

Supercomputers for Europe

Wishful dream or FP7 reality?

Maria F. Ramalho
Maria.Ramalho-Natario@ec.europa.eu



"The views expressed in this presentation are those of the author and do not necessarily reflect the views of the European Commission"

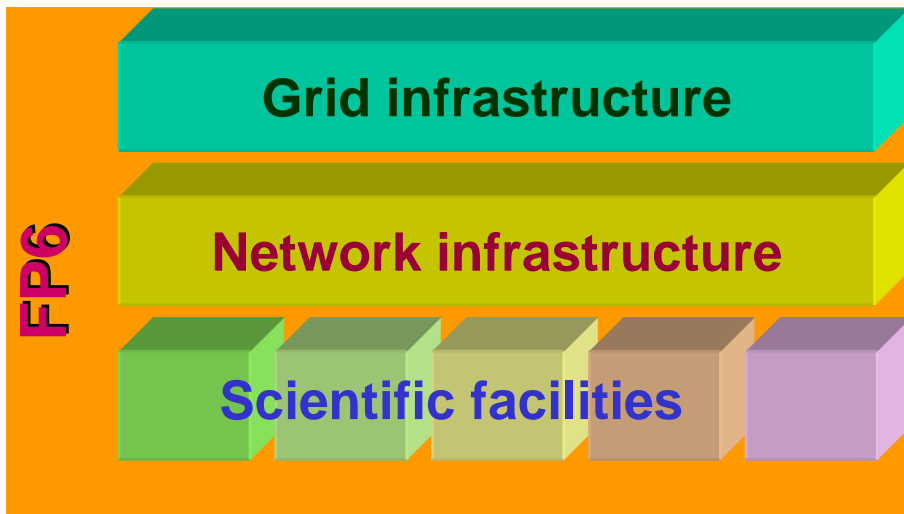


- Strategy on ICT-based Research Infrastructures (RI) in FP7
 - ✓ access to and share of scientific Resources
 - ✓ construction of new Resources
- FP7 support to Supercomputers from in the RI Work Programme

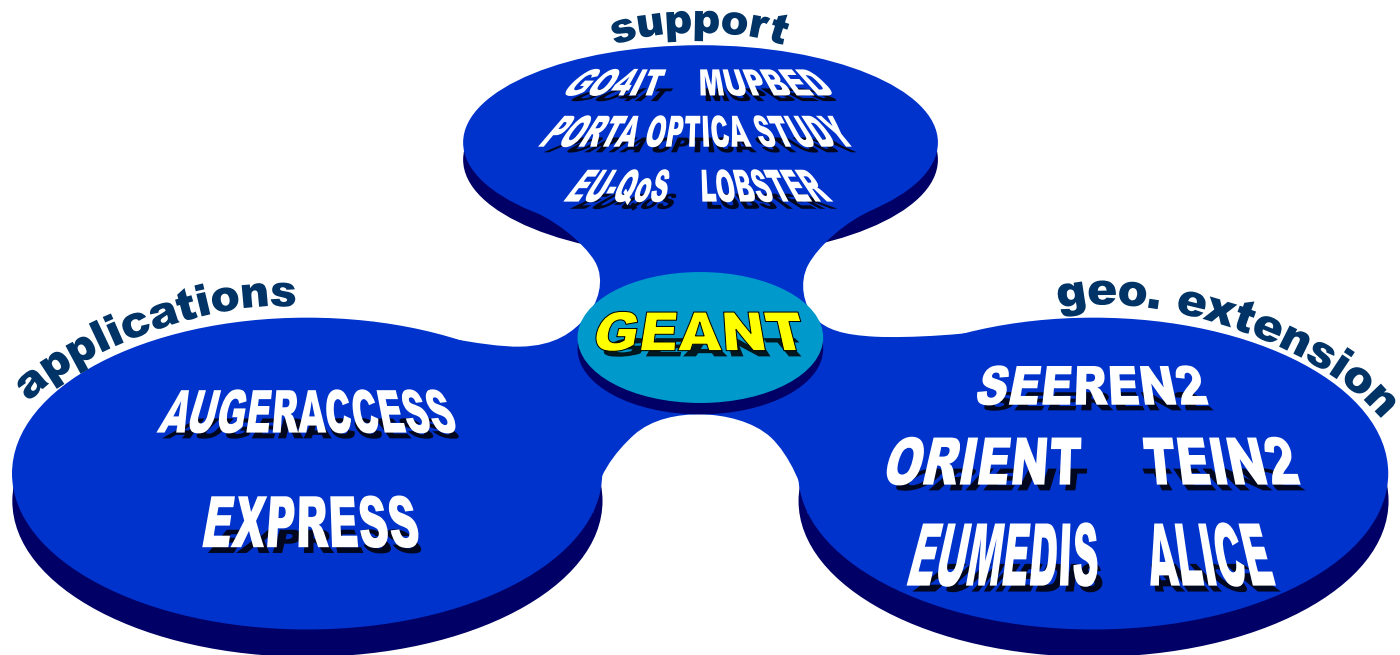
Resources = supercomputers, data repositories, scientific instruments, [soft/hard]-ware,...



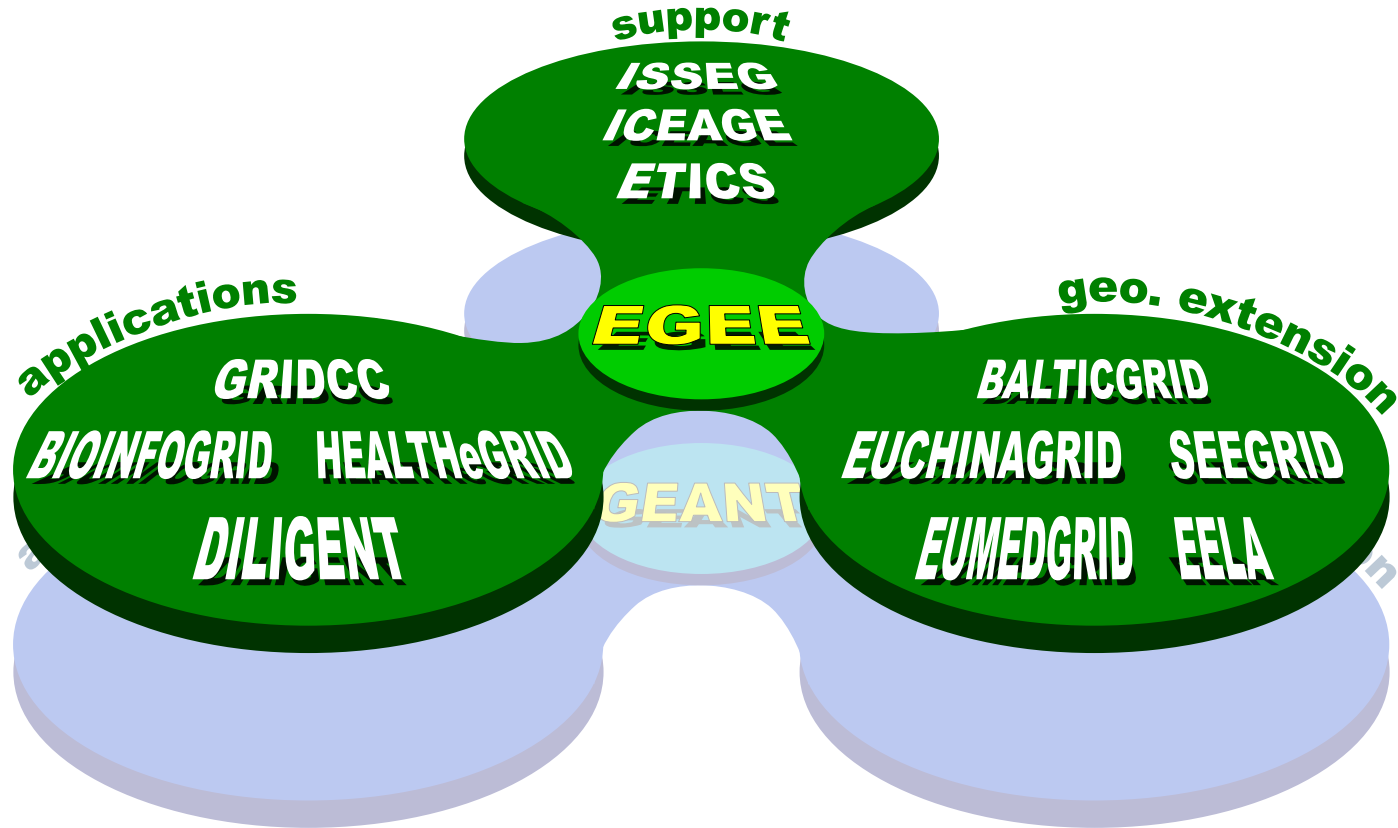
FP6 – what has been achieved so far



FP6: Horizontal and vertical integration



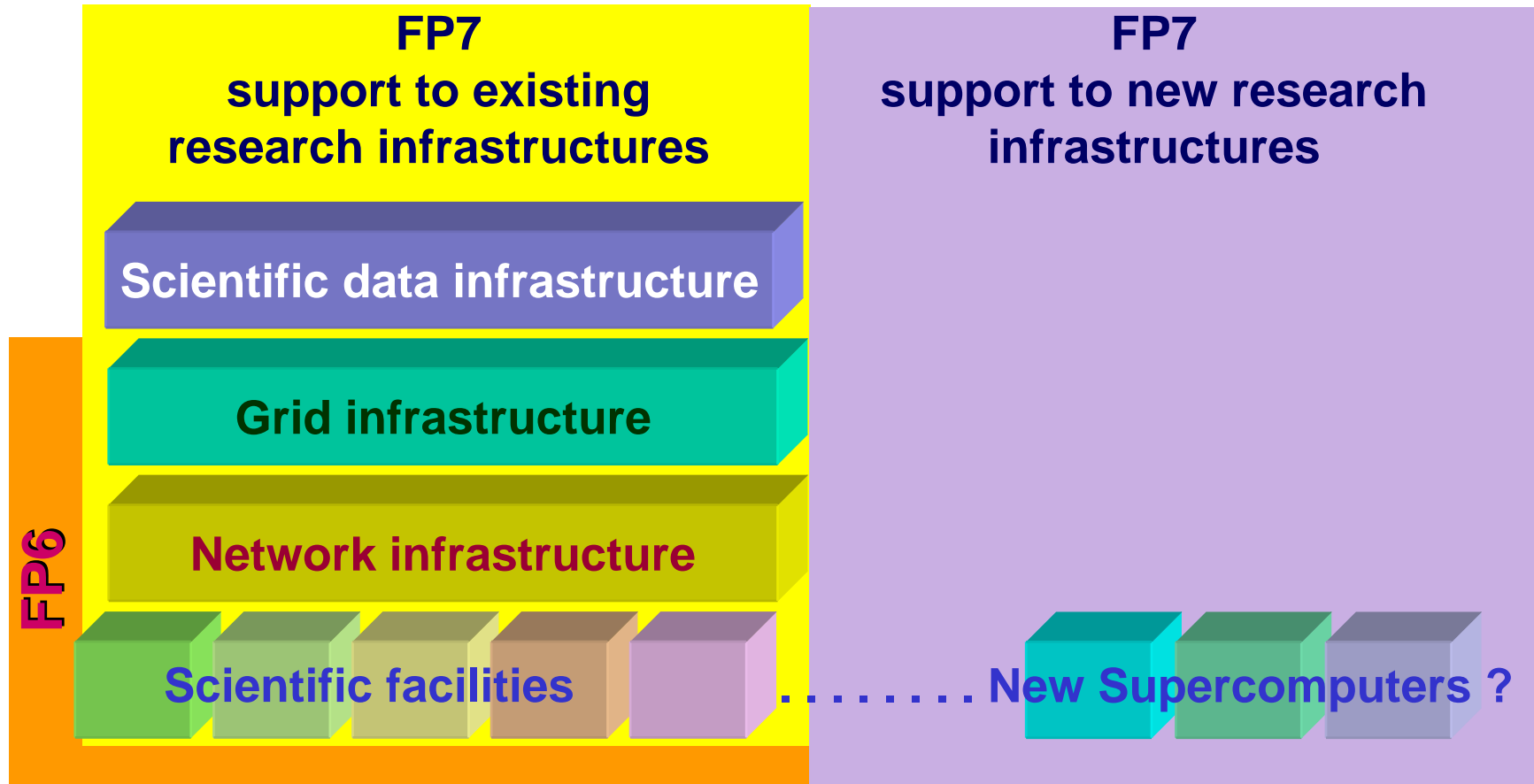
FP6: Horizontal and vertical integration



FP7: Horizontal and vertical integration

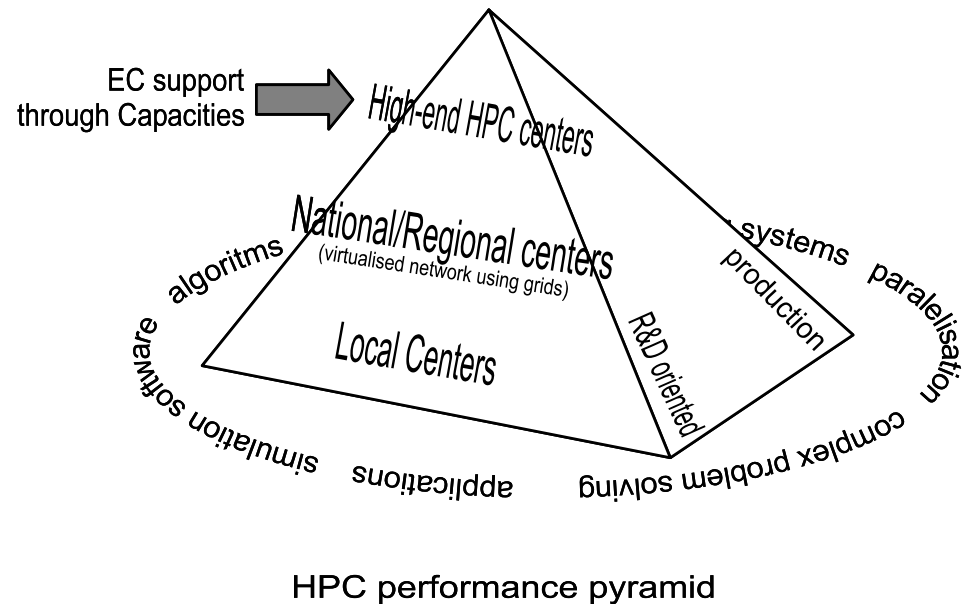


FP7 – addressing new layers and infrastructures



21st March 06 – HPC Workshop: Visions

- ✓ The HPC infrastructure is a needed component of the *European Science Grid* infrastructure
- ✓ Sustainable eco-systems for Computational Science require European *expertise* and *services infrastructure*
- ✓ HPC Infrastructure should be *pyramid shaped*
- ✓ European Science Grid infrastructure will support *different algorithmic processes* rather than *different scientific disciplines*
- ✓ Any European HPC system needs to be *significantly bigger* than comparable national systems in the same time frame
- ✓ A steady program to *continuously invest and upgrade* on top of the national infrastructures is preferred over a single one-time investment
- ✓ Any European HPC-infrastructure should *build on the DEISA model*



Strategy for investment on Supercomputers

Why does Europe need to invest in supercomputers?

1. European scientific case
2. Lower entrance barriers to SC market
3. Mission critical tasks



1. European scientific case

- Computer simulation is recognised as the **third pillar** of science and technology – sharing equal focus with theory and experimentation.
- Simulations are performed on computing platforms ranging from simple workstations to very large and powerful systems known as **high-end computers**.
- MS & EU: grids of both workstations and supercomputer systems
- MS invest periodically in supercomputer systems of regional and national nature.
 - *Top10: 2 in Europe; 7 in USA; 1 in Japan (Nov06).*
- ❖ *Investment at EU level should be in **high-end computers**.*



2. Lower entrance to market

- Supercomputers became
 - cheaper than what they were before
 - a commodity system (COTS)
- Examples:
 - Spain: Barcelona's MareNostrum (IBM's Blade Center JS21 Cluster);
 - France: CEA's Tera10 (Bull's NovaScale 5160 Cluster)
- ❖ Makes sense to examine the opportunity for **Europe to invest in supercomputers**



3. Mission critical tasks

'As computational power increases and codes are updated, model fidelity to reality increases and the accuracy of computed answers is improved.'

Examples :

- the prediction of changes in the Earth's climate
 - faster time to solution in civil protection (e.g. nuclear safety, natural catastrophes)
 - commercial arena, where minimising time-to-market is key
 - exploration the solution space of a problem in a reasonable time, before committing to build engineering prototypes
- ❖ Such investments may become critical to make *informed decisions to governments* on broader societal objectives



FP7: Specific Programmes

Cooperation – Collaborative research
(predefined themes, refined FP6 instruments)

Ideas – Frontier Research
(ERC, competition, individual grants)

People – Human Potential
(mobility)

Capacities – Research Capacity
(infrastructure, SMEs, science and society)

+

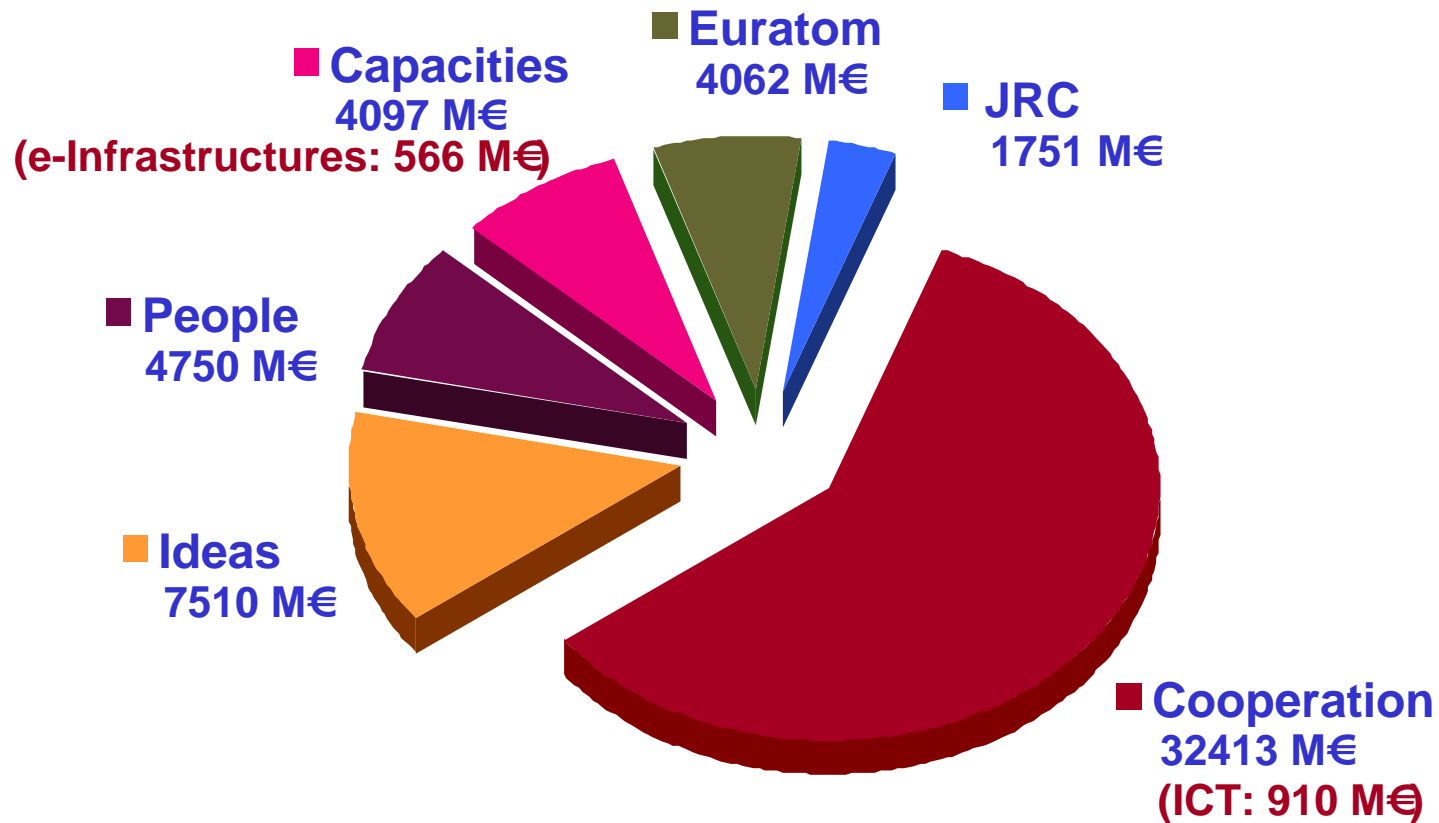
JRC (non-nuclear) + JRC (nuclear) + Euratom

~55B€

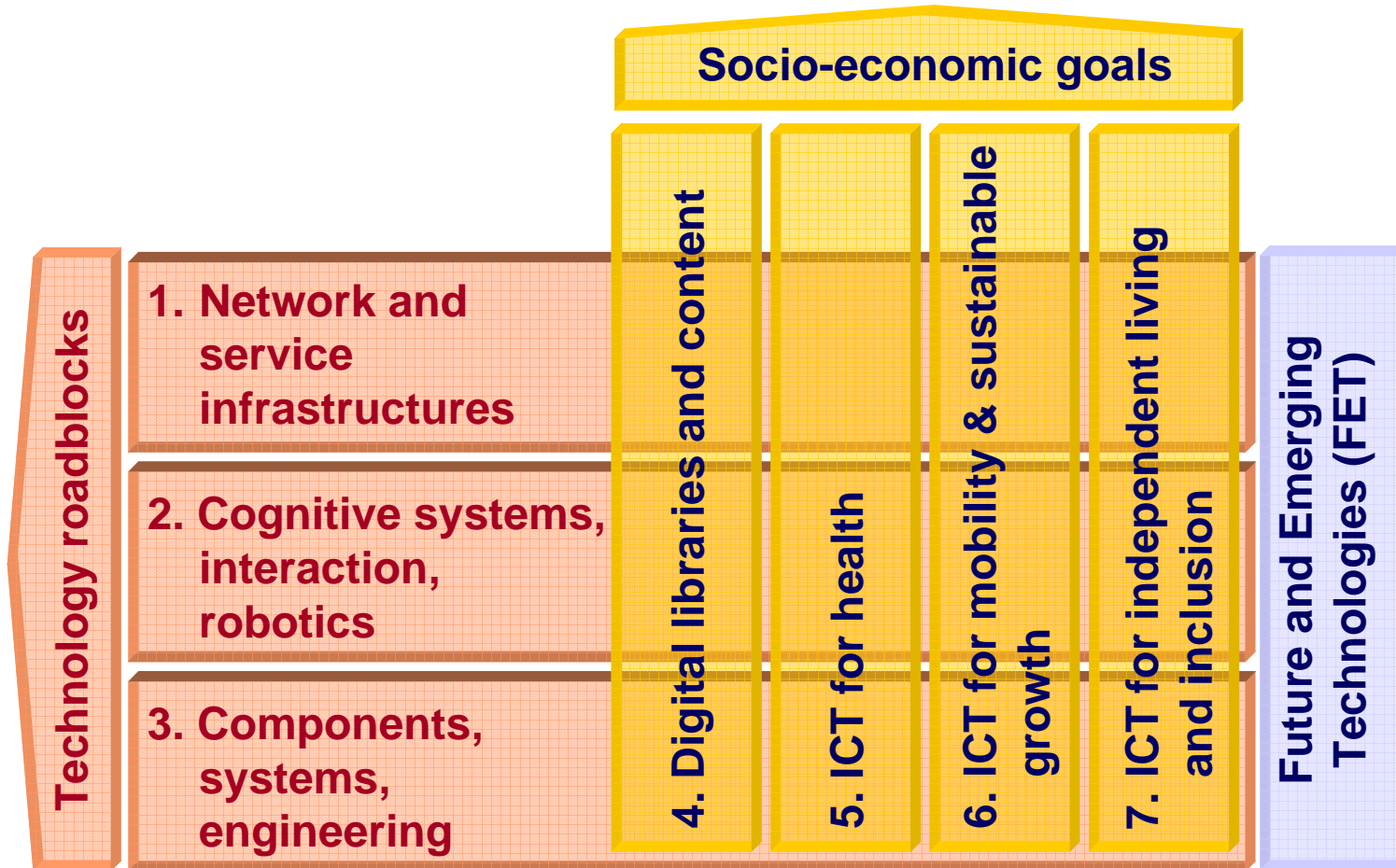


FP7: Specific Programmes

DRAFT



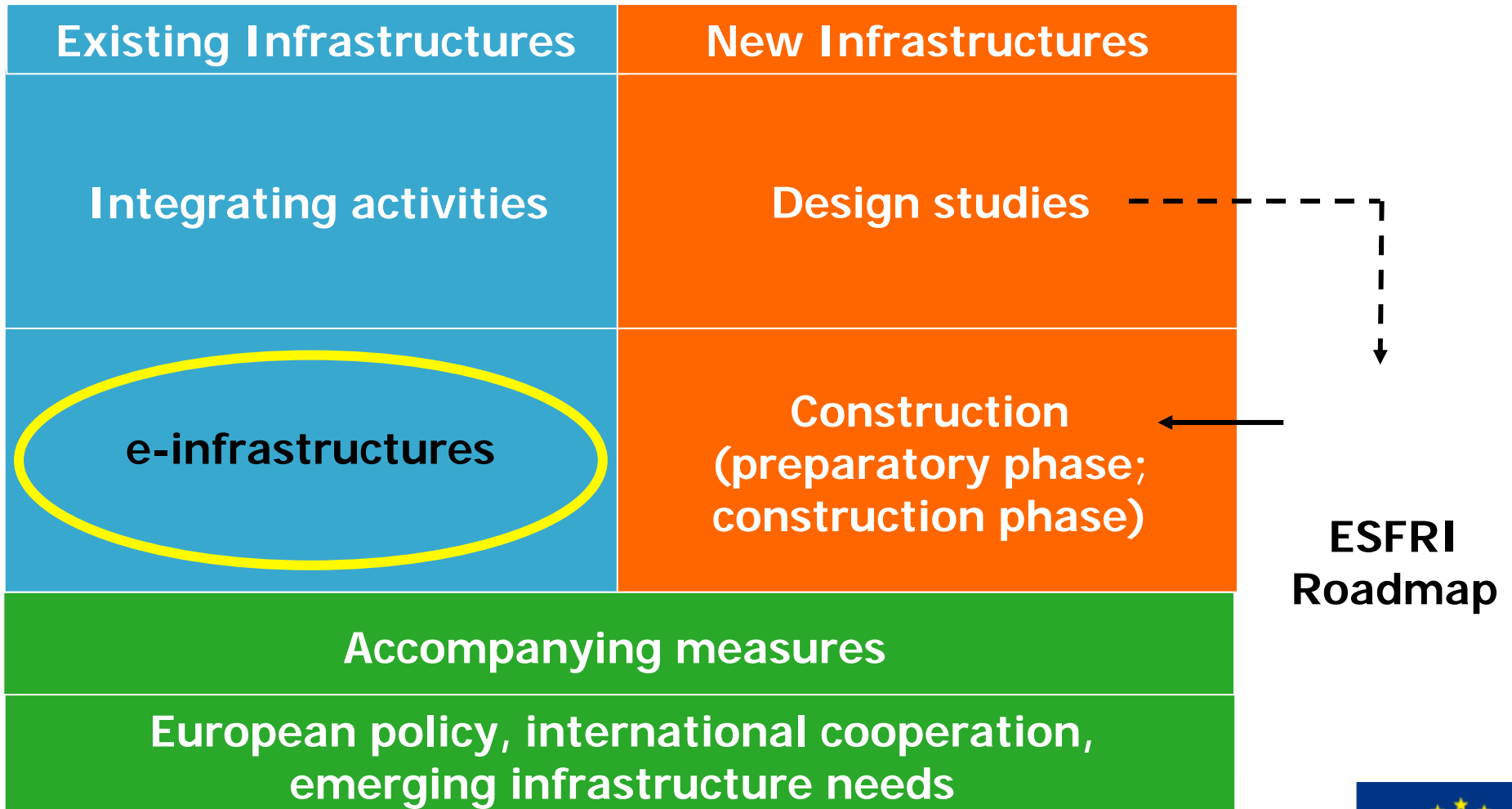
FP7 Cooperation: the ICT Work Programme



First calls expected to be launched early 2007



FP7: Research Infrastructures in brief



Call for proposals in 2007 - Topics



CALL 1 (closes May 2007)

1. Scientific Digital Repositories (€15m)
2. Deployment of e-Infrastructures for new Scientific Communities (€27m)

CALL 2 (closes Fall 2007)

3. e-Science Grid Infrastructures (€50m)
4. Accompanying Measures (€14 M)



Call for proposals N°1 – launched end 2006

Topics:

1. Scientific Digital Repositories (€15m)

Fosters:

Support deployment of digital repositories for scientific communities by **pooling existing resources** at European level and supporting data **storage, access, interpretation, interoperability, management & curation** activities

Enables:

scientists to effectively **aggregate** and **combine information** to generate and **share knowledge**, profiting from a transparent underlying data infrastructure across communities, institutions & geographic boundaries



Call for proposals N°1 – launched end 2006

Topics:

1. Scientific Digital Repositories (€15m)
2. Deployment of e-Infrastructures for new Scientific Communities (€27m)

Reinforces ...

The **impact**, **adoption** and **global relevance** of e-Infrastructure across various areas of science & engineering and supports its continuous **consolidation & expansion**.

Provision of advanced **applications** and **capabilities** to more researchers, capturing commonalities, fostering interoperability, promoting open standards and federating approaches across disciplines. Some researchers might need adaptation of methods and scientific practices (e.g. **software tools**, **simulation models**) to best exploit the e-Infrastructure (e.g. peta-flop parallelisation challenges).



Call for proposals N°2 – launched May/June 2007

Topics:

1. e-Science Grid Infrastructures (€50m)

Supports the further **time extension**, **core evolution** of grid-based infrastructures and foster the **pooling of more resources*** (across multiple scientific disciplines) across multiple scientific disciplines.

Emphasizes on provision of **persistent**, **cross-disciplinary** services with increased levels of **interoperability**, **trust** and **security**.

Aims at maintaining **world class performance** and **global relevance**.

* Resources = supercomputers, data repositories, scientific instruments, [soft/hard]-ware,...



Call for proposals N°2 – launched May/June 2007

Topics:

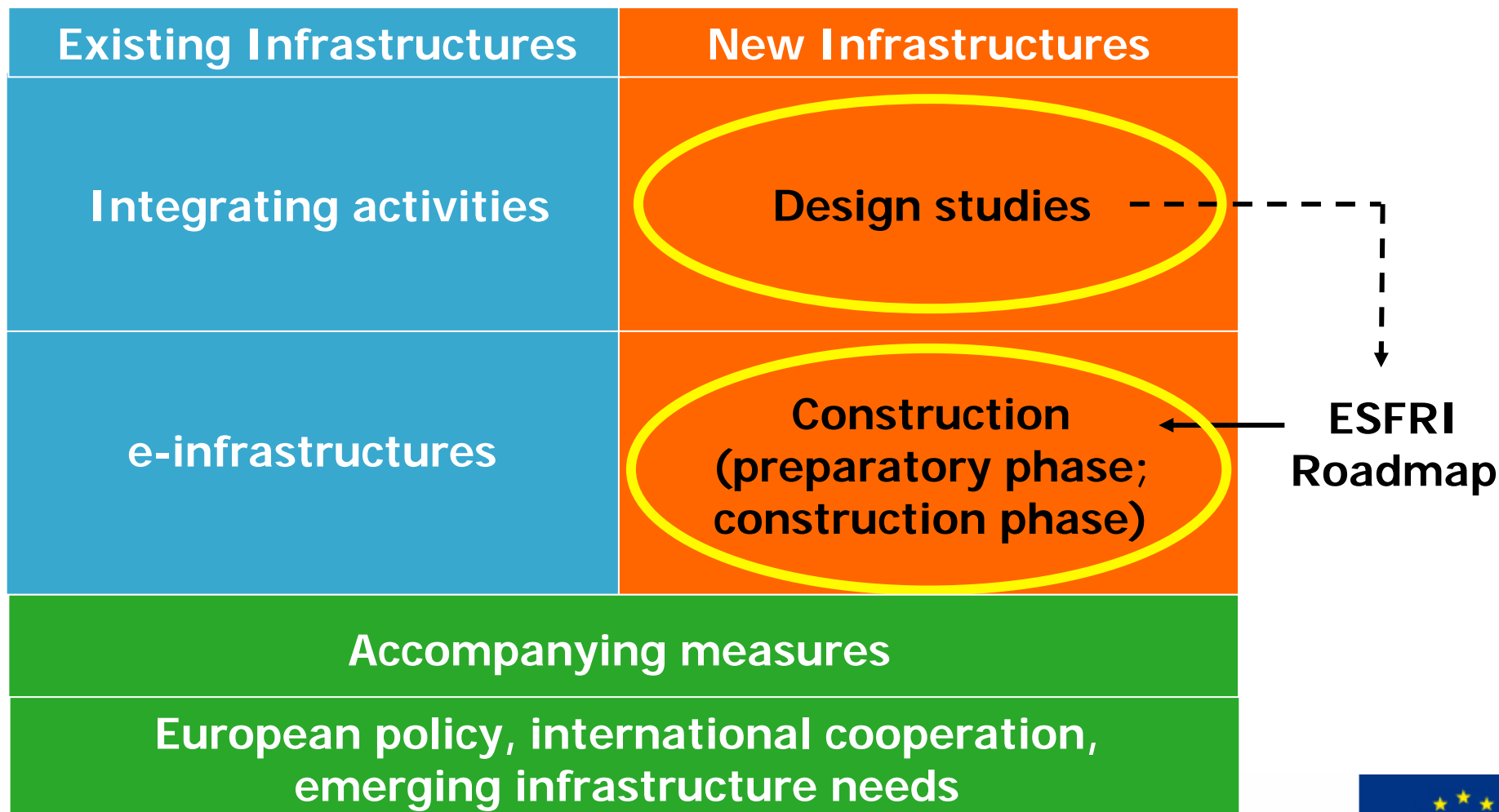
1. e-Science Grid Infrastructures (€50 M)
2. Accompanying Measures (€14 M)

Supports studies, conferences and coordination actions to promote European and/or international
-cooperation in all S&T fields and
-interoperation in between similar infrastructures.

Emphasizes on development of an European policy for RI and to contribute to sustainable approaches for the provision of cross-disciplinary research services.



FP7: NEW Research Infrastructures



Call for proposals N°1 – launched early 2007

- Indicative budget for **design studies**: 35 M€
 - 6 M€ for design studies in e-Infrastructures (feed next ESFRI roadmap update)
- Indicative budget for **preparatory phase**: 130 M€
 - 10 M€ for RI defined under the ESFRI 'Computation and Data Treatment'
- Closure: May 2007
- Single stage procedure for evaluation with possible hearings
- Results within 4 months after closure date
- First contracts will come into force before the end of 2007



FP7: *design of new* research infrastructures

- **Design studies** call supports
 - the conceptual design for new infrastructures with clear European dimension and interest
 - Assess scientific, technical and financial feasibility of new infrast.
 - New organisational models for a sustainable approach to e-infrastructure
- Useful to feed the **ESFRI roadmap** process



FP7 : development of an European HPC service (ESFRI)

- *Need for a combination of centralised, distributed and networked aspects, based on a pyramid-like organisation starting from a few very high-end centres and going down to smaller units. The service should contain both capability and throughput resources.*

- A two-stage process:

The **preparatory phase**:

- ▶ to reach a (draft) agreement between all relevant stakeholders that can make a decision on the construction and make financial commitments;
- ▶ to achieve legal and financial maturity required to engage in construction
- ▶ to transfer of knowledge from existing prototypes
- ▶ to ensure beneficiary scientific communities are able to exploit new facility

The **implementation phase**: the actual construction



Participation to the Preparatory phase

- Call for proposals but **only one proposal** is expected
- Project **consortia** should involve, as appropriate :
 - ➔ Public authorities or funding agencies at national and/or regional level
 - ➔ Research and development agencies
 - ➔ Operators of research facilities
 - ➔ Research centres, universities, industry
 - ➔ Industrial partners as ... users
 - ➔ But not Ind. Partners as Manufacturers of HPC systems
 - ➔ ... all relevant stakeholders necessary to commit to construction
- The European Commission may act as a "**facilitator**"

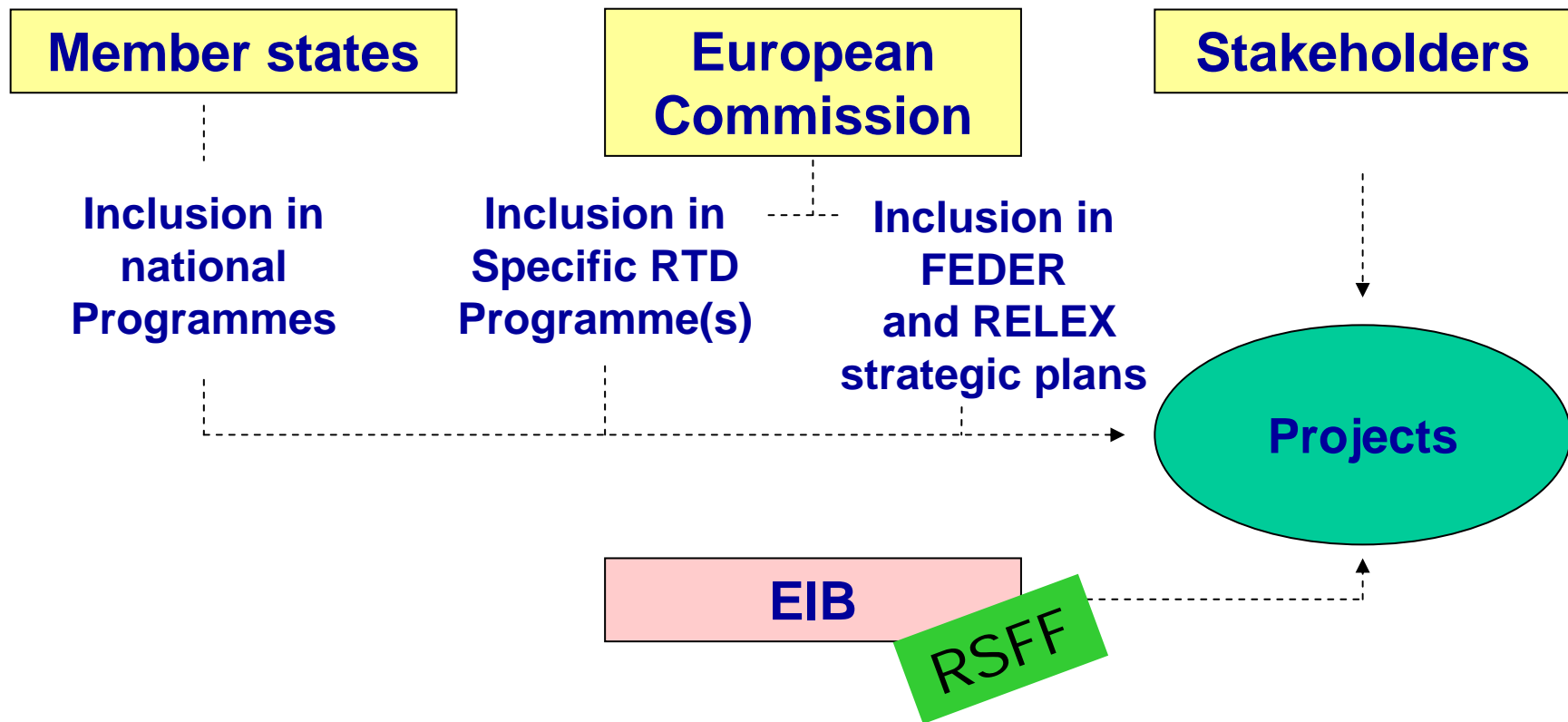


The Implementation phase

- Direct Community financial support will be **very limited**
- The European Commission may again act as a **“facilitator”**
- No calls for proposals
- The challenge: an increased use of **financial engineering**



Financial engineering for new research infrastructures



Key Messages

- Supercomputers for Europe can be an FP7 reality
- ESFRI and e-IRG have co-operated to edit the Roadmap for new RI on Computation and Data Treatment
 - European HPC service is considered mature enough
- Welcome the co-operation with ORAP members in research or policy areas related to Supercomputers

