ESFRI European Strategy Forum on Research Infrastructures

ESFRI Strategy on Research Infrastructures and Horizon 2020

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APPEC workshop, DESY Zeuthen, Berlin 4-5 November 2013

ESFRI European Strategy Forum on Research Infrastructures

Outline

- ESFRI short term issues: assistance towards 60% implementation in 2015; “prioritization” of the 2010 roadmap
- Assessment tools, Indicators, landscape analysis
- Start of H2020 – Research Infrastructures
- ESFRI medium term goal: the “newly designed” Roadmap (2015-2016)
- ESFRI and the specialist roadmaps in Physics
- The GSO-G8+5 Global Research Infrastructures

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Research Infrastructure (RI): Readiness check for 2015

RIs contribute to the implementation of Europe 2020 strategy and its Innovation Union Flagship Initiative

General

- facilities, resources or services of unique nature identified by European research communities to conduct top-level activities in all fields
- single-sited, distributed, virtual
- Open-Access for basic-research

Distributed

- Common legal form
- Single management board
- Governance structure

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Definition of pan-European RI

- Providing scientific / technological cutting edge and managerial excellence
- Have a clear pan-European added value (at least 30% of users coming from non-host countries)
- Provide top-level services and training possibilities for young scientists
- Projects selected by peer review since demand exceeds supply
- Results published in the public domain

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Priorities in the The Roadmap

- The Competitiveness Council of the EU asked to define priorities in the Roadmap
- ESFRI and the EC have created a high level panel to deliver an “Assessment of 35 projects in the Roadmap” concerning the management, governance, financial aspects. NOT SCIENCE
- ESFRI has asked the Strategic Work Groups to address the LANDSCAPE of internaitonal Ris and to assess the overall quaity of the Projects

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The Assessment Matrix

Phase	Stages	Modules					
1) Preparatory	Concept Screening						
	Feasibility Study						
2) Approval	Business case review						
	Delivery Strategy						
	Investment Decision						
3) Implementation	Construction						
	Operations						

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The Assessment Matrix

For the purpose of the AEG Report, a research infrastructure is considered to be "mature", i.e., ready for implementation, when it meets the main following criteria:

- Cost and financial plan well defined, with adequate cost estimates;
- Firm financial commitments for the relevant investments and operations;
- Approved statutes and governance structure in place;
- Existence of a credible project organisation, with clearly identified responsibilities and reporting lines;
- Key Performance Indicators (KPIs) established and staff planning outlined, including procurement considerations;
- User Strategy well planned;
- Risk Analysis included.

- Category one lists projects which meet the criteria to be ready for implementation by 2015.

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The Assessment Matrix

The Assessment Matrix is structured according to six modules, as presented in Figure 2. A well-structured research infrastructure project has to be appropriately mature at each stage of its life in each of these six areas.

Figure 2: Modules of Research Infrastructures

Modules
Cost and financial Structure
Governance and Legal Structure
HR Policy and Project Management
Stakeholder Engagement and Financial Commitments
User Strategy
Risk Strategy

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ESFRI Projects

Area	Roadmap 2010	Implemented
Social Science and Humanities (SSH)	2	3
Environmental Sciences (ENV)	9	0
Biological and Medical Sciences (BMS)	13	0
Energy	6	1
Engineering, Physical Sciences, Materials and Analytical Facilities (EPS)	8	5
E-Infrastructures	0	1

ESFRI Projects – AEG

SKA - SQUARE KILOMETRE ARRAY FOR RADIO-ASTRONOMY

Key Issues and findings

SKA is a multi-stage, dual-site infrastructure (the antennas are distributed over two continents) aiming at new fundamental results in physics and astrophysics. It has been on the ESFRI Roadmap since 2006. The Approval Phase has started and is scheduled to end in 2016. It is running late at this moment, but schedule recovery actions have been taken.

ESFRI Projects – AEG

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SKA SQUARE KILOMETRE ARRAY

- The international legal and administrative skills required to monitor and assist the different partners should not be underestimated. The same will be true for quality control and manufacturing supervision. Exchanging ideas and experiences with CTA should be considered. Regarding contractors and participating organisations, legal advice should be sought to find the most effective ways to make sure that the deliverables from participating organisations are produced on time and within budget and the in-kind contributions are properly valued at international standards. The AEG strongly encourages the management to consider establishing an international procurement task force to monitor and assist the partners responsible for critical work-packages.
- A Risk Report dealing in detail with the organisational and procurement risks in the Construction Stage should be added to the present, carefully elaborated Risk Report. It is already clear that the very high data rates from the telescopes and the corresponding energy needs for the very remote sites are challenging and require special efforts and innovative ideas. The Risk Report should also focus on the technical and cost part once the pre-construction is more advanced and the chosen designs have converged. The IPR component of such developments has applications far from the scientific areas and could even become politically important in the regions where the antennas are placed.

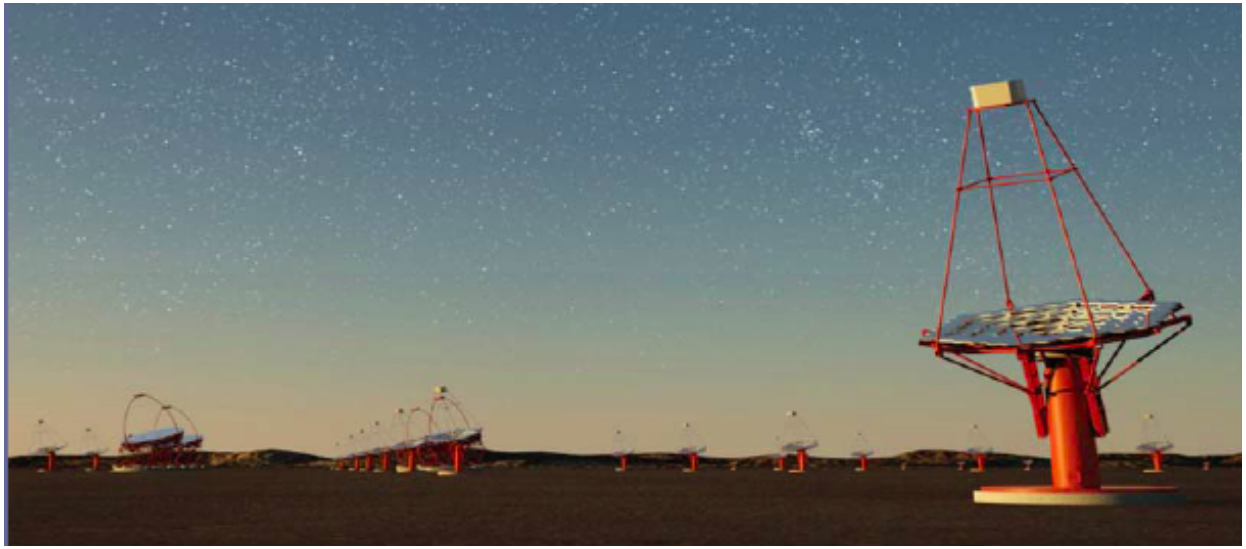
ESFRI Projects – AEG

CTA - CHERENKOV TELESCOPE ARRAY FOR GAMMA-RAY ASTRONOMY

Key Issues and findings

CTA has been on the ESFRI Roadmap since 2008 and envisages two telescope arrays (northern and southern hemispheres) for ground-based, high-energy gamma ray astronomy. The CTA consortium covers a substantial part of the worldwide scientific community in this area. CTA is a mature collaboration of 27 countries, 171 institutions, and some 1 200 people involved. In 2012, 13 countries signed a Declaration of Intent (Germany, France, Spain, Italy, the UK, Austria, Poland, Switzerland, Japan, Argentina, Brazil, South Africa and Namibia), while it is anticipated that in 2013, 14 more countries will sign (Armenia, Bulgaria, Croatia, the Czech Republic, Finland, Greece, India, Ireland, Mexico, the Netherlands, Norway, Slovenia, Sweden and the US).

The overall design concept is well developed with appropriate cost breakdown. Prototyping and site selection have taken a long time and site selection is still on-going.



ESFRI Projects – AEG

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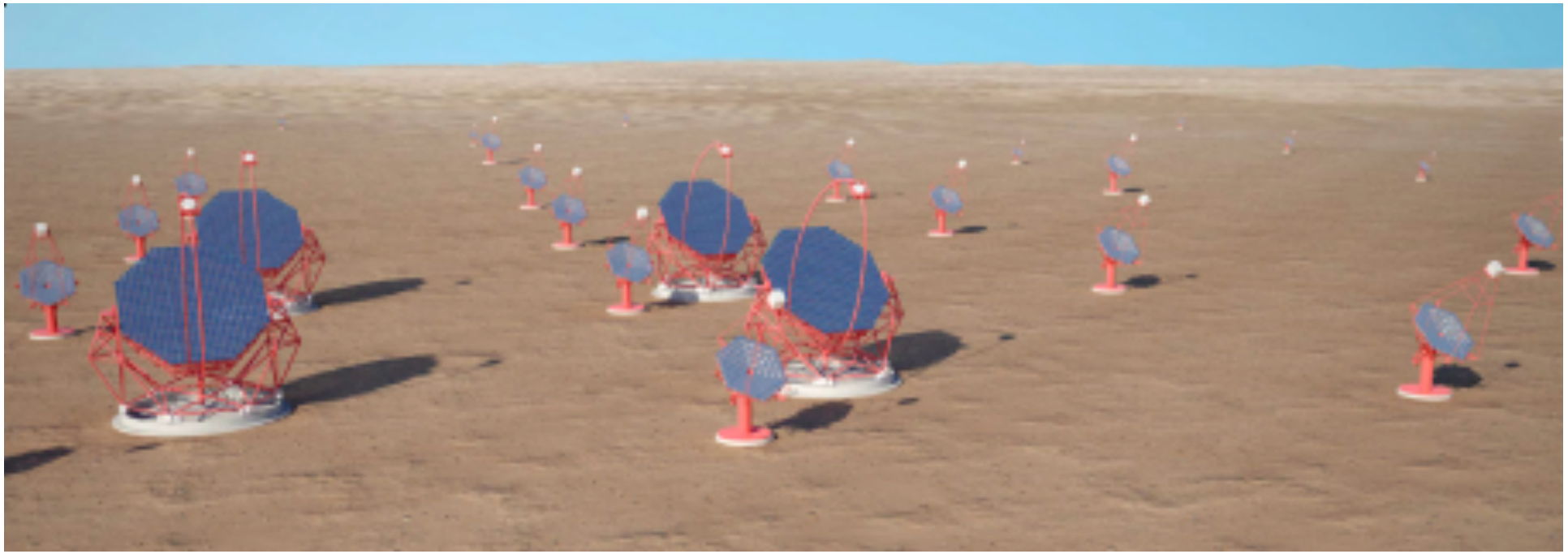
cta cherenkov telescope array

- Site selection should be concluded and hiring started in the immediate future, or the whole project will be at risk. Since the northern hemisphere site has not been decided upon, the possibility of it not being in Europe should be considered and provisions for such a scenario made.
- Call for tenders to be issued may also potentially slow down project implementation and a procurement strategy should be devised to minimize delays, depending on the legal entity selected by the proposers.
- As for all major construction projects that foresee much of the construction to occur through in-kind contributions, a major challenge will be to make sure that critical in-kind work packages are delivered on time. An independent top-level in-kind committee with real power will be required to ensure that major critical items to be procured through in-kind contributions will be properly valued and supplied on-time and on budget.



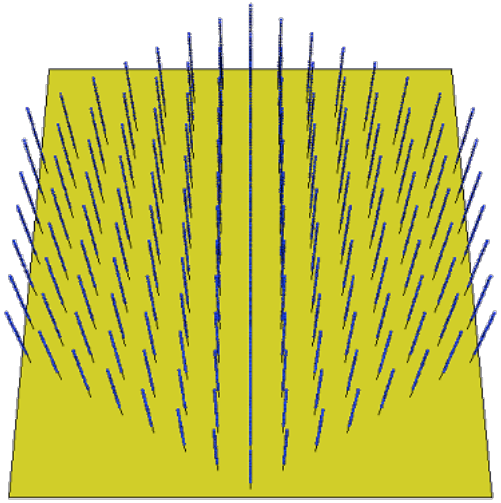
ESFRI Projects – AEG

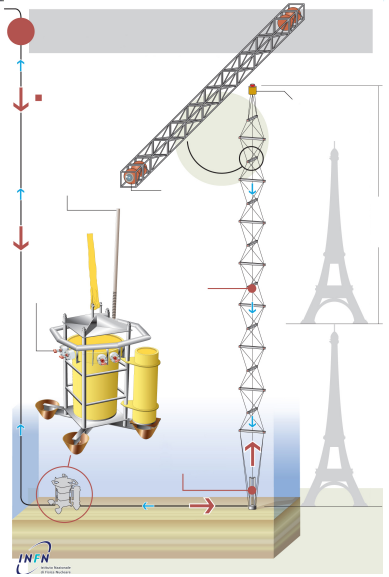
KM3NET - KILOMETRE CUBE NEUTRINO TELESCOPE

Key Issues and findings

KM3NeT has been on the ESFRI Roadmap, since 2006 as a European research infrastructure for neutrino astronomy as well as earth and sea science. The stated main purpose is to build an underwater detector to map neutrino sources in the galaxy. The management state that they will have better location(s) and higher sensitivity than the US. IceCube facility, which was completed early in 2011. The material provided and statements made during the interview indicate that the project's main interest is to be the first to observe an astrophysical source of neutrinos in the galaxy.

The current estimated cost for the full detector is EUR 225 million including 20% contingency but excluding VAT. At present some EUR 40 million is committed, which is sufficient for the Phase 1 of the project. There is, however, neither the demonstrated commitment nor expressions of interest at this stage that would enable the construction of the full KM3NeT. It could be argued that the Phase 1 investment is R&D for the full KM3NeT which itself would need to run for several years to achieve the main physics goal.





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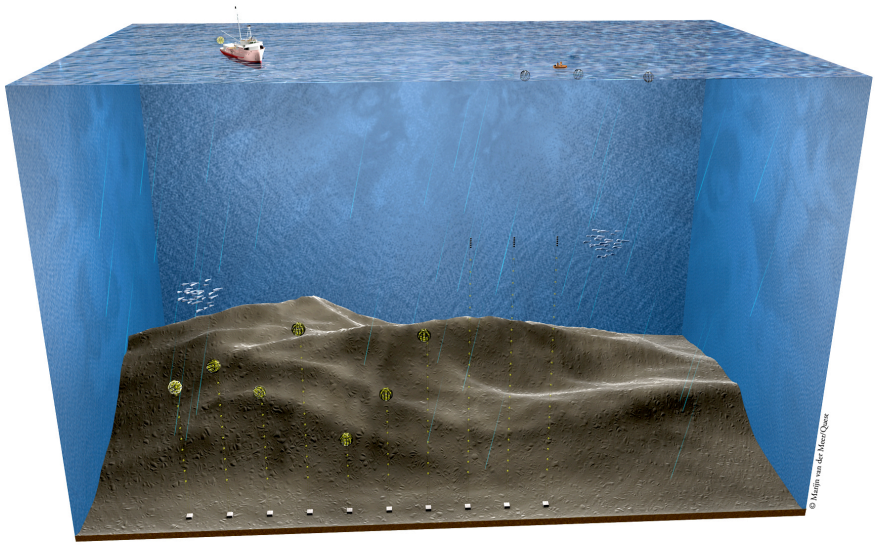
ESFRI Projects – AEG

Conclusions

KM3NeT could be considered mature in a number of respects, as it has secured funding for a Phase 1 technical demonstration. However, in order to achieve its physics goals several years running would be needed with the full detector. There is an urgent need to determine the likelihood and timing of securing the funding for this next phase. In the absence of such funding, there is a risk that the current investment will not yield any scientific return. At minimum there needs to be a detailed cost review of the current phase before funds are committed. An independent international scientific review is recommended.

KM3NeT has clearly not yet reached maturity particularly with regard to funding of the full instrument and the AEG believes the chances for achieving maturity by 2015 to be minimal.



ESFRI Projects – PSE Strategy WG (John Womersley – Giorgio Rossi)

Recommendation for Implementation Support – ONGOING ACTIVITY

The SWG felt that it was inappropriate to prioritise the four category 1 and 2 projects as all were considered by the group to be worthy of this type of funding, as in all cases a good case had been made that additional support would address key barriers to timely implementation.

It was agreed, therefore, to concentrate on the areas that had been identified within each of the projects where additional funding could make a real difference towards implementation, by addressing bottlenecks that other ESFRI projects could benefit from and by reducing the risk of not reaching implementation.

ESFRI Projects – PSE Strategy WG

ESFRI European Strategy Forum on Research Infrastructures

The following suggestions were made for support in the range 3-6 M€ :

ESS - for the development of processes to manage in-kind contributions. The level of coordination and integration required for in kind contributions has been identified as the project's No. 1 risk, and many other projects on the roadmap can benefit from such an approach.

ELI - for integration towards a common structure between the three sites. As ELI depends upon structural funds for much of the construction cost, it does not have a clear funding mechanism for integration and scientific management across all three sites, e.g. to function as a unique infrastructure from the point of view of users and as service provider. Again, this is a problem that many other distributed infrastructures can benefit from addressing.

CTA - site preparation/site infrastructure
SKA - site preparation/site infrastructure
Both of these projects are seeking to develop a science facility in remote location (s) outside the EU, which places special challenges in characterising and surveying the site(s), designing and implementing site infrastructure, and preparing for construction to begin.

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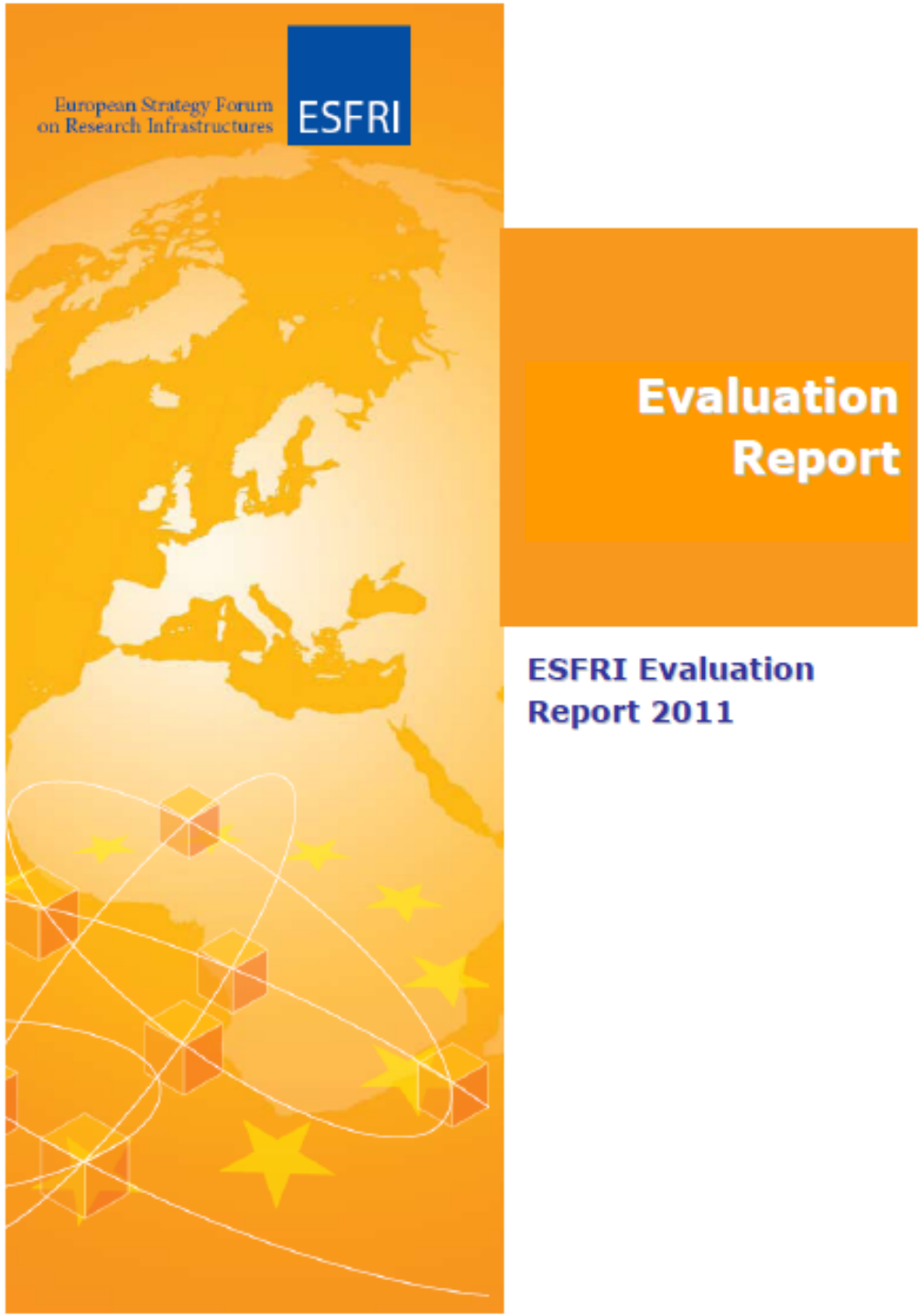
ESFRI's Indicators, landscape analysis

- Monitoring scientific developments and emerging research challenges
- Identifying development lines of e-infrastructures (e-IRG) **
- Development of an evaluation methodology for pan- European RI
- Development of closer cooperation between RIs and e.g. Joint Programming Initiatives, Joint Technology Initiatives
- Building up cooperation with European industry
- Addressing the issue of socio-economic impacts
- Promoting greater regional and international cooperation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ESFRI
Evaluation
Report
ESFRI Evaluation
Report 2011

→ CRITERIA

Evaluation of European Research Infrastructures	
Objective	**Criterion**
Scientific and technological excellence and impact Potential for promoting the ERA through strengthening the knowledge base to address the grand challenges	• **Contribution to the advancement of Science and Technology** – Ability to perform excellent research – Potential to enhance interdisciplinarity • **Appropriateness of measures for the dissemination and/or exploitation of scientific and technological results.** • **Uniqueness:** Complementarity or competitiveness with other RIs at national, regional, European or international level (What is the most appropriate scope of the facility (regional/ European/ global), how does it integrate/ replace existing RIs?) • **Potential role in structuring the ERA** – The potential to strengthen the development of an efficient European Research Area. – Relevance of the RI to EUROPE 2020 (in particular the priorities of smart, sustainable and inclusive growth) and its Innovation Union flagship, and to Horizon 2020 – The potential to address the grand societal challenges • **The contribution, at the European and/or International level to** – Knowledge generation in different areas – Knowledge transfer to industry and /or the wider society – Mobility of researchers • **Quality and relevant experience of the individual participants (Institutions, Labs) and thus the overall quality of the research infrastructure.**

Socio – economic impact and competitiveness You have to differentiate between: Short-term outputs Middle-term outcomes Long-term impacts	• **Capabilities to generate impacts** – Impact on European and/or regional competitiveness and economy – Impact on society – Impact on environment
Governance and financial management	• **Appropriateness of the management structure and procedures** – Transparent and efficient management. – Efficient research services. • **Appropriateness of the allocation and justification of the resources to be committed** • **Access management strategy**

In 2013:

a) Assessment Expert Group (ESFRI+EC) on Governance and Management: Assessment MATRIX

b) Expert Group on Indicators (ESFRI) : indicators of pan-European relevance

Normalization is relative to the data available for the specific field of action of the RI, and the solidity of the normalization data is a crucial ingredient for the indicator.

"high, medium, low" scale

The comparison of "absolute numbers" in the reference data for RIs of different nature (different organization and/or different users community) may lead to inhomogeneity since normalization is not easy in all cases.

Ex-post indicators

ANNEX 1
Table of Indicators for the ex-post evaluation of "pan-European interest" of a research infrastructure

No.	MACRO-Indicator	Comment on interpretation of the indicator	Data source
0 Background Information			
	International agreement type: ERIC or other, or explicit international mission if funded by one country	Level of shared responsibility, long term commitment of consortium	EC, ERIC committee, Project management
	Geographical distribution of service points or nodes	Level of accessibility by EU and international users flux analysis	Project management, EC TNA ststistics
	Upgrade/reuse of national pre-existing investments that acquired European/international dimension in the RI	Re-use of existing resources/operating costs in the new mission of the new RI *Re-orientation of national science sites/institutions to new pan-Eu mission*	EU, MS
	Place in the landscape of RIs in Europe	Flux analysis of users, coordination with other RIs (complementary, supplementary)	ESFRI, Project management
1 Membership Indicator High, Medium, Low			
1.1	No. of MS/AC and global partners contributing to (a) construction, (b) operation and c) to equipment	total no., quantitative indicator	Project management
1.2	Structure of commitments to (a) construction and (b) operation/GBAORD	Cash+in-kind, quantitative indicator *declared/expected total commitment to the RI normalized to the general effort in research of the MS-AC/Europe in the*	Project management and EUROSTAT or MS-AC authorities

ANNEX 1
Table of Indicators for the ex-post evaluation of "pan-European interest" of a research infrastructure

		relevant research field ("added effort" represented by the RI in the given field at pan-EU level)	
1.3	Estimated value of national nodes contributing to a distributed RI to (a) construction and (b) operation/ GBAORD	Cash+in-kind, quantitative indicator (see above)	Project management and EUROSTAT or MS-AC authorities
2 Usage Indicator High, Medium, Low			
2.1	No. of users of the RI per country/ total no. of scientists per country (in the given field)	geographical distribution, interdisciplinarity, demand (users pressure, overbooking), trans-national access (TNA) *impact on structuring the research in the field of RI over all Europe*	Data bases of RIs and EUROSTAT or MS data on total employment in the field, Data base of EC I3 for TNA
2.2	No. of user accesses	Absolute values of access to the RI (services, samples, data, expertise etc.)	Data bases of RI, possibly compared with "successful" international RIs in same or comparable field
2.3	No. of users-partnerships (when relevant for the kind of RI)	Number of collaborating research teams or consortia investing long term instrumentation and manpower resources on contractual basis to use the RI	Data bases of RI, to be compared (and scaled) with "successful" international RIs in same or comparable field

ANNEX 1
Table of Indicators for the ex-post evaluation of "pan-European interest" of a research infrastructure

3 Networking INDICATOR High, Medium, Low			
3.1	No. of joint proposals/total users	Level of cooperation, number of cooperative projects between EU, international and national institutions connected with the use or upgrade of the RI *increase of collaborative research proposals at intl-/European level due to the joint work at RIs e.g. normalized to the level of intl. cooperation in the field without RI*	Proposal data bases of RIs, Programme Committes, Statistics of I3s and proposals for suggested topics Statistics of cooperation projects in the field
3.2.1	Co-publication analysis: international	Increase in international collaborative research due to joint application at the RI	Publication data base of Ris bibliometrics
3.2.2	Co-publication analysis: interdisciplinary	Incerease in interdisciplinary research results (published) that is based on the RI	Publication data base of Ris bibliometrics
3.3	Fraction of non-European users (with non-EU affiliation)	Indicator of internationalisation	RI management
4 Excellence INDICATOR High, Medium, Low			
4.1	Share publication in top 10 journals in each field of reference of respective facilities	Indicator of excellent production	Bibliometrics, RI management (for publication data)

ANNEX 1
Table of Indicators for the ex-post evaluation of "pan-European interest" of a research infrastructure

4.2	Field normalised citation rate	Indicator of impact of publications	Bibliometrics, RI management (for publication data)
5 Knowledge Transfer INDICATOR High, Medium, Low			
5.1	No. of PhD theses and post doctoral programmes/ citations (absolute and relative to total in each field) Normalised to total number of PhD theses in the given field based on Eurostat categorisation as an experimental indicator	attractiveness of RIs to young talents for thesis and doctorate research	Number of PhD thesis based on or citing RI results / total number of PhD thesis in the field From University council statistics and from RI data base
5.2	No. of patents and licenses based on the work of the RI, normalised to no. of patents and licenses in the field	Indicator of primary and secondary (through industry grants to Univ.) impact on innovation	Data base of RI, EUROSTAT data
5.3	No. of industrial users and projects with industrial cooperation	Indicator of for-profit use	RI Management

The “ex-post” indicator list is based on evidence since data can be retrieved and “time averaged” over the construction and operation phase.

These indicators can provide a useful input also to the management of an RI in the *operation phase* referring to the score on each indicator to improve or overcome any shortcomings.

A standardization of the data collection and a “weight” of the indicator and its score should be developed in applying the indicators, based on the actual solidity of the reference data used to formulate the score. The RIs should be involved in this assessment and a consensus score should be established if possible.

Ex-post indicators should be *periodically revised* and *updated by ESFRI* in collaboration with the RIs and their stakeholders.

Ex-ante indicators

ANNEX 2
Table of Indicators for the ex-ante evaluation of the "pan-European relevance" of a research infrastructure

Objective	Indicator	Comment on interpretation of the indicator	Data source
0 Background of new RI or Upgrade Project			
EC			
	Previous Design Study Project	Successfully completed DS	EC (FP6, FP7)
	Previous Preparatory Phase Project	Successfully completed PP	EC (FP7)
	Well established I3 or equivalent networking in the science community that needs the RI	number / size of I3 networks in the field	EC Statistics of I3s and proposals for suggested topics
Other			
	Addressing new scientific challenges with unique / innovative approach strenghtening European leadership	Expectation of new knowledge by the international science community	International Science press, evidence of international competition
	Upgrade of an existing operational RI to pan-European or Global RI	Background of RI	Project Management, EC, MS, GSO
	Re-orientation of existing science sites to host new RI	Background of RI	MS-AS, Project Management
	Landscape analysis of RI in the field and the territorial distribution of service points in Europe	Background of RI	ESFRI
1 Membership INDICATOR High, Medium, Low			
1.1	No. of MS/AC and global partners engaged with	Fraction of total funding which has been	Project management

ANNEX 2
Table of Indicators for the ex-ante evaluation of the "pan-European relevance" of a research infrastructure

	determined share to (a) construction and (b) operation. Mission statement from ownership	comitted so far, quantitative indicator	
1.2	Maturity of international organisation	Existence of a credible project organisation (e.g. statutes, legal form)	ERIC committee, EC, MS, Project management
1.3	No. of nodes of Distributed RI, partner facilities	Number of nodes and flux analysis of users	Project management
1.4	Structure of commitments to (a) construction and (b) operation/GBAORD	Strength of partners involvement in terms of Cash+in-kind, w/r GBAORD	Project management Ministerial sources
1.5	Estimated value of national nodes contributing to a distributed RI to (a) construction and (b) operation/ GBAORD	Cash+in-kind, quantitative indicator (see above)	Project management and EUROSTAT or MS-AC authorities
2 User strategy Indicator High, Medium, Low			
2.1	Fraction of possible users of the RI per country/ total no. of scientists per country (in the given field)	geographical distribution, different science fields, interdisciplinarity, expected demand (users pressure), users initiatives to complement the project	Data base of the research field by reference research communities, Ministerial sources Project management Eurostat
2.2	Scale of service (expected number & time of access per year w.r. size of reference community)	Absolute values of access in the specific form of the RI	Data base of RI, possibly compared with existing "successful" international RIs in similar/comparable field

ANNEX 2
Table of Indicators for the ex-ante evaluation of the "pan-European relevance" of a research infrastructure

2.3	Data management and access structure	% of investment planned in data infrastructure normalized to the most advanced international standards in the field	Project management, data from successful international RIs in similar fields
3 Networking INDICATOR High, Medium, Low			
3.1	Number/size of users consortia willing / planning to contribute own resources to use the RI on contractual basis	number / size of perspective collaborating research teams or consortia	Project management
3.2	Expected % of non-European users	Indicator of internationalisation	Project management
3.3	Expressions of interest by diverse scientific communities	Multidisciplinarity	Project management
4 Excellence INDICATOR High. Medium. Low			
4.1	Attractiveness at international level of staff	Package offer to staff	Project management, EC, ERC
5 Knowledge Transfer INDICATOR High, Medium, Low			
5.1	PhD programme agreements with universities	Estimated number of thesis and doctorate research projects associated with the RI staff and (separately) with users	Project Management
5.2	Industrial involvement in pre-procurement studies and in the construction phase, including IPR	Indicator of industrial interest in innovation through participation to RI pre-procurement and procurement, relative to type of structure and services of the RI	Project management EC – SME related projects connected to the RI

ANNEX 2
Table of Indicators for the ex-ante evaluation of the "pan-European relevance" of a research infrastructure

			Reference to successful intl. projects
5.3	Accessibility by industrial users	Indicator of "for profit" share of use of RI	Project management

Ex-ante indicators based on a thinner data set and more weight is given to *foresight, expectations, landscape analysis and horizon scanning*.

The ex-ante indicators are therefore most useful as instruments of dialogue with the project managers in order to assess the degree of expected pan-European relevance and added value at the given stage of the project and may become reference instruments for the coaching or “incubator” role that ESFRI may pursue with respect to a given project, or ensemble of complementary projects, in order to develop the concept and help maturing the RI proposal according to its pan-European relevance.

The individual indicators of pan-European relevance should be applied to each single project to help gaining evidence on its “absolute” added value as a pan-European project, and should not be used for direct comparison between projects, especially when projects belong to different areas of research.

As the project progresses, both in the preparatory and feasibility study phases (ex-ante indicators) and in the operation phase (ex-post indicators) the values of the specific and macro-indicators will most probably evolve.

This exercise should improve the definition and perception of the pan-European relevance and added-value of the individual RIs, also aiming at its general adoption as an assessment tool by all EU relevant RIs. Its general adoption could help to define an assessment of the overall pan-European relevance of the RI eco-system.

ESFRI European Strategy Forum on Research Infrastructures

- Start of H2020 – Research Infrastructures

Horizon 2020 – Framework Programme for Research and Innovation (2014-2020)

Excellent science

- European Research Council
- Future and Emerging Technologies
- Marie Curie actions
- **European Research infrastructures (including e-infrastructures) – 2.488 M€**

Societal challenges

- Health, demographic change, wellbeing
- Food security, sustainable agriculture, marine - maritime research, bio-economy
- Secure, clean and efficient energy
- Smart, green, integrated transport
- Climate action, resource efficiency, raw materials
- Inclusive, innovative and secure societies

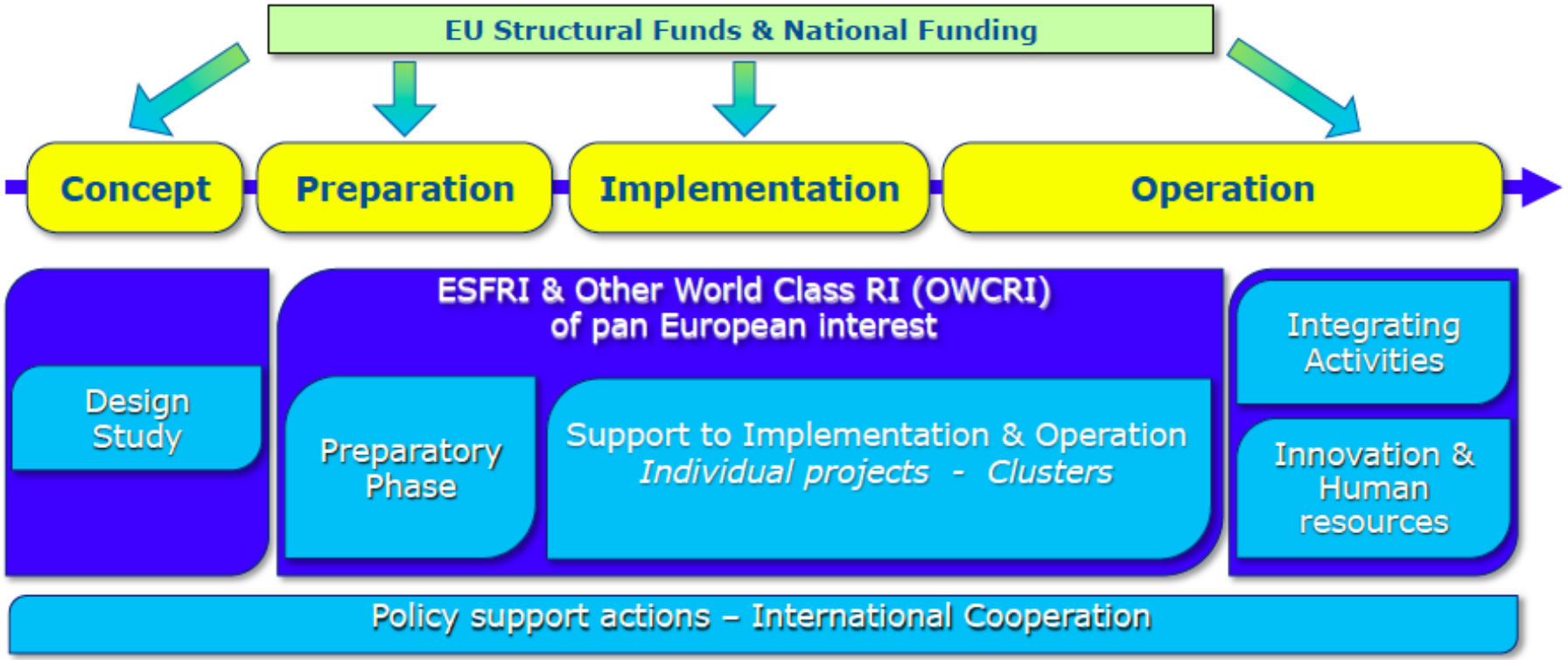
Industrial leadership

- Leadership in enabling and industrial technologies (ICT, space, nanotechnologies, advanced materials and advanced manufacturing and processing, biotechnology)
- Access to risk finance
- Innovation in SMEs

Research Infrastructures in Horizon 2020

1. Developing the European RIs for 2020 and beyond
   - Developing new world-class RIs
   - Integrating and opening national and regional RIs of pan-European interest
   - Development, deployment and operation of ICT based e-Infrastructures
2. Fostering the innovation potential of RIs and their human resources
3. Reinforcing European RI policy and international cooperation

A Coherent Toolbox of Activities



WORK IN PROGRESS !!!

European Commission

Draft Work Programme 2014-2015

Research Infrastructures – Calls

4 Calls - 22 topics in total

1. **Developing new world-class Research Infrastructures**

2. **Integrating and Opening RI of pan-European Interest**

3. ***e-Infrastructures***

4. **Innovation, Human resources, Policy and International cooperation for research infrastructures**

Developing New world-class RIs

Concept & Preparatory Phases

Help Europe respond to challenges in science, industry & society:

- Support the conceptual design of new research infrastructures, which are of a clear European dimension and interest:
  - **bottom-up process**
- Support the preparatory or pre-implementation phase of ESFRI projects:
  - **Linked to prioritisation exercise**

MATTER UNDER DISCUSSION

INFRADEV 1-2014: Design Studies

RELEVANT FOR ESFRI

Specific Challenge: New leading-edge research infrastructures in all fields of science and technology are needed by the European scientific community in order to remain at the forefront of the advancement of research, and to be able to help industry strengthen its base of knowledge and its technological know-how. The aim of this activity is to support the conceptual design and preparatory actions for new research infrastructures, which are of a clear European dimension and interest. Major upgrades of existing infrastructures may also be considered if the end result is intended to be equivalent to, or capable of replacing, an existing infrastructure.

Scope: Design studies should address all key questions concerning the technical, legal and financial feasibility of new or upgraded facilities, leading to a 'conceptual design report' showing the maturity of the concept and forming the basis for identifying and constructing the next generation of Europe's and the world's leading research infrastructures. Conceptual design reports will present major choices for design alternatives and associated cost ranges, both in terms of their strategic relevance for meeting today's and tomorrow's societal challenges, and (where applicable) in terms of the technical work underpinning the development of new or upgraded research infrastructures of European interest. All fields of science are considered.

MATTER UNDER DISCUSSION

RELEVANT FOR ESFRI

INFRADEV 2-2015: Preparatory Phase of ESFRI projects

Specific Challenge: The ESFRI roadmap, updated periodically, identifies the needs of the European scientific community in terms of research infrastructures. However, inclusion in the ESFRI roadmap does not guarantee that these needed infrastructures will be built. Before proceeding with the construction and/or implementation of the identified infrastructures, many preliminary decisions need to be taken with respect to issues such as the identification of funders, the financial plan for sustainability, the governance by involved stakeholders, the site and legal form of the managing organisation, the architecture and the service policies. The aim of this activity is to provide catalytic and leveraging support for the preparatory phase leading to the construction of new research infrastructures or major upgrades of existing ones.

Scope: The preparatory phase aims at bringing the project for the new or upgraded research infrastructure to the level of legal, financial, and, where applicable, technical maturity required for implementing it. Project consortia should involve all the stakeholders necessary to move the project forward, to take the decisions, and to make the financial commitments necessary before construction can start (e.g. national/regional ministries/governments, research councils, funding agencies). Appropriate contacts with ministries and decision makers should be continuously reinforced, thus further strengthening the consortia. Operators

Developing New world-class RIs

Implementation & Operation Phases

Facilitate and support the implementation, long-term sustainability and efficient operation of the ESFRI & OWCRI:

- Individual ESFRI projects and selected OWCRI with established legal structure and governance such as ERIC
  - **Linked to prioritisation exercise**

- Clusters: joint activities and implementation of common solutions for RI in specific domains
  - **Targets ESFRI together with OWCRI, IA, e-infrastructures**

MATTER UNDER DISCUSSION

RELEVANT FOR ESFRI

The preparatory phase may also include technical work. In this case the project should be implemented as a *Research and innovation action* instead of a *Coordination and support action*. **Preparatory phase type I**: Proposals will address research infrastructures identified in the periodic updates of the ESFRI roadmap that are willing to set up a pan-European governance and legal structure (e.g. in the form of an ERIC).

Preparatory phase type II: Proposals will target projects that have been identified by ESFRI as requiring additional support for entering into the implementation phase. In this case a reduced grant for the continuation of the preparatory phase could be given to support a limited set of activities in particular for setting up an adequate governance and management structure, securing financial commitment and broadening the membership.

MATTER UNDER DISCUSSION

RELEVANT FOR ESFRI

INFRADEV 3-2015: Individual implementation and operation of ESFRI projects

Specific challenge: The research infrastructures identified in the ESFRI roadmap have benefitted from EU support for their preparatory phase. Some of them have already moved on to the implementation phase and/or have started their operation. The initial phase is, however, the most delicate and difficult one for new pan-European infrastructures in the process to become fully operational as technologies, services and procedures need to be finalised and best tuned, financial sustainability must be proved and users' trust and awareness must be gained. This topic will address, with a targeted approach based on the prioritisation exercise of the ESFRI projects, the implementation and operation of ESFRI research infrastructures that are setting up, or have already set up, their governance and legal structure, e.g. on the basis of the European Research Infrastructure Consortium (ERIC) or any equivalent structure at European or international level.

Developing New world-class Ris

Clusters

Exploit synergies for joint activities, optimise technological implementation of common solutions, ensure a larger harmonisation, interoperability between research facilities such as:

- Training RI managers
- Developing the innovation capacities of RI
- Development of common devices and/or critical components for data handling
- Common data policies

MATTER UNDER DISCUSSION

INFRADEV 4-2014/2015: Implementation and operation of cross-cutting services and solutions for clusters of ESFRI and other relevant research infrastructure initiatives

Specific Challenge: If different research infrastructure initiatives such as ESFRI projects, other world class research infrastructures, e-infrastructures and Integrating Activity projects are developed, implemented and operate in isolation, there is a risk of fragmentation, lack of interoperability between them and parallel development of divergent solutions to same problems. In order to avoid this, there is a need in Europe to coordinate common activities, to develop and deploy common underpinning technologies and services and to implement common and efficient solutions on issues such as, for example, architecture of distributed infrastructures, distributed and virtual access management, development of common critical physical and virtual components (e.g. detectors, components for data management) and policies for data acquisition, access, deposit, sharing and re-use.

Scope: This topic will contribute to the construction and operation of the research infrastructures identified in the ESFRI Roadmap, therefore proposals must be centred around a set of ESFRI projects in a specific thematic area, broad enough to gather critical mass (e.g. Biomedical Science, Advanced Light Sources, Astronomy, or Atmospheric Sciences). While the set of ESFRI projects represents the core component around which any cluster should be

Integrating and Opening National RI of pan-European Interest

Integrating Activities

To open up key national and regional research infrastructures to all European researchers and to ensure their optimal use and joint development:

- Networking;
- Transnational / Virtual Access;
- Joint Research Activities for the improvement of RI services.

And emphasis on management efficiency, innovation capacity (technology transfer, participation of SMEs, instrumentation development), international dimension, management of generated data…

- Simplified implementation (unit cost…)

Exploiting the innovation potential of RI

Preparatory action

The action will support:

- the development of an opportunity portal of calls, tenders and future needs and technology transfer opportunities in RI of pan European interest;
- the networking of procurement professionals to encourage exchange of good practices across RI sectors;
- Awareness campaign towards industry on the potential of RIs for their activities in selected R&D areas

Exploiting the innovation potential of RI

Pilot action on instrumentation

The action will support:

- Pilot action in the field of scientific instrumentation exploiting the innovation potential of Research Infrastructures using Pre-Commercial Procurement (PCP) and/or Public Procurement of Innovation (PPI) schemes.

MATTER UNDER DISCUSSION

European Commission

Call 2 Integrating and Opening National RI of pan-European Interest

To open up key national & regional research infrastructures to all European researchers, to ensure their optimal use and joint development, 3 activities:

- Networking;
- Transnational / Virtual Access;
- Joint Research Activities for the improvement of RI services.

with emphasis on management efficiency, innovation capacity (technology transfer, participation of SMEs, instrumentation development), international cooperation, management of generated data…

Public consultation on IA topics

- *Open 15 July - 22 October 2012*
- *Evaluation by 50 experts in 7 thematic panels:*

  Biomedical; Energy; Environmental & Earth;
  Energy, Materials and Analytical Facilities;
  Maths & ICT; Physical sciences;
  Social Sciences & Humanities
- *547 submissions, of which 246 distinct topics*
- *Assessment report published in February 2013*

  http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=consultation

IA topic assessment outcome

Sub-group	Number of topics	Final grading			
		A*	B*	C	D
BMS	72	16	19	9	27
ENER	22	6	6	4	4
ENV	53	23	8	6	12
ICT	11	3	3	2	2
MAF	44	10	15	12	7
PHY	19	6	6	2	4
SSH	25	9	5	2	8
Total	**246**	**73**	**62**	**37**	**64**

*Some topics were merged

FP7 topic and proposal statistics

- *Four IA calls*
  - **2008: bottom-up + targeted**
  - **2010, 2011, 2012: only targeted**
- *247 proposals received, 91 funded (36%)*

Year	Proposals received	Above threshold	Funded	*of received*	*of above-threshold*
2008	140	118	38	27%	32%
2010-12	107	84	53	50%	63%

- *Targeted approach favoured*
  - **Maximise policy impact**
  - **Do not invite proposals whose funding is unlikely**

Guiding principles for selecting topics

- *Favourable evaluation in consultation*
- *At least 50% of topics to address new activities ('starting communities')*
- *At least 50% linked to focus areas / societal challenges*
- *Timing in relation to end of current projects*
- *Balanced distribution over disciplines*
- *Links to RI roadmaps (national/ESFRI)*

European Commission

Topics for Integrating Activities

Domain	Number of topics	% linked to focus areas / societal challenges		% linked to national roadmaps	% new topics
BMS	8	63	100	71	63
ENER	3	100	100	100	67
ENV	9	56	67	100	56
ICT	2	0	0	50	50
MAF	6	100	83	83	17
PHYS	7	0	0	47	57
SSH	4	75	75	100	50
All	**39**	**50**	**58**	**75**	**53**

Physical Sciences

Starting Communities

- **European Laboratory Astrophysics**
- **Research infrastructures for high-energy astrophysics**
- **Science at deep-underground laboratories**
- **Integrating gravitational wave research**

Advanced Communities

- **Detectors for future accelerators**
- **Research infrastructures for nuclear physics**
- **European planetary science**

Engineering, Material Sciences, and Analytical facilities

Starting Communities

- **Advanced frontier research in nano-electronics**

Advanced Communities

- **Advanced nanofabrication**
- **Fabrication and characterisation of advanced materials based on large-scale bright sources**
- **Functional materials for special applications**
- **Facilities for research on materials under extreme conditions: ultra-low temperature**
- **Large-scale testing facilities for engineering applications**

Mathematics & ICT

Starting Communities

- **Distributed, multidisciplinary European Infrastructure on Big Data and Social Data Mining**

Advanced Communities

- **Integrating activity for facilitating access to HPC (High Performance Computing) centres**

ESFRI European Strategy Forum on Research Infrastructures

- ESFRI medium term goal: the “newly designed” Roadmap (2015-2016)

- A “newly designed” Roadmap will be edited in 2015-2016 with refined criteria for PERMANECE of existing projects as well as for the THE NEW ENTRIES
- NEW ENTRIES will have to be at the “decision stage” as defined by the assessment matrix

ESFRI European Strategy Forum on Research Infrastructures

- ESFRI and the specialist roadmaps in Physics:

The PSE SWG of ESFRI is progressively considering the projects of CERN and others as key items of the landscape, namely:

- LHC upgrade (collider and experiments)
- Design Study for a Future Circular Collider (FCC)
- TIARA (accelerator technology platform)
- Linear Colliders (ILC, CLIC)
- Neutrino experiment

ESFRI European Strategy Forum on Research Infrastructures

- The GSO-G8+5 Global Research Infrastructures

ESFRI European Strategy Forum on Research Infrastructures

Objective of the GSO

To improve collaboration between G8 nations and the wider international community in the planning and construction of research infrastructures that require global scale efforts because of the nature of the research challenge or the nature of the investment in skills and finance required.

ESFRI European Strategy Forum on Research Infrastructures

Framework Key Issues

- A GRI needs to address a challenge on a global scale, and agree issues such as:
  - Science objectives
  - Budget and shares between partners
  - Access rules
  - Data management rules
  - Exploitation approach

One example put forward by Italy to GSO:

the internationalization of a national Research Infrastructure for underground physics, The Gran Sasso National Laboratory that has capacity for more experiments and further increase of international use and participation

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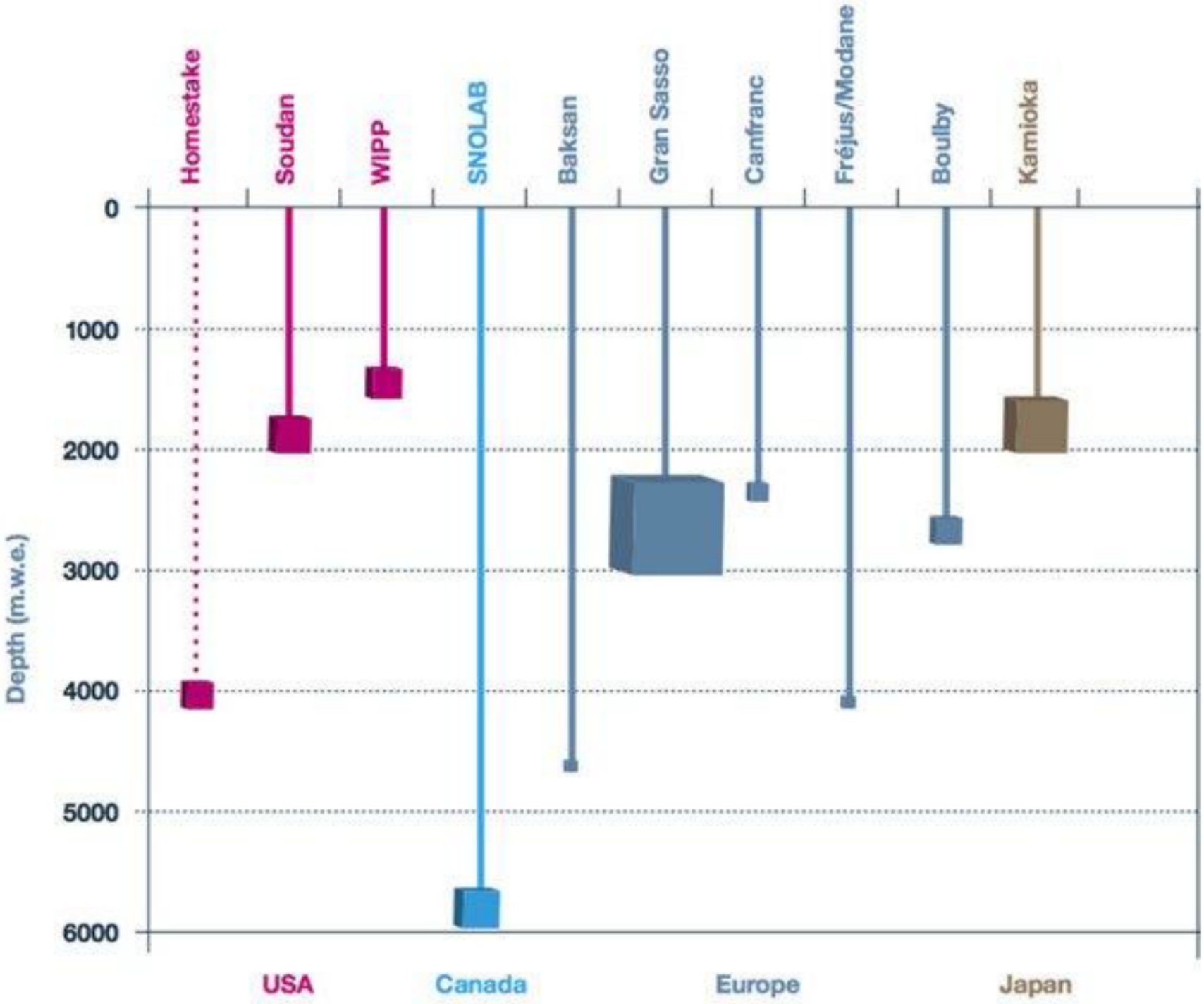
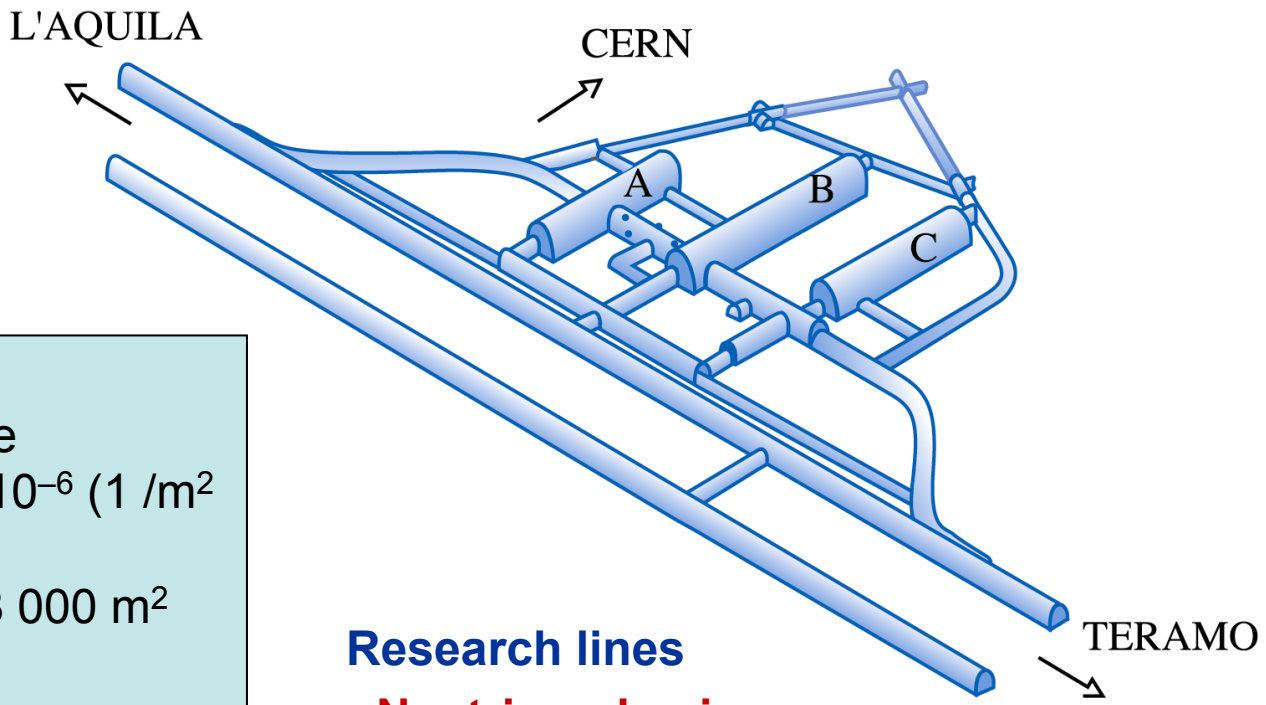

Homestake
Soudan
WIPP
SNOLAB
Baksan
Gran Sasso
Canfranc
Fréjus/Modane
Boulby
Kamioka
0
1000
2000
3000
4000
5000
6000
Depth (m.w.e.)
USA
Canada
Europe
Japan

LABORATORI NAZIONALI DEL GRAN SASSO - INFN

Largest underground laboratory for astroparticle physics

Laboratori Nazionali del Gran Sasso



1400 m rock coverage
cosmic μ reduction= 10^{-6} (1 /m^2 h)
underground area: 18 000 m^2
external facilities
easy access
756 scientists from 25 countries
Permanent staff = 66 positions

Research lines

- **Neutrino physics**
  (mass, oscillations, stellar physics)
- **Dark matter**
- **Nuclear reactions of astrophysics interest**
- **Gravitational waves**
- **Geophysics**
- **Biology**

Strategic international cooperation

Facilitate the development of global research infrastructures and the cooperation of European RI with their non-European counterparts, ensuring their global interoperability and reach, and to pursue international agreements on the reciprocal use, openness or co-financing of infrastructures.

- **Support to GSO activity on global research infrastructures**
- **Support bilateral cooperation with Africa, Russia (Mega Science projects)**
- **Support multilateral cooperation with ENP (mapping) and US, Canada, Russia etc… on Arctic research, Marine science and biodiversity**

ESFRI European Strategy Forum on Research Infrastructures

Conclusions

- The ESFRI revision of the current roadmap (prioritization) and design of a new roadmap will include more of the landscape at EU-AS and global level
- H2020 is calling to ESFRI in many points and should assist the development of strong RI projects for the ERA
- The GSO-G8+5 GRI will mature in the next few years with a first set of proposals