposit articles and make their best effort to ensure OA
- **OpenAIRE project** was selected in an open call to provide an e-infrastructure supporting mechanisms for the identification, deposit, access, and monitoring of articles

OpenAIRE

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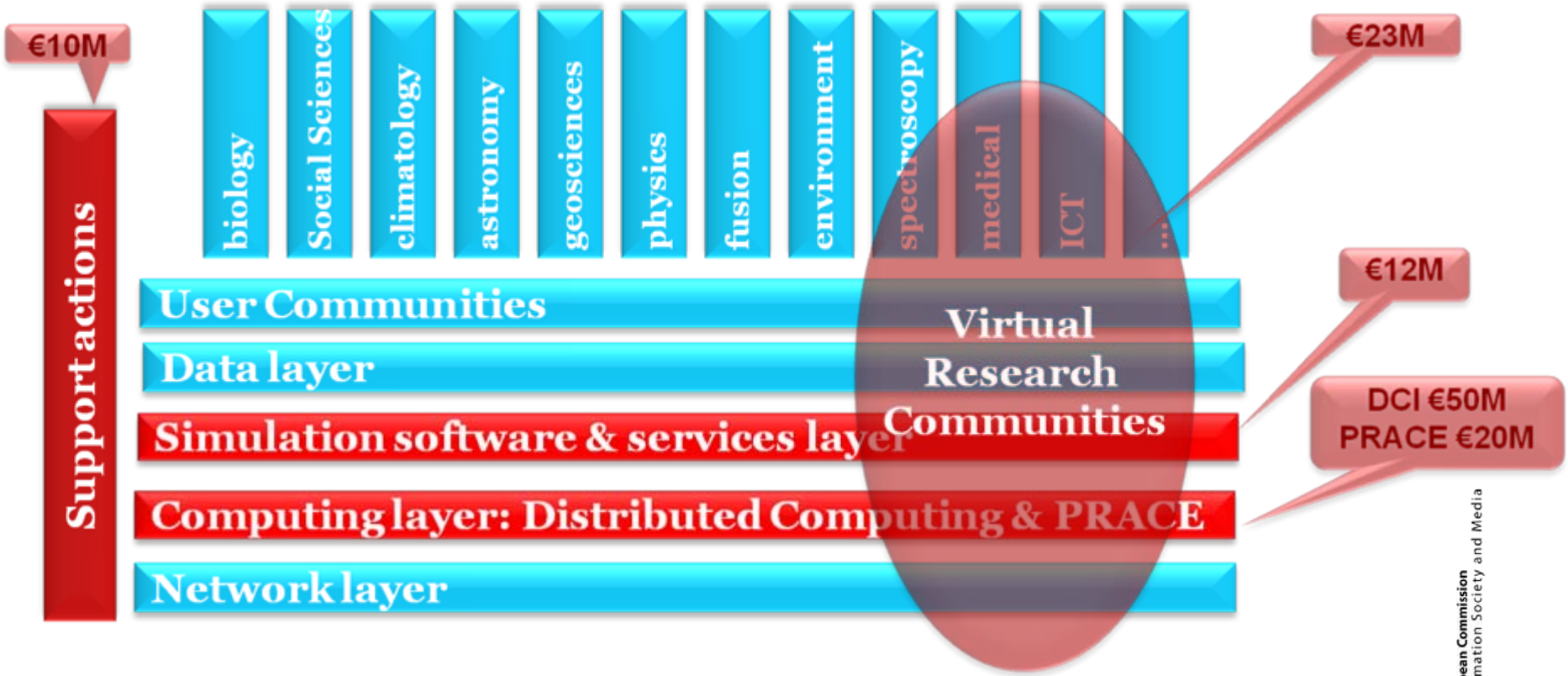
Recent call for Proposals

Published: 30/07/2009 - Closed: 24/11/2009



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e-SciDR study recommendations

Build an e-Infrastructure which ensures “research continuity”

- Funding, Governance and management, leverage on other e-Infrastructure layers

Engage users and service providers

- Support for data producers, Trust and recognition, Training and awareness

Provide access to researchers, educators and students

- Discovery and navigation, OA to publicly funded data, International collaborations

Maintain and preserve information

- Collections management, selection and appraisal for sustainability

source: eSciDR study (adapted)

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Scientific Data - Looking ahead

We need to exploit the growing sensor/effector layer to make the world itself a real-time database.

(from the creativity machine, V. Vinge)

- "Big, complex data-intensive science" of global dimension is here to stay; hence the increasing value of observational and experimental data in virtually all fields of science.
- Europe pays particular attention to the aspects of accessibility to scientific information, its quality assurance and preservation.
- Multi-disciplinary approaches, new participative paradigms and global research communities are an essential part and driver of the strategy.
  - ...but organisational, governance and financing models need further attention, taking into account sociological, political and cultural considerations.

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For further information




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

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Annex: SDI Projects

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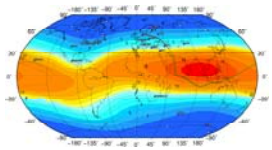
SDI – call 1 projects

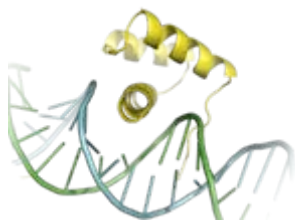
NMDB neutron monitor database

Digital repository for cosmic ray data, pooling archives and collecting observations real-time.



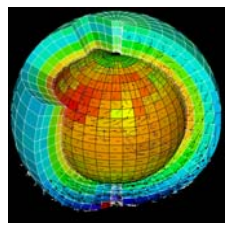
IMPACT

Improving protein annotation through coordination and integration of databases



metafor

Common Information Model and tools for using climate data and models



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SDI – call 1 projects

Moves the astronomical European Virtual Observatory into a fully functioning operational phase.

Open and seamless access to Earth science repositories (space, airborne and in-situ sensors data)

Flexible, robust, scalable and cohesive pan-European infra-structure of Digital Repositories

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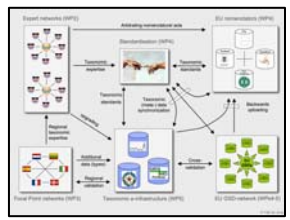
SDI – call 1 & 2 projects

Virtual research environment for Environmental Monitoring and Fishery Resource Management.

Taxonomically validated standardised nomenclatures for biological and biodiversity management.



Long-term preservation, permanent access to digital resources (intellectual capital of Europe).

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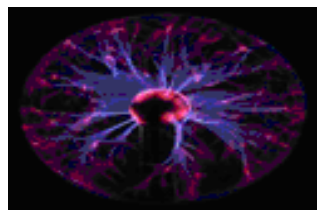
SDI – call 4 projects

4D4Life

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

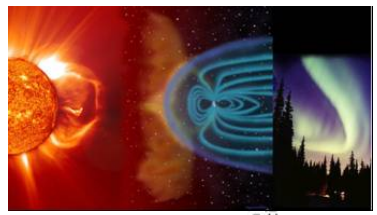
VAMDC Virtual Atomic and Molecular Data Centre

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



HELIO

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



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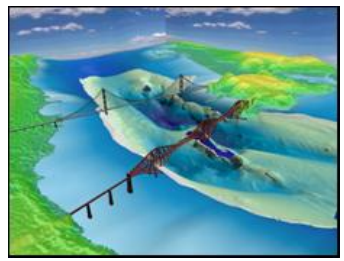
SDI – call 4 projects

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

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



Provides an infrastructure to allow the remote evaluation of semantic technologies