

Group of Senior Officials on Global Research Infrastructures Progress Report 2015

Meeting of the G7 Science Ministers
8-9 October 2015



G7 GERMANY 2015

Imprint

Editor

Group of Senior Officials on global research infrastructures

August 2015

Print

M&E Druckhaus, Belm

Layout

German Aerospace Center
Project Management Agency, Cologne

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Group of Senior Officials Progress Report 2015

As requested by the G8 Ministers on their last meeting in UK in June 2013.

Executive Summary

This report sets out the **progress of the activities conducted by the Group of Senior Officials (GSO) on global research infrastructures (GRIs) since the approval of the GSO Framework by the G8 Science Ministers in July 2013.**

Since the endorsement of such framework, the GSO has been proactively working in parallel along two lines, the first aimed at identifying concrete opportunities for collaboration based on a number of research infrastructures (RIs) proposed to the Group by the individual GSO members and, the second, aimed at identifying possible common grounds for the development of policies in the domain of Access, Data Management, Research Infrastructure Life Cycle and Evaluation, which the GSO was mandated to work on.

Following such activities, a list of GRIs (hereafter referred to as “the list”) has been produced and this report will highlight a number of possible dialogues that could be derived from such an exercise based on the expression of interests formulated by the GSO members towards the research infrastructures on “the list” itself.

In addition, this report will present progress in the mandated policy areas as well as some initial considerations on the topic of the identification of the most suitable legal framework for RIs, which emerged as a potential matter of interest during the discussions of the Group.

The first meeting of the GSO on GRIs took place in Brussels on 24 March 2011. It was followed by 5 meetings and a Video Conference (VC): South Africa (November 2011), Germany (April 2012), UK (March 2013), VC (10 October 2014), Italy (15-16 December 2014) and Germany (20-21 April 2015). The Chairmanship of the Group has always been ensured by the hosting member that was also responsible for the activities of the Group until the following meeting. The European Commission, in addition to being a member of the GSO has also provided its secretariat.

Introduction

In this context, the Group of Senior Officials (GSO) on GRIs was established to:

- provide a non-binding and open forum for policy exchanges on GRIs and to inform and improve international cooperation;
- share information about existing and planned new RIs;
- establish principles for the development of new partnerships and collaborations.

The 2013 Framework for global research infrastructures (GRIs) clearly specifies that research infrastructures (RIs) are recognized as key elements in research and innovation policies, for boosting scientific knowledge generation, for accelerating technology development and for enhancing both technological and social innovation.

RIs provide advanced scientific training for new generations of scientists and science managers and a stimulating environment for established researchers to improve their performance, and for knowledge and innovation outputs created through active - very often inter- or multidisciplinary - research communities associated with the RI. In some cases, their complexity as well as high development, construction and operation costs, or simply the global nature of the scientific challenge addressed, makes it impossible for one country or region alone to build and operate these facilities. In such cases it becomes crucial to make concerted efforts at the international level for the development of GRIs. Due to their global nature, strategic relevance and considerable visibility at the highest political level, RIs represent an efficient instrument to enable international cooperation in and through Science.

1. Mandates by the G8 Ministers

The potential for increased international cooperation on global research infrastructures (GRIs) has been recognized during international high-level meetings on science policy since 2007. At the first G8 Ministerial meeting, held in Okinawa on 15 June 2008, it was decided to form a Group of Senior Officials (GSO) on global research infrastructures (GRIs)¹ to take stock and explore cooperation on GRIs.

The mandate of the GSO included: the identification of GRIs, the analysis on how countries evaluate and prioritize the construction of large scale research infrastructures (RIs), the identification of possible new areas of cooperation, the promotion of transnational access to GRIs, fostering of “distributed RIs”, the identification of measures to ensure that (the huge amount of) scientific data is appropriately handled, stored and accessed and the adoption of a common understanding for the joint lifecycle management of GRIs.

In 2013 the GSO mandate was renewed with the emphasis to concentrate on the following topics:

- promote the adopted Framework and continue to exchange information on RIs which might offer opportunities for international collaboration (with specific reference to the role of RIs in addressing the Global Challenges);
- share information on national RI priorities and prioritization processes;
- identify areas of potential benefit that could be achieved through sharing of best practices;
- establish a representative list of GRIs open to global cooperation.

The GSO was invited to report in 2015 to the G8 ministers, on the progress of the activities of the Group.

¹The GSO is composed by representatives from Australia, Brazil, Canada, China, the European Commission, France, Germany, India, Italy, Japan, Mexico, Russia, South Africa, UK and USA. Participating countries were represented on the GSO by government officials and experts in the areas of international research infrastructures and international relations.

2. Framework for Research Infrastructures of Global Interest and related Questionnaire

During the 3rd meeting of the Group of Senior Officials (GSO) on global research infrastructures (GRIs) held in April 2012 in Hamburg (DE), the delegates agreed to test the GSO Framework (that was in the process of being developed) against a set of pilot GRIs (that would generally fulfill the criteria of the Framework) for which information would have to be provided through a dedicated questionnaire.

The results of the analysis of the data provided through the questionnaire were illustrated during the 4th meeting of the GSO held in Abingdon (UK) in March 2013 and the conclusion was that the Framework had been adequately tested and was therefore to be considered as validated by the exercise. On such occasion, it was agreed to further make use of the questionnaire (Annex 5) to exchange information on GRIs amongst the GSO members in accordance with the renewed mandate of GSO.

Members undertook to identify in their countries, GRIs that conformed to the types specified by the GSO which were open to new international memberships.

The three types being:

Real single-sited research infrastructures (RIs) - geographically localized unique facilities whose governance is fundamentally international in character.

Globally distributed RIs - RIs formed by national or institutional nodes, which are part of a global network and whose governance is fundamentally international in character.

National RIs, with unique capabilities, that attract wide interest from researchers outside of the host nation.

The goal of such inclusiveness was to allow for the exercise to effectively enable the widest possible range of collaborative dialogues to be initiated amongst the GSO members around the GRIs brought to attention of the Group.

The GRIs proposed by the GSO members, have been included in “the list” that, amongst others, depicts the collaborative level of opportunities of the single GRIs. The list (and the whole exercise behind it) is to be considered as a living document since, not wanting to preclude the initiation of any collaborative dialogue, the GSO members can at any given moment propose new GRIs or review the data already provided.

The questionnaires and the list are also stored on a **common workspace resident on the European Commission servers (CIRCABC) accessible to all GSO members**. The analysis of the data provided by the questionnaires is also available on the CIRCABC website.

3. Analysis of submitted projects

Taking stock of the Landscape of Research Infrastructures of Global Interest

Overview and Analysis of the Questionnaires:

In late 2014 through early 2015 the GSO members developed a list of research infrastructures of global interest (GRIs) (“the list”) aimed at exploring or enhancing potential international partnerships. The list is not intended to be a comprehensive catalogue of RIs and does not represent a list of global priorities. For example, the list does not include many RIs that already accommodate international users through an open access model, nor does it include all GRIs with existing international partnership agreements. GSO members can propose new GRIs or review and revise the data already provided at any given time.

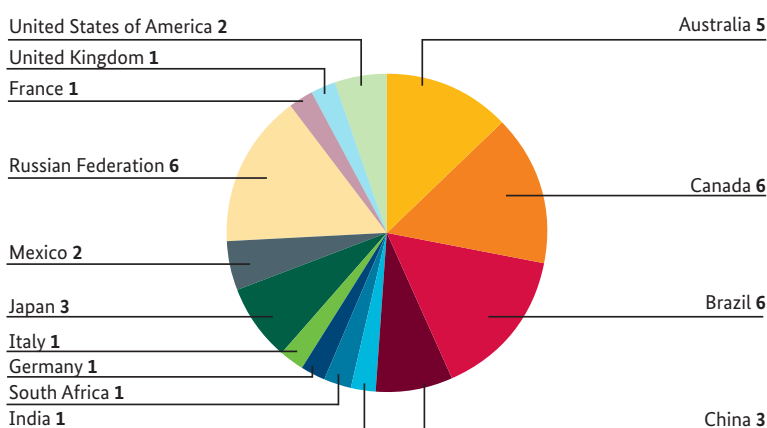
The current „GSO list of GRIs“ (Annex 6) comprises 48 GRIs divided into two complementary sections:

- Section I – National RIs of a global interest,
- Section II – Single-sited or Distributed RIs of International Character

Section I – National Research Infrastructures of Global Interest:

The list of national based RIs covers 39 RIs from 14 countries.

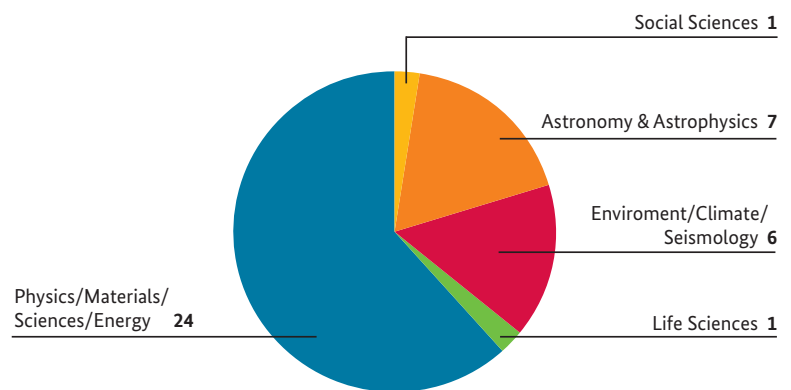
National based Research Infrastructures



Based on the “interest for collaboration”, expressed by the GSO members proposing the respective RI, motivations behind the proposals are mainly related to international openness to new members or the outreach of research communities, by fostering international access.

Among the identified national RIs, the most referenced scientific fields for cooperation are physics/materials and energy, followed by astronomy and astrophysics. This belongs to the reason that physics plays an important role in the RI's domain, but it should also be highlighted that this field comprises a full range of multidisciplinary approaches and crosscutting research and therefore such „predominant“ role appears to be natural. Social sciences and life sciences RIs are also expressed as areas for potential collaboration, in line with their major contribution in addressing global challenges.

National based Research Infrastructures (per Scientific field)



28 (out of the 39) RIs are already fully operational and 11 are still in an implementation stage.

The list is covering various scientific fields, from astronomy, biofuel, oceanography, wind engineering to population studies. The set of national RIs is composed of mainly single-sited RIs and includes RIs with long-established international partnerships and strong links with international platforms.

Section II – Single-Sited or Distributed Research Infrastructures of International Character:

The list of RIs whose governance is fundamentally international in character comprises in total 9 RIs: 6 of which were put forward by India, Italy, South Africa and the United Kingdom and 3 by the European Commission, referenced by EIROforum and ESFRI, as strategic stakeholders in the Pan-European dimension.

The listed international GRIs cover mainly RIs in astronomy/ astrophysics and life sciences, followed by environmental sciences and social sciences.

In terms of implementation, 6 (out of 9) RIs are currently operational and only 3 under implementation.

Most of the international based RIs identified in the exercise are distributed (7 out of 9), which can be seen as an advantage to enlarge cooperation links.

4. Policy Areas

Following the different meetings of the GSO and, specifically, the Video Conference held in October 2014, in line with the original mandate of the Group, the GSO has set up a number of sub-working groups to tackle with the following policy areas:

1. **Promoting Access to RIs:** led by Germany with the participation of France, Canada and the European Commission;
2. **Access to data and data management:** led by the data infrastructure working group of the GSO;
3. **Alignment of evaluation criteria and prioritisation processes:** led by Italy with the participation of Germany and Canada;
4. **Life Cycle issues:** led by the USA with the participation of China and United Kingdom;
5. **Legal framework for GRIs:** led by the EC with the participation of United Kingdom and Canada.

The following section presents a short overview of the 5 sub-working groups outcomes agreed by the GSO members.

1. Promoting Access to Research Infrastructures

Respectfully, the GSO Access Working Group Germany, France, Canada and EC delegations, June 2015

The considerable costs of constructing and operating large-scale research infrastructures (RIs), can lead the owners and managers of that RIs, be governments or non-governmental organizations, to restrict access in order to ensure that funders receive the maximum return on investment (juste retour) for their scientific communities and other key stakeholders. Furthermore, access to RIs can be restricted on the basis of issues such as national security, privacy and confidentiality, and commercial and intellectual property considerations.

Despite these restrictions, a number of jurisdictions recognize the need to provide global access to their RIs. For example, the European Commission, in the implementation of the European Research Area (ERA), has recognised the promotion of transnational access to RIs as one of the key enablers of ERA success and has been working in collaboration with the main European RIs stakeholders to draft an EU Charter for Access to RIs that will harmonize access practices and terminology throughout the ERA. One of the main achievements of the Charter is to identify the need for all RIs to have in place an open and transparent access policy that defines how they regulate, grant and support user access².

²The Charter states that „Research infrastructures should have a policy defining how they regulate, grant and support access to users“ and „the access policy of a Research Infrastructure should define the access in terms of access units, state the specific access mode, clarify the conditions for access, describe the processes and interactions involved in the access and elaborate on the support measures facilitating the access, if existing“

The current version of the draft EU Charter³ defines access as:

the legitimate and authorized physical, remote and virtual admission to, interactions with and use of RIs and to services offered by RIs to Users. Such access can be granted, amongst others, to machine time, computing resources, software, data, data-communication services, trust and authentication services, sample preparation, archives, collections, the set-up, execution and dismantling of experiments, education and training, expert support and analytical services.

◀ The European Charter could provide a useful reference for promoting the adoption of access policies for RIs worldwide.

The Charter identifies three different modes through which access could be granted to users: the **„excellence-driven“ mode, the „market-driven“ mode and the „wide access“ mode**. The excellence-driven mode is defined as being *“exclusively dependent on the scientific excellence, originality, quality and technical and ethical feasibility of an application evaluated through peer review conducted by internal or external experts. It enables users to get access to the best facilities, resources and services, wherever they are located. This mode enables collaborative research and technological development efforts across geographical and disciplinary boundaries.”*

Notwithstanding the right for any RI to regulate access according to its own specific mandate, it is proposed to explore the possibility of establishing a global excellence-driven access (gEA) quota for RIs that wish to be identified as research infrastructures of global interest (GRIs) by the GSO where the excellence-driven mode is not used anyway. A gEA (global excellence-driven access) quota means providing a defined amount of physical access to a specific RI “purely on excellence”, an amount which has to be determined for each specific RI by the shareholders. In some cases, it must be distinguished between free access to an organization and free access to a project (i.e.: instrument use). Such kind of gEA quota must be determined on the basis of an analysis of the feasibility and potential benefits and costs of such gEA, recognizing that the ownership and management models of RIs vary among GSO countries. Some RIs, such as ITER, CERN, and the future SKA are established as truly global enterprises. More often, however, RIs belong to specific countries, non-governmental organizations, or national or international consortia, that operate as legal entities under the umbrella of national, European (as in case of an ERIC), or International law. The establishment of a gEA quota, as a measure to foster global cooperation would require the active commitment of the owners and managers of the respective RI, which could be governments or non-governments, national or international partners. Especially in cases where in Europe RIs are set up with the involvement in construction and operation cost of RIs from smaller Member States of the European Union, gEA quotas have to be defined carefully to secure priority access for scientists from these smaller countries. Such rules should also secure sustainability of the operation of the respective RI.

In the GSO Framework, a possible gEA quota could include a commitment to provide:

1. Readily available information on the services and facilities available to international users; a specific focus on the importance of training, offered by GRIs, is also important to be promoted.
2. A certain minimum percentage of gEA open to excellent proposals wherever the respective scientists are located as determined by international peer review;

³ European Commission - Charter for Access to Research Infrastructures Draft Version 1.0 – June 2015: http://ec.europa.eu/research/infrastructures/pdf/2015_charterforaccessto-ris.pdf#view=fit&pagemode=none

3. Transparent guidelines on the access application and peer review processes; and,
4. Detailed and commented Information on the full cost of access along with a commitment to charge international users only reasonable costs for access. In this respect, it is important that each user, whatever its financial level of resource, should participate even at low level in the funding of the GRI exploitation.
5. Specific access for training and education purposes for scientists from less developed countries.

The determination of how much access should be set aside for gEA and what percentage of total access costs should be borne by international users would require consultation among GSO members and proposed GRI; however, many of these provisions are already in place for several of the proposed GRIs. Further consideration could also be made including a commitment to open access to data standards in keeping with the norms of GRIs such as CERN and ITER.

While the GSO still needs to develop the specific details in a qualitative manner that would be included in such standard, it would be possible for it to present the above elements to Science Ministers for approval as general standard expected of GRIs. Such agreement should create a “platform for scientific competition/collaboration” that facilitates user access purely on excellence criteria, independent of nationality or economic contributions. The proposed gEA quota could also be promoted as good practice among other RIs within GSO countries. This would help to raise global awareness of the services and facilities that currently exist and could service to promote greater collaboration and cost-sharing among RI owners and managers in similar fields.

As far as a data policy is concerned, GSO should examine the issue of the consequences of a “free immediate access to data produced by a GRI”; in different communities, a period of limited, delayed and protected access to data allows the developers of main GRI instruments to benefit from their strong financial and time investments during construction phase; this is a strong incentive to foster the participation to the construction of high performance instruments or GRIs. This topic deserves a special attention at international level.

2. Access to data and data management

*Respectfully, the GSO Data Infrastructure Working Group
June 2015*

The scientific discovery process is undergoing rapid transformation around the world. Major international collaborative research projects, from flagship global research infrastructures (GRIs) to large-scale research initiatives such as the E.U. Human Brain Project and the U.S. BRAIN Initiative, are expanding in number. Socio-economic challenges such as human health and climate change are increasingly being addressed through transnational collaborative research efforts. Growing ubiquity and declining cost of sensors and mobile devices, powerful computing

systems, accessible software and modelling platforms, and sophisticated online collaboration and exchange networks constitute an exciting new environment for scientific and engineering research that is increasingly borderless, collaborative, and data-driven. This emerging environment can also enable new access to “long tail” research information and results that can potentially be turned into further scientific knowledge.

Critical to this transformation in global collaborative research are concerted investments in advancing the underlying e-infrastructures (a.k.a. cyber infrastructure) spanning data management, computing, networking, software, workflow processes, and workforce development. There are many dimensions of this investment need: The capacity to efficiently and reliably access, analyze, preserve, and share research data at scale across wide geographical regions must be ensured. Innovative processes including novel scientific workflows and training opportunities must be developed to support users engaged in collaborations across disciplines and geographic regions. Perhaps most urgently, global coordination is crucial to ensure that the resulting ensemble capabilities will most broadly serve the dynamic computational and data sharing needs of multidisciplinary and transnational research in an efficient and cost-effective way. While a multitude of separate e-infrastructure funding efforts are concurrently being pursued nationally and internationally, many international bodies – representing governments and research communities – have recognized the need for greater emphasis on convergence and synergy among these efforts.

Thus, an important challenge is to develop internationally-coordinated opportunities to fund research cyber infrastructure that reflect individual funding agency and national priorities **while building towards a greater collaborative and interoperable whole**. In response to this challenge, an informal **Funders Group on Collaborative Research E-Infrastructures (CREs)** is being launched that will focus on identifying and pursuing international funding opportunities across a broad range of cyber infrastructure activities. A central feature of this effort will be to capitalize on the advantages of moving beyond the current multiplicity of bilateral topic-specific funding efforts to a generalized multilateral cooperative funding framework, exemplified by the successful G8 HORCs⁴ and Belmont Forum⁵ models. A key ingredient for achieving a successful and sustainable multilateral funding framework will be the flexibility for funding entities to participate voluntarily on any given initiative or call according to their individual missions and priorities. Accordingly, membership in the CRE Funders Group will be open to interested government funding entities, and the focus will be on developing funding calls that adhere to principles of multi-laterality, flexibility of participation, and open research and data policies such as those cited earlier. CRE activities will be consistent with the principles of sharing of research data as articulated by the G8⁶, the GSO Data Infrastructure Working Group (Annex 7 in this document), and efforts of the community-based Research Data Alliance

⁴ G8 HORCs Initiative and pilot calls, <http://www.agence-nationale-recherche.fr/en/information/news/single/the-g8-research-councils-initiative/>.

⁵ Belmont Forum Collaborative Research Actions, <https://igfagcr.org/collaborative-research-actions>.

⁶ Joint Statement, G8 Science Ministers and national science academies meeting, London, 12 June 2013, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/206801/G8_Science_Meeting_Statement_12_June_2013.pdf.

(RDA), while respecting individual national and funding body policies regarding access to research data, and while recognizing that priorities for data interoperability, accessibility, privacy and assurance will differ across and within research communities. Tentative plans are to hold a first meeting of the CRE Funders Group in late September, possibly adjoining the RDA 6th Plenary in Paris; further meeting details will be disseminated as they become available. Points of contact are Carlos Morais-Pires (EU/EC), Clare McLaughlin (Australia), and Irene Qualters and Bill Miller (US/NSF).

3. Alignment of evaluation criteria and prioritization processes

Respectfully, the GSO Evaluation Group Italy, Canada and Germany delegations, April 2015

The GSO has been asked to identify good practices regarding the prioritization and evaluation of potential research infrastructures of global interest (GRIs) to facilitate more effective international collaboration on new GRIs and existing research infrastructures (RIs) that could benefit from increased international linkages. This exercise has resulted in the outline below which proposes common approaches to these activities that GSO members may wish to adopt in order to facilitate national decision-making and international coordination.

The approaches described below are intended to help GSO members, individually and collectively, identify strong candidates for international collaboration and then assess the strengths of these collaboration opportunities with respect to governance, management, access, and their potential to contribute to international research efforts. As a body charged to promote good practices to improve international coordination, the GSO recommends approaches to its members, but does not prioritize potential investments or to carry out peer review itself.

Prioritization

In the context of the GSO's work, the purpose of prioritization is to identify proposed or existing RIs with a high potential to become successful GRIs. Prioritization would include three steps: 1) the identification of potential GRIs of interest to two or more GSO members; 2) the description of each proposal of these potential GRIs in relation to an agreed set of prioritization criteria; and 3) decision-making by interested potential national and international organisations on which opportunities, if any, they wish to pursue. It is envisioned that the GSO would provide a forum to carry out the first and second stages and then provide descriptions of the potential opportunities to the GSO member states and/or their respective funding agencies for consideration for the third stage. The criteria and process for prioritizing opportunities for international collaboration are intended to aid decision-making and engagement efforts by members and not intended to supersede either national decision-making processes or international coordination efforts.

The following criteria, drawn from the GSO Framework for GRIs and good practices by GSO members, are intended to assist with measuring

the potential of a collaborative opportunity to support global excellence in research, governance, and management, and to improve the effectiveness and efficiency of aligning international RI funding,

Prioritization Criteria

- **International relevance:** Potential GRIs should address pressing global research challenges, i.e., those frontiers of knowledge where a global critical-mass effort is required in order to achieve substantial progress.
- **Research quality:** International peer review should have determined that the potential scientific output and strategic goals of the RI are world-class.
- **Opportunities for shared governance, management, and funding:** Partner countries should have the opportunity to share in the governance, management, and funding of the RI and to play a role in decision-making that is commensurate to their level of engagement in, and commitment to, the RI.
- **Opportunities for resource sharing and cost effectiveness:** Collaboration should increase the efficiency and effectiveness of international funding for science and should enable the meaningful sharing of resources and benefits among all partners.
- **Opportunities for mobility of personnel:** The international mobility of researchers, engineers, and technicians working at the facility and complementary facilities around the world should be actively encouraged.
- **Opportunities for access:** GRIs should provide access to partner countries and the broader international research community.
- **Opportunities for training:** GRIs should provide opportunities for training across the education spectrum for international students and post-doctoral fellows.

Prioritization Process

The processes for identifying RIs with high potential to be GRIs and for helping GSO members to prioritize their efforts to develop these opportunities are intended to be flexible and recognize the primacy of national decision making. To identify potential GRIs, GSO members have been asked to propose a number of RIs for consideration for further international collaboration. The resulting list is intended to remain 'live' with new proposals added at the discretion of individual GSO members. These proposals include potential GRIs across all three of the RI categories described in Chapter 2.

GSO members have subsequently been asked to identify proposals on the list that they would like to explore further, with the end result being a new list of proposals which are of interest to two or more GSO members. A broader discussion among GSO members will then take place in which each proposal on the new list will be discussed in the context of the prioritization criteria outlined above and a description of each project developed for submission would be shared with GSO member states for their further consideration as opportunities for international collaboration.

Evaluation

In the context of the GSO's work, common criteria and processes for the evaluation of RIs are being proposed to help countries individually and jointly assess the proposed GRIs. Agreement on a baseline for assessing a facility's potential benefits and likelihood of success would facilitate international cooperation. Evaluations themselves would be the responsibility of partnering countries and/or their respective funding agencies. The role that the GSO proposes for itself in this context is the facilitation of international discussions and the sharing of relevant information among potential partner countries as requested by those countries. As above, the following criteria have been drawn from the GSO Framework for GRIs and good practices among GSO members.

Evaluation Criteria

Research Excellence: As with prioritization, the GSO recommends that the strong potential to contribute to global research excellence remains an expectation of all GRIs.

Uniqueness: GRIs would be expected to offer services and/or facilities not readily available to international researchers.

International usage: GRIs should attract significant international usage, over and above the countries specifically partnering in their management and governance.

Project management: Appropriate management structures and professional top level management should be established, consistent with best practices derived from existing recommendations and experience at the international level.

Data exchange: Global scientific data infrastructure providers and users should recognise the utility of data exchange and interoperability of data across disciplines and national boundaries as a means to broadening the scientific reach of individual data sets. Furthermore GRIs should contribute towards greater sharing of data among the global scientific community.

Periodic reviews: The scientific output and strategic goals of GRIs should be evaluated and updated periodically, if needed, throughout the GRI's entire life-cycle to ensure consistent excellence of the scientific output. In addition, an assessment of the quality of the services offered to the scientific communities is necessary to ensure the long-term usefulness and success of the infrastructure. Partnership agreements among funding agencies should enable each nation to fulfil its unique stewardship responsibilities on behalf of its national government for oversight of contributed funds. In an effort to reduce the duplication of administrative burden placed on GRIs, further work at the GSO could focus on identifying opportunities for GRIs to align report requirements among their funding partners.

Monitoring socio-economic impact: The socio-economic impact and knowledge transfer opportunities of GRIs should be assessed not only at the beginning, but also during the life-cycle of the project.

Evaluation Process

As noted above, evaluations would be conducted by individual countries, though we would note the potential benefits of potential partnering countries conducting the evaluation jointly. Without prescribing a particular evaluation process, the GSO recommends that all evaluations include review by international research peers and potential non-academic partners and facility users. Furthermore, each evaluation could consider the following elements:

- relevance to issues of international importance
- value added to international research community
- size, diversity, international nature of the potential user community
- governance and management model
- funding model for capital and operations and required upfront and ongoing financial commitments
- technical challenges
- risks and mitigation strategies
- opportunities to improve the effectiveness and efficiency of global funding for RIs

Further work on the development of evaluation criteria for GRIs shall be part of the GSO's future mandate.

4. RI Life Cycle issues

Respectfully, the GSO Life-Cycle Working Group United States, China and United Kingdom delegations, February 2015

In pursuing its goals the GSO discusses frequently life-cycle issues of RI projects including the major investment decision points that define the evolution of an RI project from an idea to finished reality. For these discussions to be productive and efficient, a consistent terminology for the distinct life-cycle stages is essential. Defining the life-cycle stages will help GSO members frame the issues under discussion in their own national context and help prevent unintentional misunderstandings. In cases where GSO members agree to collaborate on a project, this common terminology will be the precursor to establishment of a prioritized work plan, the identification of lead stakeholders, and tracking of progress. A defined GSO life-cycle terminology may also promote consistency in RI policy documents produced by the various international committees and working groups such as the Global Science Forum (GSF) and Research Data Alliance (RDA).

Proposal for Consideration by the GSO: The Life Cycle Working Group has reviewed the documentation developed to-date by the various internatio-

nal committees and working groups and believes a common terminology is achievable. The terminology used when framing RI activities is often quite similar, but not consistent. As a result, **the Working Group proposes to the GSO formal adoption of the following five RI life-cycle stages:**

1. Development Stage
2. Design Stage
3. Implementation Stage
4. Operations Stage
5. Termination Stage

The following definitions are also proposed:

Development Stage: This period of time is when the initial idea and research justification for the RI begins to coalesce within the national or international science community. This stage can last up to 10 years or more depending on how much time is required for consensus to emerge. The effort is focused on the high-level ideas and building consensus on requirements and setting priorities across a broad landscape of potential needs. Annual investments in initial development can be focused or sporadic by the government or private interested parties, but are generally modest. However, the cumulative investment over a long period can be quite substantial. At the end of this stage the rough order of magnitude of the project cost is generally known.

Design Stage: This stage is entered when the sponsoring government or international body formally recognizes the proposed RI as a priority and starts funding a detailed project design, and eventually, a detailed statement of cost, scope, and schedule for the Implementation Stage. This stage normally includes a series of readiness reviews to ensure proper advancement and defined sub-stages including conceptual, preliminary, and final design. This stage generally lasts 3-5 years and costs 10% or more of the construction cost depending on the nature of the RI. It is also the stage during which construction funds are identified and (ideally) partnerships are formalized.

Implementation Stage: Entrance into this stage occurs when: (1) construction of and/or acquisition of capital equipment for the RI formally starts through obligation of funds specifically for these purposes, or (2) for distributed RIs, federation of existing facilities, or e-Infrastructures when the existing centres coordinate their operations. This stage normally includes periodic reviews of project management and financial performance. Depending on the nature and scale of the RI, construction typically lasts 3-6 years, but the timescale may be shorter where existing assets are being utilized.

Operations Stage: Entrance into this stage occurs, when the scientific community has the ability to access the RI to conduct the research for which it was designed, and/or access data generated by the RI. This stage generally includes reviews and decisions on further investment, capability upgrades, refurbishments, and eventually the final decision on termination. This stage may also include re-orientation and re-use of the RI to meet evolving scientific objectives, or the phasing out of certain capabilities.

This stage typically lasts 20-40 years, the total cost of which often greatly exceeds the cost of construction. Annual operating costs and concept for operations plans (including operational agreements between parties for funding, data sharing, etc.) should already be well established before entering this stage.

Termination Stage: Entrance into this stage occurs when the first financial investment is made to divest or decommission the RI. The decision to terminate happens at the end of the Operations Stage. The decision to terminate is generally made when the government or governments involved determine that the RI is no longer considered an operational priority with regard to advancing science. This final decision is often the most politically challenging due to the human element and political landscape. Management of expectations is critical, especially if the decision is made to terminate an RI earlier than expected. Termination could include divestment to another entity's operational and financial control or decommissioning, including complete de-construction and removal of the infrastructure. Cost of decommissioning can be substantial. Re-deployment of skills and fostering a position of resilience within the RI and the science community is highly valuable.

The diagrams below illustrate the five life-cycle stages in terms of flow, relative cost, and relative time scales. The boundaries between the stages may not always be distinct (e.g. some facilities may be capable of science operations before construction/implementation is complete).

Next Steps: Once a standardized life-cycle terminology is adopted, the Working Group proposes that the GSO use this terminology to share information about the various national RI investment decision processes and other best practices, and also begin to frame and organize various conversations using this terminology, as appropriate. This framework can then be used to illustrate establishment of priorities, advance solicitation of partnerships, and frame project decisions for external stakeholders including the G 7. At a high level, this framework will help support initiatives and cooperation on RIs at different stages.

The financial figures are illustrative relative costs.

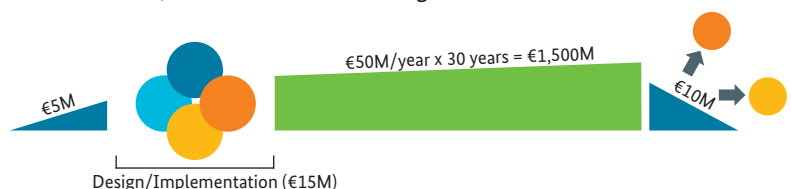
Life Cycle Stages



New Construction



Federation and/or coordination of existing infrastructures



5. Reflection on the possible legal framework of GRI

*Respectfully, the legal framework Working Group
European Commission, United Kingdom and Canada delegations
June 2015*

The analysis of the most appropriate legal framework for establishing an international research infrastructure (RI) is one of the main decisions that need to be taken and agreed amongst the different members when setting up the new International RI. During the preparatory phases of the new international RI establishment there is a moment in which such analysis is conducted and the different options are assessed. On a pragmatic basis GSO members agreed that the simplest acceptable model should be adopted.

For a national RI being opened up to new partners, the solution may be an inter-institutional agreement accepting the existing legal basis of the RI and identifying the responsibilities of the new partner. For a new RI the options range from Limited Liability Companies established under national law to International Intergovernmental Organizations regulated through a Treaty. Each of which have advantages and disadvantages that need to be carefully analysed according to the specific requirements of the future RI. Just to provide an example, the establishment of an international treaty organization has the clear advantage for the facility in terms of independence from national policy and regulatory changes and thus of ensuring long term stability. The drawbacks include the lengthy procedure for its establishment that could in some cases become a particular threat for the scheduling and progress of the project, and the requirement for a long term commitment which some governments may resist.

The EU has addressed this issue by establishing a dedicated legal framework (the European Research Infrastructure Consortium, ERIC) which fills (at EU level) the gap between the traditional treaty-based organizations and national legal entities for establishing and operating European RIs. As such, the EU ERIC Regulation facilitates the quicker establishment of European RIs by saving time on one side in avoiding the repetition of negotiations, project by project, to analyse and discuss the best legal form for such international research organizations, and, on the other, in avoiding discussions in each national parliament related to the approval of a needed international agreement.

The weakness of the ERIC model in the global context is that it is based on European law, which while accepted by EU member states may not be acceptable to global partners. Since there is no equivalent global legal structure, and at present there are few candidate projects that might benefit from the creation of a possible „International Research Infrastructure Consortium“ (IRIC), it would be difficult to justify the effort that would be required since success could be hard to achieve. In the wider international context the EU solution could be used, alongside work by the OECD Global Science Forum, as an example to develop fundamental principles for the establishment of GRIs.

Recommendations

Due to the complexity and political sensitivity of the issue, the GSO will not further explore the possibility of setting up an International legal framework for RIs. The issue of the legal framework of International RIs will be addressed, as appropriate, and when so decided, if a specific requirement were to arise in the frame of the other activities/policies being dealt by the Group.

5. Examples of new initiatives of relevance to GSO

Research Data Alliance, RDA

In 2013, the EU, US and Australian governments co-funded a significant activity in the quest of global data-sharing. The RDA is a grass-roots community based effort with the aim to promote international cooperation and to facilitate scientific data sharing and re-use. It has currently 2,350 members from 96 countries. The following issues are tackled:

- What kind of infrastructure is needed to handle this data rich science?
- How do you quickly find, access and interpret the right data in the right lab?
- How do you manage permission, privacy and proper access to the data?
- What new software tools are needed to manage, analyze, preserve and cite all this data?
- How can we improve the use of computer simulation and big data analytics in science?
- How do you ensure the scientific data don't get lost or corrupted? How can you prove integrity and authenticity?

RDA's vision is that researchers and innovators openly share and re-use data across technologies, disciplines, and countries to address these questions and other grand challenges of society. RDA's mission is to build the social and technical bridges that enable data sharing, accomplished through the creation, adoption and use of the social, organizational, and technical infrastructure needed to reduce barriers to data sharing and re-use. Issues like intellectual properties and embargo periods for collaborations generating new data have to be solved in an appropriate manner. Scientists and researchers join forces with technical experts in focused working groups and exploratory interest groups. Membership is free and open to all accepting the RDA principles on www.rd-alliance.org.⁷

The funders currently supporting RDA established a Colloquium discuss mutual interests related to RDA activities and outputs. Recently, the funders have been working to evolve the Colloquium into a Funders Group dedicated to multilateral funding of Collaborative Research E-Infrastructures (CREs). The GSO Data Infrastructure Working Group has been kept informed through information updates at its meetings on these developments and members have provided input and comments towards the development of a Charter for the CRE Funders Group.

⁷The Data Harvest, An RDA Europe Report, December 2014

6. Future Actions for the GSO

During the 6th GSO meeting in Hamburg possible future actions for the GSO were discussed. The opinion of the members was that there should be a follow up especially to test the Framework against some case studies and to implement possible new collaborations between different countries by opening up national research infrastructures (RIs) for international users.

The conclusions were as follows:

- 1) Try to implement possible new collaborations (on a bilateral basis) amongst RIs of different countries on the basis of the Expression of Interest Exercise which has been carried out by means of the research infrastructure of global interest (GRI) list. The possible opening up of national RIs for international users has been studied by the match-making exercise of the GSO and has received a lot of interest from the different partners;
- 2) The identification of a number of case studies to be analysed by the Group to test the Framework adopted in 2013 practically and to investigate further how potential global collaborations could/should be addressed by the Group. For such purpose 5 pilot exercises will be launched in parallel for:
 - i. The International Mouse Phenotyping Consortium (IMPC) as an example of international distributed RI;
 - ii. The High Altitude Water Cherenkov Observatory (HAWC) as a bilateral collaboration (with the US) around a single sited RI with the aim to attract more (international) partners;
 - iii. The Underground laboratories as an example of a possible coordination of National endeavours;
 - iv. The Canadian High Artic Research Station (CHARS), as an example of national lab of potential global interest;
 - v. The European Spallation Source, as an example of an EU multinational initiative that would benefit from a further enlargement by international partners.

These case studies have been chosen for representing a diversity of situations but do not attempt any selection or pre-selection of projects for the future. The case studies will be a pilot exercise which will not determine the further cooperation between the GRIs on the list or with further partners.

Further suggestions for future policy themes of global interest related to RIs that could be tackled in the frame of the GSO were discussed such as international mobility of researchers (including pension schemes), open innovation, and socio-economic impact of RIs. The discussion led to an understanding that socio-economic impact is an integral part of open innovation because RIs are part of a larger ecosystem. It was agreed that agendas of future meetings will foresee focused discussions around 1-2 of such identified topics with the aim of enabling sharing of best practices amongst the GSO members.

Future GSO meetings are foreseen in January 2016 in Australia and on the periphery of the ICRI conference in October 2016 in South Africa.

There was also a discussion during the last two GSO meetings how to include new members in the GSO Framework. In Rome the GSO Group came to an agreement that the Group is in principle open to new members although the mandate is provided by the G8 ministers.

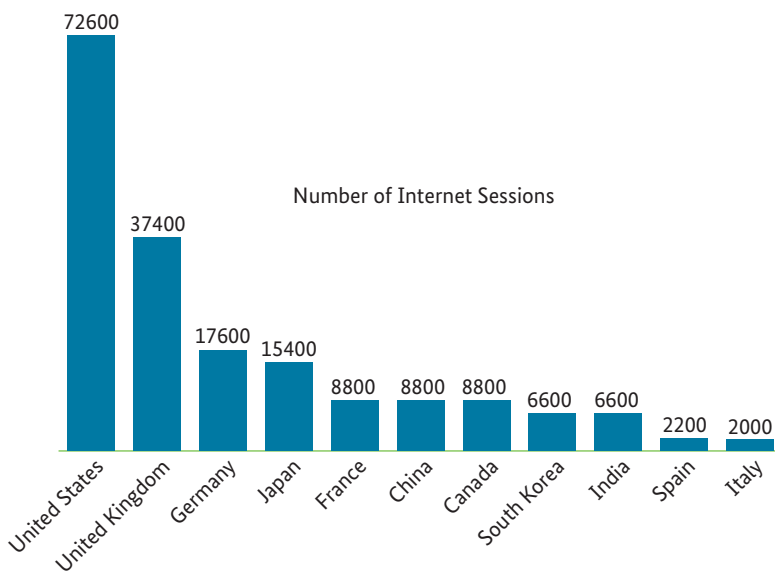
Many of the non G7 countries (especially China and India) suggested exploring a more appropriate governance structure of GSO. Having acknowledged that the Carnegie Group would not be a suitable alternative since it is an informal body, the Group discussed the possibility of G20, being the reference body for the GSO and suggested that China, as host of 2016 G20, will explore the possibility of including this in the agenda of 2016 G20 Summit agenda. Such point should be further discussed at the next GSO meeting in Australia. There might be another option to bring this point forward on the research summit in Japan in 2016.

Annex Case Studies:

1. **The International Mouse Phenotyping Consortium (IMPC)** is comprised of 18 research institutions and 5 national funders, representing 12 countries from 4 continents and has been in operation since 2011. The mission of IMPC is to build the first comprehensive functional catalogue of a mammalian genome, which will give new insights into gene function and human disease. This bold goal will require the support, infrastructures and cooperation of multiple countries. The scientific community has taken advantage of the mouse's fundamental similarity to humans at the genetic level (>95% at the gene level), similar physiology and anatomy, its relative low-cost compared to other mammals, and nearly 100 years of genetic study. The IMPC is coordinating efforts to generate a knockout mouse strain for every protein-coding gene in the mouse genome (~20,000). These mouse strains are characterized using a standardized, broad-based biological and physiological analysis platform, in which data are collected and archived centrally by the IMPC-Data Coordinating Centre. Potential disease models are identified, and all mice strains are preserved in repositories and made available to the scientific community representing a valuable resource for basic scientific research as well as generating new models for human diseases. As of today IMPC has registered thousands of individual users world-wide and has shipped gene knockout mice to thousands of laboratories for in-depth research. Over 3,500 IMPC mouse strains have been produced, with phenotype data for 1500 of these strains available already. IMPC will complete another 16,000 genes over the next 7 years. Users can access freely all data including new gene-phenotype relationships via an intuitive web portal. Annotation with biomedical ontologies allows biologists and clinicians to easily find mouse strains with phenotypic traits relevant to their research and to human disease.

As can be seen from the graph, the IMPC already has a broad network representing the majority of GSO members, both as producers and distributors of data and mice as well as users ordering the materials.

Geographic Location of Hits



Further expansion is sought. To this end, the Czech Centre for Phenogenomics (BIOCEV/IMG) joined the IMPC this past year, and the Universitat Autònoma de Barcelona, from Barcelona, Spain has recently applied for membership to the IMPC. In the coming years IMPC plans to reach out to India, Russia and hope to expand to China, Brazil and the Republic of South Africa and more with benefits both in reaching in a timely fashion the main scientific goal and enable a global community to participate and take advantage of this fundamental method and knowledge for the human health.

2. The High Altitude Water Cherenkov (HAWC) observatory

The facility sits high on the slopes of Pico de Orizaba and Sierra Negra volcanoes, near the State of Puebla, Mexico; at an altitude of 4,100 meters, to help scientists probe the universe's most energetic phenomena. HAWC has unique capabilities for detecting the highest-energy electromagnetic radiation, and complements other gamma ray observatories around the world.

Unlike optical or radio telescopes that observe light from astronomical phenomena directly, HAWC will study high-energy cosmic and gamma rays indirectly. The observatory has been recording data and producing preliminary science results since August 2013, when the first 100 detectors came online. It is now fully functional with the full suite of 300 tanks. HAWC is expected to be 10-15 times more sensitive than its predecessor, the Milagro experiment in Los Alamos, and HAWC will continuously monitor over a wide field of view to observe two-thirds of the sky every 24 hours.

HAWC is a Mexican/U.S. science collaboration with funding provided by Mexican institutions such as the Consejo Nacional de Ciencia y Tecnología (CONACYT), the Universidad Nacional Autónoma de México (UNAM), and the Instituto Nacional de Astrofísica, Óptica y Electrónica (INAOE); and funding provided by the United States through the National Science Foundation (NSF), the Department of Energy (DOE), the Los Alamos National Laboratory (LANL), and the University of Maryland.

Researchers from around the world will access the data with the hope of better understanding some of our universe's most explosive events and biggest mysteries.

3. The Underground laboratories

LNGS (Italy) and SNOLAB (Canada) are respectively the largest and the deepest underground science laboratories in the world. The mission of both laboratories is world-class science, with a program primarily addressing Dark Matter searches and Neutrino Physics. Dark Matter is a kind of unknown, still undiscovered, matter that is however believed to constitute 85% of matter in the Universe. Neutrinos are extremely elusive particles emitted in beta decays of nuclei. They played an important role in the evolution of the universe and constitute a prompt messenger of nuclear reactions occurring in the core of stars. Both research domains require extremely low levels of radioactivity in the detectors and in the surrounding environment. Therefore laboratories have to be shielded by thousands meters of rock in order to reduce cosmic rays by 6-8 orders of magnitude, and materials used in the detectors construction must be specifically selected and processed in order to attain extreme radio-purity levels (up to 10-18 g/g in ^{238}U residual content). The two laboratories are operated as facilities hosting multiple experiments. They are open to international access on the basis of excellence of peer reviewed scientific projects. Progress and goals achieved by experiments are periodically monitored and evaluated by international Scientific Committees. The total number of users exceeds 1500 per year, most of them coming from foreign institutions (with respect to Canada and Italy). The two laboratories are largely complementary to each other: LNGS offering a larger laboratory volume and easier access through a highway tunnel, SNOLAB offering a better shielding against cosmic rays and a laboratory environment operated with clean room specifications.

Staff researchers from the two laboratories are cooperating on science and technology matters. An international workshop on Low Radioactivity Techniques is organized every second year in order to exchange, compare, and make available to a wider community progresses on techniques for ultra-radio-pure materials and detection of ultra-trace contaminants.

The cutting-edge science and technologies of LNGS and SNOLAB require a wide participation of scientists and scientific and academic

institutions from several countries. A GRI would play a very important role in the progress of science and technology, in training graduate and undergraduate students, and in a wider dissemination of knowledge.

More information on SNOLAB and LNGS is available at:

www.snolab.ca

www.lngs.infn.it/en

4. The Canadian High Arctic Research Station (CHARS)

On June 1, 2015, the Government of Canada created Polar Knowledge Canada (POLAR), a federal government agency responsible for conducting world-class cutting edge Arctic research including establishing a hub for scientific research in the Canadian Arctic. POLAR's Canadian High Arctic Research Station (CHARS), currently under construction in Cambridge Bay, Nunavut, will provide a world-class hub for science and technology in Canada's North complementing existing scientific facilities distributed across Canada's North. In addition to providing a suite of research services, including logistical support for scientists going into the field, the new station will house advanced laboratory facilities, including general analytics labs, a cold lab, a GIS lab, and a necropsy lab. An aquatics lab is being planned for a subsequent phase. The Station also has a technology development mandate and will include mechanical and electronics workshops. One of the few polar research stations that will run a dedicated science and technology (S&T) program that operates year round, CHARS will host international researchers, including Antarctic experts, and provide an opportunity to leverage resources, research infrastructure and polar expertise.

POLAR's five-year S&T priority areas (2014-2019) are:

- alternative and renewable energy for the North;
- baseline information preparedness for development;
- underwater situational awareness;
- infrastructure for development; and
- predicting the impacts of changing ice, permafrost, and snow on shipping, infrastructure and communities.

POLAR is seeking partnerships and collaboration agreements with polar research organizations, including memoranda of understandings (MOU) to indicate high-level agreements to work collaboratively, and project-specific agreements leading to engagement of research, government, industry and aboriginal communities to contribute to the priorities of Polar Knowledge Canada.

5. **The European Spallation Source (ESS Neutron)** has been brought to the attention of the GSO by the European Commission. The ESS is one of the largest science and technology infrastructure projects

being built today that will provide the scientific community with new opportunities for research using neutrons in the fields of life sciences, energy, environmental technology, cultural heritage and fundamental physics.

ESS will offer neutron beams of unparalleled brightness for cold neutrons, delivering more neutrons than the world's most powerful reactor-based neutron sources today, and with higher peak intensity than any other spallation source. Smaller and more complex samples will be accessible for neutron investigations, making the study of rare and biological samples and samples under extreme conditions possible. These gains will bring a paradigm shift in neutron science, and expand the use of neutron methods, providing the wider research community with a smart new set of experimental options.

The decision to invest in its development is the result of Europe's requirement for an advanced, high-power neutron facility which was identified already 20 years ago.

The facility design and construction includes a linear proton accelerator, a heavy-metal target station, a large array of state-of-the-art neutron instruments, a suite of laboratories, and a supercomputing data management and software development centre. The ESS facility will be built in Lund (Sweden), while the ESS Data Management and Software Centre will be located in Copenhagen (Denmark).

Together with the adjacent MAX IV synchrotron, the ESS will become a world-leading centre for materials research.

Since 2006 the ESS is part of the European Strategy Forum on Research Infrastructures (ESFRI) roadmap, which defines the priorities at EU level in terms of development of new Research Infrastructures (including major upgrades).

The ESS is open to potential additional Partner Countries interested in taking part in construction and operations. Countries joining now will have a unique opportunity to participate in the development of ESS as the project will be highly dependent on contributions of knowledge and technology from leading universities, laboratories and companies. Becoming a Partner would also provide the Country's neutron user community the possibility to take part in defining the scientific possibilities at ESS, as well as to access to the facility once in operation.

Annex 1.

List of Senior Officials and Accompanying Experts (Alphabetical order by delegation) (June 2015)

COUNTRY	NAME	POSITION	INSTITUTION - CITY
AUSTRALIA	Ms Ditta ZIZI (Senior Official)	Branch Manager, Research and Higher Education Infrastructure	Department of Education and Training - Canberra
	Mr Mat PEARSON	Director - Research Infrastructure Taskforce	Department of Education and Training - Canberra
	Mr Luke ATCHISON	Policy officer – Research Infrastructures	Department of Education and Training - Canberra
	Ms Clare MCLAUGHLIN	Counsellor (Education & Science)	Australian Embassy and Mission to the European Union - Brussels
BRAZIL	Ms Bárbara RIBEIRO DE SANT'ANNA (Senior Official)	Deputy Director of the Office for International Affairs	Ministry of Science, Technology and Innovation - Brasilia
	Mr Marcos FORMIGA	Director of the Office for International Affairs	Ministry of Science, Technology and Innovation - Brasilia
	Mr Carlos MATSUMOTO	Senior Analyst - Office for International Affairs	Ministry of Science, Technology and Innovation - Brasilia
	Mr Arquimedes CILONI	Head of Unit, S&T and Infrastructures	Ministry of Science, Technology and Innovation - Brasilia
	Mr Michael STANTON	Director of Research and Development	Brazil's National Research and Education Network - Brasilia
CANADA	Ms Katharine WRIGHT (Senior Official)	External Relations Science and Innovation Sector	Industry Canada - Ottawa
	Ms Anupriya SETHI	Manager, International Science and Technology	Industry Canada - Ottawa
	Ms Sandra NOËL	Senior Project Leader, Policy Development	Industry Canada - Ottawa
	Mr Matthew LUCAS	Senior Policy Advisor	Industry Canada - Ottawa
EUROPEAN COMMISSION	Mr Robert-Jan SMITS (Senior Official)	Director General	Directorate General for Research and Innovation - Brussels
	Mr Octavi QUINTANA TRIAS	Principal Advisor	Directorate General for Research and Innovation - Brussels
	Mr Andrea DE CANDIDO	Policy Officer	Directorate General for Research and Innovation - Brussels
	Mr Carlos MORAS PIRES	Head of Sector - Scientific Data Infrastructures	Directorate General Communications, Network, Content and Technology - Brussels

COUNTRY	NAME	POSITION	INSTITUTION - CITY
FRANCE	Mr Philippe LAVOCAT (Senior Official)	Conseiller scientifique du Directeur Général Mission Stratégie de la recherche Chef du Service de la stratégie de la recherche et de l'innovation	Direction générale pour la recherche et l'innovation Ministère de l'Education nationale , de l'enseignement supérieur et de la recherche
	Mr Christian CHARDONNET	Chef du département des Grandes Infrastruc- tures de Recherche	Direction générale pour la recherche et l'innovation Ministère de l'Education nationale , de l'enseignement supérieur et de la recherche
GERMANY	Ms Beatrix VIERKORN- RUDOLPH (Senior Official)	Director for Large Facili- ties and Basic Research	Federal Ministry of Education and Rese- arch, Bonn
	Mr Ralph DIETER	Deputy Head of Division „Basic Scientific Rese- arch“	Federal Ministry for Education and Research, Bonn
	Ms Claudia RITTER	Team Leader Support Office ESFRI/Large Research Infrastructures of Basic Research	German Aerospace Center, Project Ma- nagement Agency, Bonn
	Ms Christin KULKE	Scientific Officer Sup- port Office ESFRI/Large Research Infrastructures of Basic Research	German Aerospace Center, Project Ma- nagement Agency, Bonn
INDIA	Ms Sadhana RELIA (Senior Official)	Adviser & Head Inter- national Multilateral & Regional Cooperation (IMRC) Division	Department of Science & Technology, New Delhi
	Ms Rita GUPTA	Scientist and Deputy Director, Inter- national Multilateral and Regional Cooperation	Dept of Science and Technology New Delhi
ITALY	Mr Giorgio ROSSI (Senior Official)	Professor	Physics Department, University of Milan - Milan
JAPAN	Mr Shoichiro SAKAGUCHI (Senior Official)	Director, International Science and Technology Affairs Division	Ministry of Education, Culture, Sports, Science and Technology
	Mr Taku KAWAHARA	Deputy Director, International Science and Technology Affairs Division	Ministry of Education, Culture, Sports, Science and Technology
	Ms Yuko NISHIYAMA	Deputy Director, International Science and Technology Affairs Division	Ministry of Education, Culture, Sports, Science and Technology

COUNTRY	NAME	POSITION	INSTITUTION - CITY
	Mr Masahiko TAKETANI	Officer, International Science and Technology Affairs Division	Ministry of Education, Culture, Sports, Science and Technology
	Ms Orié SHIMADA	Officer, International Science and Technology Affairs Division	Ministry of Education, Culture, Sports, Science and Technology
	Ms Nozomi MURAKAMI	Officer, International Science and Technology Affairs Division	Ministry of Education, Culture, Sports, Science and Technology
MEXICO	Mr Héctor SÁMANO ROCHA (Senior Official)	Counselor for International Cooperation	National Council for Science and Technology– Mexico
	Mr Arturo BORJA TAMAYO	Director of International Cooperation	National Council for Science and Technology
PEOPLE'S REPUBLIC OF CHINA	Ms Rongfang WANG (Senior Official)	Division of International Organizations and Conferences	Dept. of International Cooperation Ministry of Science and Technology - Beijing
	Mr Jing SU	Deputy Director General	National Science and Technology Infrastructure Center
	Ms. Qiongqiong ZHOU	Director	National Science and Technology Infrastructure Center
RUSSIAN FEDERATION	Ms Lyudmila MIKHAYLOVNA OGORODOVA (Senior Official)	Deputy Minister	Ministry of Education & Science of the Russian Federation - Moscow
	Ms Alesya VLADIMIROVNA KVETINSKAYA	Assistant to Deputy Minister L.M. Ogorodova	Ministry of Education & Science of the Russian Federation - Moscow
	Mr Sergey Vladimirovich Salikhov	Director of Department of Science and Technology	Ministry of Education & Science of the Russian Federation - Moscow
	Mr Viktor MIKHAYLOVICH SMIRNOV	Deputy Director International Department	Ministry of Education & Science of the Russian Federation - Moscow
	Ms Olesya VASILYEVNA KHOLOD	Deputy Head of Unit of international organisations and multilateral cooperation International Department	Ministry of Education & Science of the Russian Federation - Moscow
	Mr Evgeny MASTERSKIKH	Head of Division for Science Infrastructures	Ministry of Education & Science of the Russian Federation - Moscow
	Mr Alexandr GORDIENKO	Counselor of Division for Science Infrastructures	Ministry of Education & Science of the Russian Federation - Moscow
	Mr Valery FEDORKOV	Consultant of the International Department	Ministry of Education & Science of the Russian Federation - Moscow
SOUTH AFRICA	Mr Daniel ADAMS (Senior Official)	Chief Director for Basic Sciences and Infrastructure	Department of Science and Technology – Pretoria
	Mr Charles MOKONOTO	Officer	Department of Science and Technology - Pretoria

COUNTRY	NAME	POSITION	INSTITUTION - CITY
	Ms Vinny PILLAY	Minister Counsellor (S&T)	South African Mission to the European Union - Brussels
UNITED KINGDOM	Mr John WOMERSLEY (Senior Official)	Chief Executive	Science and Technology Facilities Council - Swindon
	Mr Peter FLETCHER	Head of International Relationships	Science and Technology Facilities Council - Swindon
UNITED STATES OF AMERICA	Mr Matthew HAWKINS	Acting Head, Large Facilities Office	National Science Foundation - Arlington
	Mr Benjamin L. BROWN	Senior Science and Technology Advisor	US Department of Energy Office of Science – Washington DC

Annex 2.

Terms of Reference (February 2013)

Background

Cooperation at global level for the efficient realisation, operation and utilisation of research infrastructure of international interest is crucial in a period of intense and continued economic crisis, where national research budgets are at risk of being significantly reduced, while at the same time research to address the Grand Challenges and meet the demands of a Knowledge and Innovation Society is becoming increasingly important. In several cases like global warming, evolution of the earth atmosphere and oceans, or energy, water, substantial progress can only be reached by research efforts truly integrated at the global level.

Considering the already existing cooperation of some scientific communities, the potential for more cooperation on issues related to global research infrastructures (GRIs) has been recognised by the **Carnegie Group** since 2007. At the first G8 Ministerial meeting, held in Okinawa on 15 June 2008, it was decided to form a **Group of Senior Officials (GSO)** to take stock and explore cooperation on Global Research Infrastructures. At its meeting in Canada in November 2010, the Carnegie Group agreed to have the first GSO meeting on **March 24, 2011, in Brussels**.

Objectives

The Group of Senior Officials should **advise policy makers** in the field of Global Research Infrastructures. In practice, it would propose by end of 2012 a **draft framework for international cooperation in the field of Global Research Infrastructures**, based on a clear background analysis. In this context, an intermediate report, due by the end of 2011 should be able to answer to the following questions:

- 1) *How to identify RIs of global interest? Which are those, currently existing? In this context which categories of RIs can be identified?⁸*
- 2) *How do countries evaluate and prioritize which large scale research infrastructures to invest in and maintain, nationally and internationally? How to realise an ex-ante impact assessment that includes collateral benefits?*
- 3) *How to identify possible new areas of cooperation?*
- 4) *How can transnational access to RIs of global interest be ensured, including for researchers from countries that cannot afford such facilities?*

⁸ (a) single-sited international large scale RIs (such as CERN), (b) distributed RIs (systems of facilities) of global interest (e.g. open ocean observatories or scientific databases), and (c) national RIs of global interest (such as NIF).

- 5) *Considering that major research infrastructure in social sciences, health or earth observations differ from the single-site facilities such as telescopes or accelerators, what could be done on an international scale to foster these “distributed infrastructures”?*
- 6) *What measures are in place (or are needed) to ensure that the huge amount of scientific data that is (and will be) produced is handled, stored appropriately, and readily accessible worldwide by any communities that might require them for their work? How to ensure full interoperability or standardization of scientific data?*
- 7) *What is in place regarding joint lifecycle management of global RIs, in particular methods to determine and control costs and schedules, thus helping to ensure efficient and cost-effective development of large scale research infrastructures?*

Working Approach

In order to fulfil the above objectives, the Group of Senior Officials is expected to produce two sets of deliverables:

- A **State of the Art report** for the end of 2011 meeting of the Carnegie Group – which could possibly be fed into the G8 summit, including recommendations for improving the current situation;
- A **final report** by the end of 2012 targeted at policy and decision-makers with clear recommendations to optimise the development of future large scale RIs of global interest.

Three physical meetings of the Group are currently planned:

- One on 24 March 2011⁹
- One during the autumn 2011
- A third one in spring 2012

In addition, the members of the Group will exchange documents by e-mail and may hold telephone conferences, as appropriate.

The Group agrees that the Senior Official hosting each meeting will be the **meeting chair** and will be **responsible** for the follow-up until the next meeting takes place.

The Group may constitute sub-groups to tackle specific issues and may also request and use as appropriate **inputs from existing bodies** such as the OECD Global Science Forum, the European Strategy Forum for Research Infrastructures (ESFRI) or national agencies involved in this field.

The Group will be supported by a **Rapporteur**, who will be responsible for putting together the written deliverables mentioned above.

⁹At their last two meetings, (Kazan, Russia, 29-30 October 2009 and Cambridge, Ontario, Canada, 19-21 November 2010) the Carnegie Group welcomed the Commission’s proposal to hold the first meeting of the Group of Senior Officials on Global Research Infrastructures in Brussels.

Annex 3.

Categories of RI (G8/UK 2013)

Due to the large variety of research infrastructures and the lack of a common terminology, the GSO agreed on **three broad categories of research infrastructures of global relevance** to be used in its discussions. The first two can be properly considered global research infrastructures, while the third one constitutes a broader set of national facilities of global interest. These are:

- **Real single-sited global facilities are geographically localized unique facilities whose governance is fundamentally international in character.** The Large Hadron Collider (LHC) at CERN and ITER are current examples. The possibility of future opportunities which may arise from similar projects being developed in different countries needs to be kept in mind, in order to ensure that only one such facility is built.
- **Globally distributed research infrastructures are research infrastructures formed by national or institutional nodes, which are part of a global network and whose governance is fundamentally international in character.** Ocean, earth or seafloor observatories fit very well into this category, including oceanography fleets of research vessels and polar research facilities (both for the Arctic and Antarctic), as well as large telescope arrays. Ad-hoc distributed facilities, linked with time-limited campaigns of observations, might also be considered for possible inclusion in this category. Scientific information exchange, data preservation and distributed computing infrastructures relying on open high-speed connectivity, provide new opportunities in terms of virtualization of resources, advanced simulation environments and improved and wide access to research infrastructures.
- **National facilities of global interest are national facilities with unique capabilities that attract wide interest from researchers outside of the host nation.** Antarctic or ocean drilling facilities are typical examples. Existing research infrastructures with the potential for wide international utilisation (for instance, facilities that leverage geographical advantages or exhibit unique opportunities for advanced research) may fall under this category. Countries may accordingly propose those national facilities that have the potential to be opened for global participation, taking due care of balancing international and national interests.

The development and operation of global research infrastructures rely on common principles such as:

- Global research infrastructures may constitute the basis for the national or regional development of comprehensive innovation clusters around the global research infrastructures, with the aim to coordinate

other nationally or regionally important infrastructures, research labs, technology transfer and education structures which need to be identified and supported along the life-cycle of the research infrastructure. In addition, different RIs with complementary capabilities working in similar scientific areas should consider realising collaborative global research infrastructure.

- Other common principles include: the use of variable geometry schemes where only interested stakeholders should participate along the full life-cycle; the use of harmonized evaluation criteria to assess the benefits of a global research infrastructure; and clear rules for accepting additional partners.

Annex 4.

Framework Criteria (G8/UK 2013)

The Framework for global research infrastructures

The following recommendations form the basis for the Framework for global research infrastructures. They build on the work of the GSO and are based on previous experience with existing global research infrastructures available worldwide.

1. **Core purpose of global research infrastructures.** Global research infrastructures should address the most pressing global research problems, i.e. those frontiers of knowledge where a global-critical-mass effort to achieve progress is required. Science, technology, innovation, and advanced research training goals should be fully integrated throughout the infrastructure plans from their early development.
2. **Defining project partnerships for effective management.** Global research infrastructures initiatives should explicitly and clearly define, as early as possible, the roles and responsibilities of the partners through the different phases of a project's full life-cycle: planning, construction, operation, upgrading, and termination or decommissioning. Rules for future participation should be defined to allow the inclusion of new partners.
3. **Defining scope, schedule, and cost.** Stakeholders should agree upon a shared understanding of the foreseen scope, schedule (including a timetable) and cost, addressing inherent uncertainties and any external constraints, and define processes to effectively address deviations.
4. **Project management.** Appropriate management structures and professional top level management should be established, consistent with best practices derived from existing recommendations and experience at the international level, to ensure rigorous project management.
5. **Funding management.** The development of a global research infrastructure should foresee a careful balance between the minimum acceptable percentage of in-cash contributions and the appropriate level of in-kind contributions. The in-kind contributions have to be effectively evaluated regarding quality and schedule.
6. **Periodic reviews.** The scientific output and strategic goals of global research infrastructures should be periodically evaluated and updated if needed throughout the entire life-cycle to ensure consistent excellence of the scientific output. In addition, an assessment of the quality of the services offered to the scientific communities is necessary to ensure the long-term usefulness and success of the infrastructure. Partnership agreements among funding agencies must enable each nation to fulfil its unique stewardship responsibilities on behalf of its national government for oversight of contributed funds.

7. **Termination or decommissioning.** Planning for termination or decommissioning of a global research infrastructure initiative should be established early in the development of the facility where possible or relevant, by defining criteria for the conclusion of operation, and establishing exit criteria and procedures for closing down and recognizing future termination liabilities or encumbrances on the sponsors at the conclusion of operation.
8. **Access based on merit review.** The definition of an access policy to the global research infrastructure on the basis of peer-reviewed excellence should be agreed upon by the relevant stakeholders from the beginning of the project.
9. **E-infrastructure.** Global research infrastructure initiatives should recognize the utility of the integrated use of advanced e-infrastructure, services for accessing and processing, and curating data, as well as remote participation (interaction) and access to scientific experiments.
10. **Data exchange.** Global scientific data infrastructure providers and users should recognise the utility of data exchange and interoperability of data across disciplines and national boundaries as a means to broadening the scientific reach of individual data sets.
11. **Clustering of research infrastructures.** Where clustering of complementary research infrastructures appears to be consistent with the mission of the global research infrastructure, schemes for access to and mobility of researchers, engineers and technicians through the cluster should be actively encouraged.
12. **International mobility.** Measures to facilitate the international mobility of scientists and engineers to participate in global research infrastructures should be promoted.
13. **Technology transfer and intellectual property.** In order to facilitate technology transfer activities and the most productive participation of industry, members of the GSO should regularly exchange information on best practices regarding intellectual property rights management, and on the sharing and exploitation or utilisation of data and technology generated in global research infrastructures, by following internationally accepted regulations, in order to facilitate technology transfer activities and the participation of industry.
14. **Monitoring socio-economic impact.** The socio-economic impact and knowledge transfer issues of global research infrastructures should be assessed not only in the beginning but during the life-cycle of the project.

Annex 5.

Questionnaire (November 2013)

Group of Senior Officials (GSO)

LIST OF QUESTIONS FOR FACILITIES OF GLOBAL INTEREST PROPOSED BY GSO DELEGATIONS

Introduction

The GSO has been tasked with developing a commonly agreed „Framework for a coherent and coordinated world-wide development and operation of global research infrastructures“ to assist in global cooperation in future research infrastructure development and operation on a global scale.

One of the primary objectives of the GSO is to facilitate the early exchange of information on major research infrastructure projects, some of which may still only be ideas, in order to identify projects of interest to other countries.

This open exchange would ensure that proposals include all interested partners as early as possible, thus avoiding the situation in which for instance one partner develops a fully detailed proposal which others are then expected to accept, and exploiting opportunities for joint development in the early stages of the project.

The Framework was endorsed by the G8 Science Ministers at their meeting in June 2013, who invited other nations to join them in using the Framework to promote cooperation in the development of global Research Infrastructures (RIs).

In addition to multinational facilities, the Framework recognises the importance of national facilities of global interest as follows:

National facilities of global interest are national facilities with unique capabilities that attract wide interest from researchers outside of the host nation. Existing research infrastructures with the potential for wide international utilisation (for instance, facilities that leverage geographical advantages or exhibit unique opportunities for advanced research) may fall under this category. Countries may accordingly propose those national facilities that have the potential to be opened for global participation, taking due care of balancing international and national interests.

This questionnaire has been developed as a practical tool to facilitate this open exchange of information. It contains a set of „structured questions“ organised by main areas. Each group of questions contains a short rationale to facilitate the discussion and understanding at national level.

In answering the questionnaire, the GSO delegations should indicate the rationale behind their identification of these facilities. Examples could be

to explore transitioning the governance of their national facilities to an international partnership model, obtaining ancillary funding for existing international facilities, finding additional partners for proposed new RIs or expanding the use of their national facilities. Identification and common understanding of these reasons could facilitate the international participation in the proposed facilities and speed up the development of new projects.

The questionnaire has been divided into sections which may be answered at different levels. This is necessary because facilities may be in different stages of development. In the case where they might be in the early stages, early identification and exchange of information on similar projects could be very useful for their possible development at international level. On the other hand, existing facilities already in operation or in advanced construction phase could provide additional details that might be available (i.e. if a project is looking for additional partners).

RIs should answer as many sections as possible, recognising that early stage projects will have less information available. However, the more information that can be made available, especially about budget and approval status, the greater the opportunity for new partners to join. Please note that these questions should be considered as a guide only and should be answered in a flexible manner to accommodate specific cases. Nevertheless they should be answered as exhaustively as possible to facilitate further comparative analysis.

It should be understood that this set of questions does not intend to be a substitute for a comprehensive assessment of the proposed facilities, which is out of the scope of the present exercise.

A. Questions related to RI identification

The objective of this group of questions is to obtain a unique identification of the proposed RI and some links to obtain additional information where applicable. The type of host institution and the existence of possible partners are relevant here for their legal implications on other dimensions of the questionnaire.

1. Full name of the facility and acronym

Location (country, city or central hub in case of a distributed facility)

Host institution

Type of host institution

(e.g. university, government research centre, consortium, or other)

2. International partners (specify name and country)

3. Type of RI (single sited, distributed, e-infrastructure or hybrid/mixed model)

4. Web page address where current information on the facility or the project (including main references) can be found

B. Questions related to scientific relevance and use

1. Describe in 4-5 lines the scientific goals and objectives of the RI and the approach used to meet these objectives. Indicate if it is an evolution/upgrade of a pre-existent RI.

2. List the most relevant research areas covered by the RI describing its activity(ies). Indicate Relevance for supporting inter or multi-disciplinary scientific work and the possible relationship to an existing cluster at national and/or international level.

3. Indicate the uniqueness of the RI. The uniqueness can be in the world, in the region, and it can be based also on specific geographic conditions of the RI site, or in the country.

4. Reasons for (or benefits of) potential additional international partners. Indicate added value and potential role of international partners, financial involvement.

a. Added value and potential role of international partners

b. Responsibilities (including potential liabilities) of international partners joining the project

c. Financial involvement of international partners (in the construction and/or operation)

d. Access to international scientific or technological knowledge

e. Relationship to other complementary international RI

5. Potential users (the objective is to evaluate the potential impact of the proposed facility within the global community of potential users)

a. Estimation of the number of potential users that could result from increased international partnerships. Define the criteria used to identify users.

b. Inter-disciplinarity covered by the RI: describe the range of disciplines in the user community

c. Potential benefits to society and industry, including education and workforce development (documented impacts if available).

d. Number of industrial users, national and/or international (the objective is to understand if the facility is used by scientific or engineering users from the industrial sector).

i. Today

ii. Estimation of potential industrial users resulting from increased international partnerships (indicate criteria applied).

This group of questions intends to obtain a general overview of the scientific relevance of the RI in the global context and its possible impact on the scientific users' community (both public and private) which potentially could use it.

This information is useful to assess the relative importance of the proposed RI of global relevance with other possible infrastructures in the same scientific domain and then, the interest it could have for other communities to participate in it.

C. Questions related to the current status of the RI

The proposed RI could be in different phases across its life-cycle and not necessarily in full operation. The current situation of the RI in its life cycle will affect the potential participation of other international partners, and the time and cost necessary to become a reality for scientific use will affect the interest of potential partners because the possibilities to contribute to its construction and operation are different. This also applies to significant upgrades of existing RIs. This set of questions intends to obtain a global picture of the situation of the RI and apply only to facilities that are not yet operating.

1. Status of the formal approval of the RI (select one and provide relevant documentation).

- | | |
|----|---|
| a. | Conceptual proposal phase: provide URL with preliminary design. |
| b. | Detailed project phase: provide URL with detailed design. |
| c. | Under evaluation (the RI has been taken for formal consideration but the construction phase has not been approved yet). If relevant, indicate its prioritisation status at national/regional level or by the relevant funding agency. |
| d. | Approved and funded: provide URL to baseline definition of project scope, budget, schedule, and risk management plan, as well as the Project Execution Plan. |
| e. | Under construction: provide start date and construction duration, URL to current technical and financial status report, and to top-level schedule if available. |
| f. | Operation phase: indicate date of start of operations, access scheme foreseen, annual operating budget (assuming full operations). |
| g. | Termination/decommissioning phase (if applicable): indicate already identified termination liabilities or environmental constraints. |

D. Questions related to „openness“

1. **Annual Report: provide URL to the most recent issue.**

2. **Definition (categories of users) and estimate of users (by category, if applicable). Indicate the total number of potential users at present (both national and international) and an estimate of the number of potential users resulting from increased international partnerships.**

3. **Support to users: describe the interaction of users with the facility, including support facilities both on site and/or remotely (remote access to instrumentation), training programmes and links to Master or Ph.D. programmes.**

4. **Mechanisms for allocating access and resources to external users (including international): describe the criteria used to allocate access to users, structure of the time allocation committee(s) (including membership and main functions). Specify access conditions to industrial users.**

5. **Restrictions and limitations to peer-reviewed access for external (international) users: indicate relevant institutional agreements where the allocated time depends on other commitments (i.e. derived from contributions to an operating budget, in-kind provisions, a host country privilege, or other types of support).**

6. **Mobility schemes: indicate programmes for supporting external users. Provide the number of mobility requests supported annually, typical values of amount and duration.**

7. **Access to data (provide URL to facility data access policy): describe availability of remote access to data, data storage and preservation facilities, data processing facilities, interoperability with other facilities around the world, connection to e-infrastructure, access to data mining.**

8. **Management of Intellectual Property Rights (IPR) issues: describe IPR provisions for external scientific users and commercial users, exploitation policies.**

The concept of „openness“ is a key concept to consider an RI as global; however, the concept is used in different ways and the level of openness can be very different from one type of facility to another and in different fields. This set of questions tries to clarify the way and the percentage of time that the proposed RI is „open“ for external users in order to compare it with other cases. It is also important to know the conditions related to Intellectual Property Rights management for potential users.

More specifically, it is important to disclose whether the RI could be open for scientific external users on the basis of the quality of proposals received in open calls or whether there is an institutional agreement where the allocated time depends on other commitments (i.e. derived from contributions to an operating budget, in-kind provisions, a host country privilege, or other types of support).

This set of questions is focused to obtain a clear picture of the way the facility is organised and open in the international context. For those facilities whose use is currently restricted, the governance scheme is a key factor to assess the way that a RI can be opened to the participation of international stakeholders, if desired. Likewise, the management structure and procedures are crucial in the lifecycle of any RI, but even more so in the case of a global RI due to the interaction with the interests of international stakeholders.

E. Questions related to governance and management

1. **Legal structure: provide URL to information on legal structure of the facility. Highlight if and how it is possible to incorporate other international stakeholders.**

2. **Governing Board/Council or equivalent governance structure. Describe the main functions and membership composition (including any relevant sub-committees), identifying individual profiles, roles and responsibilities and process to appoint its members. Describe the relationship to the facility management. Provide a URL to the Board charter.**

3. **Identification, evaluation and selection process for top management (such as Director General, Scientific Director or equivalent position, and any other relevant top management positions).**

4. **Level of oversight of management by Board for decision making in the following areas: annual budget, recruitment of personnel, in-kind provision, operation services, other (specify).**

5. **Describe the positions of the high level management (2nd level), their role and responsibilities as well as the procedure for their selection.**

6. **Indicate the share of administrative costs with respect to total number of employees.**

7. **Describe any acquisition plans and procurement policies (including juste retour where applicable).**

8. **Technology transfer issues: give information on the facility's IPR policy if separate from that used to deal with IP generated by users, as well as plans to support technology transfer and spin-off creation, patenting, and licencing of technology or know-how to external entities.**

F. Questions related to cost/budget

1. Contributions to the costs of the facility.

- a. Total cost: Estimated in case of a RI not operational yet, actual costs in case of an operational RI

- b. Distribution of budget among funding partners (actual or planned): indicate host share; national funding partners; national vs. international balance and percentage covered by each international partner; equivalent value of in-kind contributions.

2. Procedures for construction costs (acquisition and contracting plan): eg open tenders for component provision (national, regional, worldwide); allocation of responsibilities on the basis of MoUs or national/international agreements; sub-award and subcontract management plan; import tax considerations.

3. Operation costs: indicate actual or projected operating costs, giving if possible a URL to a webpage containing an activity-based budget estimate; decommissioning costs and termination liabilities (if applicable).

4. In case of global RI in the construction phase indicate for each participant the percentages of in-cash and in-kind contributions.

5. Delays and over-costs: provisions for managing changes in budget and schedule and provide a URL with the project's Risk Management Plan for budget and schedule risks.

This set of questions is related to the understanding of the economic effort and procedures required to construct, operate and use the RI.

G. Additional information

1. Please provide any additional information you consider important for potential new international partners.

Annex 6. List of Global Research Infrastructures (June 2015)

Section I National based research infrastructures

Country	RI Name and web site	Scientific Domain	Description	Proposed collaboration opportunity	EoI
Australia	Australia Telescope National Facility - ATNF – www.atnf.csiro.au	Astronomy	<p>The Australian Telescope National Facility (ATNF) operates a number of world-class astronomical facilities, including:</p> <ul style="list-style-type: none"> • the Parkes Telescope, the most powerful single dish telescope in the southern hemisphere; • the Compact Array, the largest radio interferometer in the southern hemisphere; • the Australian SKA Pathfinder (ASKAP) telescope, a ground-breaking high speed survey instrument. <p>The Parkes Telescope and Compact Array are both fully operational. The ASKAP telescope is partly constructed and is operational at proof of concept level.</p>	<p>The ATNF is a unique set of facilities due to their combination of technical features and their position in the southern hemisphere. There are strong relationships between ATNF facilities and international partners and opportunities exist for further international partnerships and investment. Co-funding of facilities would allow greater diversity of instrumentation and higher research support levels, as well as increasing operational planning horizons.</p>	
Australia	Australian Astronomical Observatory - AAO – www.aao.gov.au	Astronomy	<p>The Australian Astronomical Observatory (AAO) provides world-class optical and infrared observing facilities based at a remote site with dark skies and excellent views of the southern hemisphere. The Anglo-Australia Telescope and the United Kingdom Schmidt Telescope at the AAO have been in operation since the 1970s, but remain at the forefront of research due to the innovative instrumentation developed through the AAO's expertise in optical fibre and spectrographic technologies.</p>	<p>The AAO presents opportunities for international partners to co-develop and utilize new instrument technologies which could be used in conjunction with complementary facilities in the northern hemisphere.</p>	RU

Australia	Murchison Widefield Array Radio Telescope - MWA – www.mwatelescope.org	Astronomy	The Murchison Widefield Array (MWA) is a low-frequency radio telescope which provides the facilities to study the sun, the heliosphere, the ionosphere, and radio transient phenomena. The MWA is unique because of its novel design and architecture, and because of its geographic location, it is sited in the remote Murchison Shire of Western Australia, one of the best locations in the world for radio astronomy due to its very low population density and lack of radio interference. The MWA views the southern hemisphere, making it complementary to its close cousin, the LOFAR telescope based in The Netherlands.	As part of an international cluster of activities and facilities associated with the Square Kilometer Array telescope, the MWA is closely coupled to other research infrastructure in Australia and around the world. There is enormous scope for additional partners to bring new scientific and technical knowledge to exploit the MWA, in collaboration with existing MWA partners. In particular, due to the massive datasets involved, partners with expertise in the management of Big Data projects are welcome.	RU
Australia	Population Health Research Network - PHRN – www.phrn.org.au	Social Sciences	The Population Health Research Network (PHRN) provides nationwide data linkage e infrastructure capable of securely and safely managing population health information from around Australia. A dispersed network, the PHRN operates data linkage units across every state and territory in Australia, increasing the efficiency and effectiveness of population health research. With the ability to provide large sample groups, the PHRN enables a whole-of-population approach to health and health related research.	The PHRN is a founding member of the International Population Data Linkage network, in partnership with facilities in Canada, Germany, the United Kingdom and New Zealand. Apart from world-class infrastructure, the PHRN provides partners with access to uniquely high quality, long term patient-level data drawn from across the Australian population. The PHRN data linkage ability enables individual patients to be tracked across sectors and years, and all data has been collected under a well-established national reporting system. The combination of high quality infrastructure and high quality datasets with an already established set of international linkages makes PHRN an excellent partner for international collaboration with the goal of building a globally significant dispersed facility.	UK
Australia	Open-Pool Australian Light-water reactor - OPAL – www.ansto.gov.au/ AboutANSTO/OPAL/	Neutron source Materials Science	The Open-Pool Australian Light-water reactor (OPAL) is a high intensity neutron source suitable for a range of nuclear medicine, research, scientific, industrial and production goals. OPAL is highly versatile, making it suitable for industrial and production uses, but also for world-class basic research using a wide array of instrumentation.	OPAL is not globally unique, being one of a number of similar facilities around the world, but is recognised in the Asia-Pacific region as a leader in neutron-scattering research. At a regional level, partnerships between OPAL and international users present the opportunity to consolidate resources and expertise, and provide research opportunities which may not otherwise be available within countries around the region.	RU
Brazil	Brazilian Centre for Research in Energy and Materials - CNPEM –	Energy and materials	The CNPEM is a private research and development institution (R&D) mainly owned by the Brazilian Ministry of Science, Technology, and Innovation (MCTI). CNP responsible for the management of the following main research laboratories: Br-Synchrotron Light Laboratory (LNLS), Bioscience Lab (LNBio), National S&T Laboratory for Bioethanol (CTBE), and the National Laboratory for Nanotechnology (LNNano)	The four CNPEM's national laboratories have facilities open to academic and business communities of Brazil and overseas. On average, 1900 external researchers are benefited annually by the campus infrastructure. The laboratories also develop their own research projects and participate in the cross-investigation agenda coordinated by the CNPEM, combining facilities and scientific skills around strategic themes related to energy and materials	DE RU

Brazil	Brazilian Synchrotron Light Laboratory - LNLS –	Synchrotron Materials Science	The LNLS operates the only Synchrotron Light Source in Latin America and a set of scientific instrumentation for the analysis of organic and inorganic materials; The Brazilian Synchrotron Light Source (LNLS) aims to make available to the scientific and technological community experimental facilities in state of art, in an open, multi-user and multi-disciplinary to foster excellence and complex research, thus contributing to the development of STI in the country and promoting international integration	The Institute is open to users, and researchers worldwide can come to perform their experiments. To do this, proposals can be submitted twice per year. All the proposals are evaluated by an external committee, and those approved will receive beam-time in the following semester.	RU MX
Brazil	Brazilian Bioethanol Sci&Tech Laboratory - CTBE –	Bio Fuel	The CTBE investigates new technologies in bioenergy The CTBE is a National Laboratory that operates with the scientific and technological community and the Brazilian productive sector, aiming to contribute to the maintenance of competence of the Country in the production of sugarcane ethanol and other compounds from biomass. The CTBE Mission is contributing to the advancement of scientific technological knowledge in the production, use and conversion of biomasses on energy materials, through research, development, innovation and personnel training		IN
Brazil	Brazilian Bioscience National Laboratory - LNBIO –	Bioscience	LNBio conducts research in frontier areas of Bioscience, focusing on biotechnology and drugs LNBio is responsible for the following programs: a. The Cancer Biology Scientific Program, This program aims at the prospection of potential candidate biomarkers, target molecules, active compounds and delivery strategies for therapeutic purposes, and likely for diagnosis, prognosis and treatment follow-up stages. b. Neglected diseases c. Biology of the Cardiovascular System d. Microorganisms and plants At LNBio several research projects aiming at studying the molecular mechanisms governing plant-pathogen interactions. LNBio has employed a multidisciplinary approach to investigate the biological role of plant proteins involved in resistance against bacterial pathogens as well as the function of bacterial and fungal proteins required for pathogenicity or pathogen adaptation in the host		DE RU

Brazil	Brazilian Nanotechnology National Laboratory – LNNANO –	Nanotechnology	<p>LNNano conducts investigations with advanced materials, besides hosting the China-Brazil Binational Center for Nanotechnology. The Brazilian Nanotechnology National Laboratory (LNNano) was created in 2011. LNNano aims to attend the scientific and industrial community and to align with thematic RD&I programs of CNPq. The laboratory seeks, by means of applied and basic research carried out by its researchers, experts and technicians, to exploit the opportunities offered by nanotechnology to satisfy the needs of agriculture, industry and services on the regional, national and international scale, aiming at the creation and development of sustainable products and processes and the generation of knowledge and wealth.</p>	<p>The LNNano collaborates with its partner laboratories in CNPq for the characterization of advanced materials and the creation and implementation of novel search methodologies. Unique in the world since it is the first laboratory which has performed implementation of thermomechanical simulation and X-ray scattering (XTMS) equipment associated with an X-ray diffraction line of the LNLS (XRD1). This attracts outstanding researchers from Brazil and other countries such as the USA, Argentina, India and Japan. In 2013, the LNNano – in collaboration with the LNLS – has completed the installation of an apertureless scanning nearfield optical microscope (SNOM) at the LNLS IR beamline (IR1)</p>	CA RU
Brazil	STIRIUS	Fundamental Physics Materials Science	<p>3 GeV, 4th generation synchrotron light source, emittance of 0.27 nm.rad, 13 beamlines in the first phase, will be able to hold up to 40 beamlines, first beam schedule for 2018. It is an evolution of the current 2nd generation light source already in operation at LNLS. The current source is a 1.37 GeV machine, 100 nm.rad, with 18 operational beamlines. It is today the only synchrotron light source in Latin-America.</p>	<p>MX</p>	
Canada	Sudbury Neutrino Observatory Laboratory – SNOLAB – www.snolab.ca	Fundamental Physics Astrophysics	<p>SNOLAB is an underground science laboratory specializing in neutrino and dark matter physics. Situated two Kms below the surface in the Vale Creighton Mine located near Sudbury Ontario Canada, SNOLAB follows on the important achievements in neutrino physics achieved by SNO and other underground physics measurements. The primary scientific emphasis at SNOLAB will be on astro-particle physics with the principal topics being: Low Energy Solar Neutrinos Neutrino less Double Beta Decay Cosmic Dark Matter Searches Supernova Neutrino Searches</p>	<p>Currently the lowest radioactivity laboratory in the world, SNOLAB hosts multiple experiments and is available for any user (domestic or international) through merit-based access. Potential users must demonstrate a sound science program that requires the underground laboratory and retain funding for their experiment. The science programme at SNOLAB is primarily focused on astroparticle physics, with particular emphasis on neutrinos and dark matter.</p>	IT ZA CA

Canada	Ocean Networks Canada Canada – ONC – www.oceannetworks.ca www.neptunecanada.ca www.venus.uvic.ca	Oceanography, energy, environment, marine technology, climate change, operational oceanography, ICT	Ocean Networks Canada (ONC) is a world-leading organization supporting ocean discovery and technological innovation. ONC is a not-for-profit society, established in 2007 by the University of Victoria under the BC Society Act. Under a Management Agreement with the University, the purpose of ONC is to govern, manage and develop: <ul style="list-style-type: none"> the Ocean Networks Canada Observatory (comprised of the VENUS and NEPTUNE Canada networks) as a national research platform; the ONC Centre for Enterprise and Engagement as a federal centre of excellence for commercialization and research. 	ONC operates the first and largest cabled ocean observatory in the world with networks of ocean sensors off the coast of British Columbia, Canada, with some data collection in the Arctic ocean. Sensors are connected nationally and internationally to facility users via the internet. This facility supports both inter and multi-disciplinary research spanning biology, geology, oceanography, ecology, earthquakes, tsunamis, climate change, and technology. International collaborators could benefit both at the experimental and the data use levels. Data can be accessed remotely. ONC's facilities and data are open to any user (domestic or international) through open calls to scientists, with priorities set by advisory committees.	RU JP
Canada	Canadian High Arctic Research Station – CHARS – www.science.gc.ca/chars	Energy Environment Climate	CHARS will provide a world-class hub for science and technology in Canada's North that complements and anchors the network of smaller regional facilities that exist across Canada's North and internationally. The new Station will provide a suite of services including a technology development centre, mechanical and electrical workshops, a knowledge-sharing centre, and advanced laboratories. It will provide logistics support for scientists going into the field. The mandate for the Station is broad covering four broad themes: in its mandate: <ul style="list-style-type: none"> Resource Development; Exercising Sovereignty; Environmental Stewardship and Climate Change; Strong and Healthy Communities. 	CHARS infrastructure, program, and cross-cutting capabilities will provide a platform and resources to engage potential collaborators around targeted science and technology priorities as defined in the Stations inaugural S&T Plan. Recognizing the multiplicity of stakeholders that need to be engaged to address these key issues effectively, CHARS is being designed explicitly to broker partnerships and collaborations. The Station will link relevant industry, academic, Aboriginal, Northern, government, and international stakeholders and leverage their expertise, experience, and resources to address shared goals. CHARS is already engaged in discussions internationally to partner on monitoring. International partners are welcomed on the delivery of the S&T Plan where goals and objectives match those articulated in the Plan.	DE RU UK JP
Canada	TRIUMF www.triumf.ca	Particle Physics Nuclear Physics Nuclear Medicine Materials Science Accelerator Science	TRIUMF, located in Vancouver, BC, is Canada's national laboratory for particle and nuclear physics. In addition, TRIUMF also operates world-class programs in the areas of accelerator science, nuclear medicine, and materials science. TRIUMF operates several particle accelerators on its 13-acre site, including the world's largest cyclotron (520 MeV protons), a new state-of-the-art superconducting linear electron accelerator, and the ISAC heavy-ion accelerator for rare isotopes.	1) TRIUMF operates user facilities for rare isotope science (ISAC) and molecular and materials science using MuSR and betaNMR. Collaboration opportunities include using the existing experimental infrastructure as well as developing new experimental facilities. 2) Collaboration opportunities exist for developing modern accelerator technologies, including SRF and target technologies for the production of isotopes. 3) With the presence of multiple cyclotrons and hotcell facilities on-site, TRIUMF has world-class accelerator target, isotope production, and radiochemistry expertise, and interest in known or novel isotopes as applied to medicine, medical imaging/radiotherapy, or other sciences (i.e., oceanography, mining/geology, etc.).	CN MX

<p>Canada</p> <p>The Wind Engineering Energy and Environment (WindEEE) Dome www.windee.ca</p>	<p>Wind engineering, wind energy and wind environment</p>	<p>WindEEE covers research in the three main areas of: wind engineering; wind energy; and wind environment. WindEEE currently brings together more than 20 researchers at Western University, approximately 40 across Canada and at least 20 internationally. The research covers three areas of research in Engineering (Civil, Mechanical and Electrical) as well as in the Sciences (geography, physics and mathematics) and business/economics. WindEEE is an integral part of the Wind Energy Strategic (WESNet) Network of Canada and has been declared by both WESNet and the Wind Energy Institute (WEICan) as a “facility of national character”</p>	<p>WindEEE is open to new international research partners and users and can offer the unique capabilities of this facility the international community. WindEEE is currently co-applicant through the European Energy Research Association (EERA) to Horizon 2020 together with several EU partners from Germany (Fraunhofer IWES), Denmark (DTU Wind Energy), Spain (CENER), Holland, Italy (Poli Milano), etc.</p>	<p>RU IN</p>
<p>Canada</p> <p>Canadian Light Source -CLS- www.lightsource.ca</p>	<p>Materials Science Life Sciences Energy Environment Health</p>	<p>CLS, located in Saskatoon, is a 2.9 GeV 3rd generation synchrotron light source with 22 photon beamlines either operational or under construction. It currently supports over 900 users per year which includes ~20% international users. Primary access is through a peer review process, with proposals being accepted twice a year. CLS is known for its innovative and business-friendly Industrial Science program. CLS has also pioneered the production of Mo-99 using an electron accelerator.</p>	<p>CLS is open to international users who compete on an equal basis for access through peer review, or they can purchase beamtime via the Industrial Science program. CLS seeks to facilitate access for Canadian users to international synchrotron and free-electron laser facilities. CLS also seeks collaborators to develop new technologies and experimental facilities, and welcomes the exchange of people.</p>	<p>MX</p>
<p>China</p> <p>Beijing Electron Positron Collider – BEPC - english.ihep.cas.cn/</p>	<p>Fundamental Physics Materials Science</p>	<p>BEPC II is a two-ring e+e- collider running in the tau-charm energy region (E_{cm} = 2.0-4.2 GeV), which, with a design luminosity of 1 × 10³³ cm⁻²s⁻¹ at the beam energy of 1.89 GeV, is an improvement of a factor of 100 over its successful predecessor, BEPC. The machine also provides a high flux of synchrotron radiation at beam energy of 2.5 GeV.</p>	<p>1. Welcome to join BESIII collaboration to analyse BESIII data for t-charm physics study. The related procedure and the management policy can be found at website http://bes3.ihep.ac.cn/orga/manage.htm. 2. BEPCII is also for producing synchrotron radiation—Beijing Synchrotron Radiation Facility (BSRF). BSRF welcome international users to come to do multidisciplinary research. The procedure for users to apply for beam time at BSRF is in accordance with international practices: http://english.ihep.cas.cn/rs/fs/stl/usersinformation/</p>	<p>MX</p>
<p>China</p> <p>Experimental Advanced Superconducting Tokamak – EAST - www.ipp.cas.cn http://east.ipp.ac.cn</p>	<p>Energy research</p>	<p>EAST tokamak is designed on the basis of the latest tokamak achievements of the last century, aiming at the world fusion research forefront. Its mission is to conduct fundamental physics and engineering researches on advanced tokamak fusion reactors with a steady, safe and high performance, to provide a scientific base for experimental reactor design and construction, and to promote the development of plasma physics and related disciplines and technologies. EAST has three distinct features: non-circular cross-section, fully superconducting magnets and fully actively water cooled plasma facing components which will be beneficial to explore the advanced steady-state plasma operation modes.</p>	<p>EAST is fully open to the world fusion community as a valuable test bench for physical and technical issues on advanced steady-state plasma operation for ITER and future DEMO. It warmly welcomes all fusion/plasma scientists and engineers in the world come to EAST to explore the relevant theory, physics, and technology for fusion energy. It includes, but not limited in, plasma control, wave heating and current drive, diverter, plasma surface interaction, superconducting technology, high efficient cooling, remote handling maintenance, etc.. The partners can join the research on EAST by bringing innovative ideas, know-how, or additional funds with bilateral agreements. The scientists and engineers can also work on EAST as a staff, guest professor, post-doctor, Master/Ph. D student.</p>	<p>RU UK</p>

China	Heavy Ion Research Facility at Lanzhou - HIRFL - www.impcas.ac.cn	Nuclear Physics, Atomic Physics, Materials Sciences, Biophysics, Energy	Employing low and high energy heavy ion beams provided by accelerators, to search for the existing limit of super heavy elements, to study the nuclear structure and properties, nuclear processes relevant to astrophysics, atomic structure in strong fields and atomic collision dynamics, radiation damage of materials, radiobiological Effects. New technology in accelerator development and ion sources.	International partners will participate actively in the construction of the RI and associated detector systems. They would bring their expertise, know-how and additional funds to the HIRFL. It is proposed that international partners take part in the construction of the new facility – HIAF. The conditions to use the new facility in future could be signed through bilateral negotiations.	FR RU
France	Système de Production d'Ions Radioactifs et Ligne de 2ème génération - SPIRAL2 - www.ganil-spiral2.eu/spiral2-us http://pro.ganil-spiral2.eu/spiral2/	Fundamental nuclear physics, atomic physics, material sciences, radiobiology, research for hadron and isotope therapy.	SPIRAL2 is a new facility that will be scientifically and technologically complementary to the existing infrastructure, GANIL. SPIRAL2 is supported by the existing structure of GANIL for both personnel and technological development needs and will be operated as part of the GANIL facility. SPIRAL2, which is as large as the current GANIL facility, will produce the only ion beams of their kind in the world. The fields of experimentation with SPIRAL2 range from radiotherapy to the physics of the atom and its nucleus, from condensed matter to astrophysics. SPIRAL2 will reinforce the European leadership in the field of nuclear physics based on exotic nuclei.	France proposes an international enlargement of the collaboration process of the SPIRAL2 IR project for its second development phase. It is proposed that partners (or their representatives) join the GIE GANIL-SPIRAL2 as scientific partners having voting rights in the Scientific and Strategy Committees and as such fully participate in the definition of the scientific policy of the facility. The partners participating in the running costs of the facility will acquire rights to propose and perform experiments at the preferential conditions defined in the corresponding bilateral agreements between the partner and the GIE GANIL-SPIRAL2. International partners will participate actively in the construction of the RI and associated detector systems. They would bring their expertise, know-how and additional funds to the one of the world-leading nuclear physics RI.	CN
Germany	PETRA III http://photon-science.desy.de/facilities/petra_iii/index_eng.html	Structure and Dynamics of Matter, Materials Science, Energy, Enabling Technologies, Health	PETRA III at DESY is a world leading high energy (6 GeV) 3rd generation synchrotron radiation source and Germany's main source for experiments in the hard X-ray regime from 200 eV up to 150 keV. The user operation of the first beamlines started in 2010 and all 14 beamlines are in full operation since end of 2012. By providing the worldwide smallest horizontal emittance and photon beam spot sizes down to the 5 nm range PETRA III offers the best conditions for all experiments needing high brilliance or a high degree of coherence, such as for micro- and nano-focussing applications, samples under extreme conditions and high-resolution spectroscopy. It also provides ideal conditions for a broad range of hard X-ray experiments like in engineering materials science and structural biology. Moreover, the large circumference of 2.3 km, in combination with a top-up mode of operation, enables special bunch patterns, which are important for timing experiments, without loss in overall beam intensity. At present, PETRA III is being extended by two experimental halls with 11 new beamlines. They will be dedicated to experimental techniques either not covered or extremely high in demand in the main hall.	DESY accepts so-called "Special Access Groups" at PETRA III. These are institutions or consortia represented by a legal entity, which contribute to the construction and operation of the facility. In return, they are granted beamtime "Special Access Beamtime" up to a certain maximum amount. The details of such collaborative schemes are subject to careful case-to-case negotiations, ending in a written agreement. Special Access Groups may join DESY's peer review system or may also establish their own peer review system, to be approved by DESY. The technical state and scientific achievement of all beamlines (including the Special Access Groups in their dedicated time) will be evaluated by an external expert group under guidance of the DESY advisory board "Photon Science Committee" (PSC) every 4 years. The above considerations refer exclusively to the scientific, non-commercial use of the PETRA III facility. Any commercial use of the facility requires a separate written agreement with DESY. As a general rule, Special Access Groups are not entitled to allocate beamtime for commercial purposes at their own discretion. Further options for collaborative partnerships on a larger scale must be explored in the context of the DESY future strategy in close cooperation with the funding agencies and supervisory board.	RU MX

India	India-based Neutrino Observatory - INO - www.ino.tifr.res.in	High Energy Physics	The project aims to create an underground laboratory in India where front ranking experiments in the area of neutrino physics can be carried out. This site can also be used to setup experiments to study dark matter. Development of particle detectors of various kinds will be an integral part of this project. The project will have two components: <ul style="list-style-type: none"> • Development of underground laboratory infrastructure and support services • The Iron Calorimeter (ICAL). 	A 50 kiloton Magnetised Iron Calorimeter detector (ICAL) to be set up in the INO facility will address the neutrino mass hierarchy issue using atmospheric neutrinos. International partners are welcome to participate in the construction of the ICAL detector and its operation as well as in the analysis of the data as equal partners. The exact role of partners and their contributions could be defined through bilateral agreements between the partners and INO. International partners are also welcome to join other proposed experiments like dark matter search and neutrino-less double beta decay to be setup in the INO underground facility.	RU MX
Italy	Gran Sasso National Laboratories /Laboratori Nazionali Del Gran Sasso - LNGS - www.lngs.infn.it	Fundamental physics Astronomy	LNGS is a world class international facility for deep underground science, located at a depth of 1.4 Km under the Gran Sasso Massif. LNGS main scientific goal is the study of extremely rare and weak processes in particle physics. Shielding from cosmic rays provided by the rock coverage, low environmental radioactivity and additional shielding with ultrapure material provide ideal conditions for studying rare processes. Facility upgrades have been planned and partially funded.	Opening LNGS as a Global Research Infrastructure will consolidate LNGS mission by widening the international participation to science at LNGS. The international science community will benefit of an easily accessible and fully equipped underground laboratory, of advanced workshops and services, and of world-class expertise in ultrapure materials. Participation to governance and sharing of costs, in the form of cash or in-kind contribution, will be part of the action towards a wider international opening.	CA RU ZA CN MX
Japan	Deep Sea Scientific Drilling Vessel CHIKYU www.jamstec.go.jp/chikyuu/eng/index.html	Climate and Ocean Change, Biosphere Frontiers, Earth Connections and Earth in Motion.	Our science program will bring together the Earth, ocean, atmospheric, and life sciences with a common goal of understanding the Earth's past, present and future. The program's science plan, Illuminating Earth's Past, Present, and Future, addresses pressing scientific priorities and social concerns within four themes: Climate and Ocean Change, Biosphere Frontiers, Earth Connections and Earth in Motion. The plan for NantTOSSEIZE includes drilling, below the ocean, very deep into the Earth to observe earthquake mechanisms. Other plate convergent margins, mid-ocean, continental margins, etc. are also our target areas.	Scientific drilling vessel which explores as the main platform of the International Ocean Discovery Program (IODP). It explores 26 countries such as Japan, USA and Europe to open the new frontier of the scientific knowledge and contributes the international collaborative research and human resource. Regarding to the IODP's international project led by both Japan & US, it is necessary to establish the partnerships, propose the scientific research, and adopted by each three ships operated by Japan, US, and Europe. To board on CHIKYU, becoming a contribution member of the project (with a voluntary contribution) is required. We hope to extend the framework of the corporate research with the GSO country members which have not been collaborated in the past.	RU UK

Japan	E-Defense www.bosaigo.jp/ hyogo/ehyogo/index. html	SeismologyE- arthquake effects mitigation	To mitigate the damage caused by earthquakes, E-Defense provides the opportunity to examine the failure/collapse process of full- and large-scale structures, by directly applying to the structures, three-dimensional forces equivalent to the level of large earthquakes. Accumulated experimental data are used to reveal the collapse process, as well as to develop new technology for the mitigation of damage to structures from large earthquakes. Experimental study on collapse process of structures and relating development of new technology in order to mitigate damage to structures from large earthquakes Research on numerical methods that simulate collapse process of structures for development of a simulation system called "E-Simulator" International collaboration of utilizing each other's earthquake engineering test facilities and sharing experimental results will make it possible to promote effective research and better outcomes.	International corporate research of E-defense will be carried out without any particular limitation. There will be no public offering of the corporate research although; instead, research proposals and consultations are needed to be carried out. In this case, it is necessary to pay part of the facility uses. As a specific example of such cooperation, the earthquake engineering research group operated by The US National Science Foundation (NSF) carried out the opportunities for cooperative activities related to earthquake research, citing E-Defense collaboration. By registering to the list, we hope to extend the framework of the corporate research with the GSO country members which have not been collaborated in the past.	CA IT
Japan	Radioactive Isotope Beam Factory - RIBF - www.nishina.riken.jp/ RIBF/	Nuclear physics, and related accelerator-based science	RIBF is a leading research facility in the field of nuclear physics based on heavy-ion accelerator complex consisting of cyclotrons and linacs. It produces a wide variety of beams of unstable nuclei (Radioactive Isotopes, RIs) with the highest intensities in the world. By using these RI beams, pioneering research achievements are expected in nuclear physics. Also, various applications in many research fields are being promoted by exploiting unique properties of RIs.	At present, several international collaborations are being conducted at RIBF, using large experimental detectors developed by major institutes in European countries and the US. We expect to expand these scientific opportunities further by inviting new collaborations under the framework of GSO. We are also planning personal exchange programs between the institutes that are currently operating and under construction, in order to promote scientific research activities. International collaborations in the modern accelerator technology are desired between major facilities in the world, such as FRIB, FAIR, Spiral2, and IBS for the future plan of RIBF. It will also be useful for future evolution of accelerator-based science if international collaborations are established between the other Asian countries for human resource developments under the framework of GSO.	RU
Mexico	The Large Millimeter Telescope Alfonso Serrano - LMT - www.lmtgtm.org	Astrophysics, astronomy & engineering	Principal scientific goals: understand the physical processes of structure formation and its evolution throughout the full history of the Universe. The LMT will exploit is unprecedented combination of sensitivity, resolution and mapping speeds to investigate subjects as the constitution of comets and planetary atmospheres, the formation of extra-solar planets and the birth and evolution of stars, the hierarchical growth of galaxies, as well as the cosmic microwave background.		

Mexico	High Altitude Water Cherenkov Observatory – HAWC – www.hawc-observatory.org	Astrophysics	Unlike optical or radio telescopes that observe light from astronomical phenomena directly, HAWC will study high-energy cosmic and gamma rays indirectly. The observatory has been recording data and producing preliminary science results since August 2013, when the first 100 detectors came online. It is now fully functional with the full suite of 300 tanks. HAWC is expected to be 10-15 times more sensitive than its predecessor, the Milagro experiment in Los Alamos, and HAWC will continuously monitor over a wide field of view to observe two-thirds of the sky every 24 hours.		
Russian Federation	A Superconducting accelerator complex NICA (Nuclotron-based Ion Collider facility) http://nical.jinr.ru/	Fundamental physics	NICA is the new accelerator complex. The aim of realization complex NICA is to start in the coming years, experimental study of hot and dense strongly interacting QCD matter and search for possible manifestation of signs of the mixed phase and critical endpoint in heavy ion like Au, Pb or U collisions. Range of center-of-mass energy available for experiments is 4–9 GeV·u ⁻¹ with average luminosity of 10 ²⁷ cm ⁻² ·s ⁻¹ .	The NICA collaboration includes already more than 110 scientific centers and organizations from more than 30 countries. About 190 scientists participate in the NICA physical programme preparation (see http://theor.jinr.ru/wiki/pub/NICA/WebHome/WhitePaper_10.01.pdf). More than 300 experts participate in accelerator complex design and construction and more than 300 physicists are involved in design and preparation of the MPD, BM@N and SPD detectors. It is expected that the collaboration will be extended by physicists and engineers both from Russia and other countries.	IN CN
Russian Federation	Reactor complex PIK www.pnpi.spb.ru	Neutron source	One of the highest research nuclear reactors in Europe. The main feature of complex PIK consists in multifunctionality and interdisciplinaryity. On the base of the reactor complex PIK will be built up The International Center for Neutron Research. Creation of this center will enable to conduct breakthrough investigations in the field of condensed matter physics; biology, physics of polymers, neutron and nuclear physics and physics of elementary particles and fundamental interactions, which will contribute to supporting Russian Federation leadership in scientific community. Technical characteristics: max. heating power – 100 MWatt; The flux density of thermal neutrons – 5·10 ¹⁵ cm ⁻² ·c ⁻¹ ; max. volumetric energy-release in active zone – 6,6 MWatt·t ⁻¹ .	Currently there are already exist or in preparation cooperation agreements on the joint use of the experimental reactor PIK stations with the Helmholtz Zentrum Geesthacht (GKSS) (Germany, Hamburg), a research centre of the Helmholtz Society in Jülich (HFZ Jülich) (Jülich, Germany), the Budapest Neutron Centre (Budapest, Hungary) and the European Centre for Neutron Research – Institute Laue-Langevin (Grenoble, France). There are perspectives for collaboration with European Spallation Source – ESS (Lund, Sweden). The ICNR on the basis of PIK Reactor Complex is open for collaboration with International Research Centers which activities are based on neutron research.	
Russian Federation	Tokamak IGNITOR the web site under construction	Fusion energy	IGNITOR is the first in the world tokamak with high magnetic field. The ignition of thermonuclear reaction in IGNITOR will be set up at the flowing current without extra heating devices. The design (dimensions) of IGNITOR will be much less than international thermonuclear reactor ITER. For current excitation will be used central solenoid with high field (more than 14 T). Plasma will be stabilized at strong poloidal magnetic fields.	Originally bilateral Russian-Italian collaboration in the framework of the Tokamak «IGNITOR» project realization will be open for the International Tokamak Research Centers on the construction phase.	

<p>Russian Federation</p>	<p>Fundamental Physics and materials science.</p>	<p>Super synchrotron radiation source of the 4th generation (SSRS-4) the web site under construction</p>	<p>The synchrotron radiation source of the 4th generation will have high space coherence corresponding to laser radiation, high brightness and temporal pattern. The main scientific directions are used SRS-4 will be consisted in researching of structure and dynamics of substance with atomic space and femtosecond temporal resolution, developing new synthesis and characterization of nanostructure materials, researching in sphere of biomedicine, etc. Technical characteristics: photon energy – 1–30 keV, average luminosity – about 10^{24} photons\cdotsec\cdotmm$^{-2}$$\cdot$mgrad$^{-2}$, duration of an electronic bunch – 0,1 ps.</p>	<p>The representatives of NRC “Kurchatov Institute”, ANL, DESY, ESRF, SLAC and SPRING-8 recognize the importance of X-ray science for the future development of International Society beyond 2020 and signed Agreement on International Design Effort for the Future Light Source (Moscow Communiqué). The purpose of the Agreement is to collaborate on design of unique new generation facility on the basis of Synchrotron Radiation Source of the 4th generation. The SSRS-4 project is open for collaboration with International Research Centers which activities are based on using the synchrotron radiation sources.</p>	<p>MX</p>
<p>Russian Federation</p>	<p>Fundamental Physics and materials science.</p>	<p>Exawatt Center for Extreme Light Studies (XCELS) www.xcels.iapras.ru</p>	<p>A large research infrastructure – the Exawatt Center for Extreme Light Studies, will be a new unique source of light having the power of about 200 Petawatt with a further prospect to increase it up to 1 Exawatt (1 Exawatt = 10^{18} W) and beyond. The research program includes such scientific direction as high energy physics, nuclear physics, astrophysics, and biomedicine.</p>	<p>ELI delivery consortium international association (EC) Commissariat of Atomic Energy of France Thales (France)</p> <p>Deutsches Elektronen-Synchrotron DESY (Germany) Center for Antiproton and Ion Research FAIR (Germany) Rutherford Appleton Laboratory (UK) John Adams Institute for Accelerator Science (UK) Institute of Laser Engineering Osaka University (Japan) High Energy Accelerator Research Organization KEK (Japan) Shanghai Institute of Optics and Fine Mechanics (China) Gwangju Institute of Science and Technology (Korea)</p>	
<p>Russian Federation</p>	<p>Fundamental Physics</p>	<p>A Super c-T (charm-tau) Factory https://ctd.inp.nsk.su/c-tau/ Southern African Large Telescope (SALT) www.salt.ac.za</p>	<p>An electron-positron collider operating in the range of energies from 2-6 GeV with a high luminosity of about 10^{35} cm$^{-2}$$\cdots^{-1}$. Study of the processes with c quarks or T leptons, the search and study of an entirely new form of matter: glueballs, hybrids, etc. The data, which are planned to record, by 3-4 orders exceed everything that has been recorded so far in any other experiment.</p>	<p>The scientists from Dubna and IHEP at BEPS II are interesting in participation in Super-Tau Charm Factory program. They also have an intention to develop Super-Tau Charm Factory project in China. There is the signed agreement between Budker INP and Dubna.</p>	
<p>South Africa</p>	<p>Astronomy</p>		<p>To provide a large telescope (10m diameter) for optical and near infra-red astronomy. It is used to tackle fundamental questions about how the Universe works. SALT collects light from astronomical objects and accurately focuses it on one of four selectable foci. The light then proceeds into an optical instrument while the telescope tracks the relative movement of the object across the sky to maximise exposure time.</p>	<p>SALT is seeking partners who wish to purchase observing time without becoming a shareholder, alternatively, additional partners who wish to contribute to the project will be welcomed as well.</p>	

United Kingdom	ISIS neutron and muon source ISIS www.isis.stfc.ac.uk Ocean Observatories Initiative	Neutron/Muon science	Short pulse accelerator (spallation) source utilising neutrons and muons for a broad range of scientific applications in the physical and life sciences. Started operation in 1984 as an evolution of an earlier particle physics accelerator. Second target station (TS2) started operation in 2008. Only RI of its kind in Europe (2 in USA and 1 in Japan). ESS – a complementary/ long pulse spallation source – just started construction in Sweden.	ISIS welcomes international partners who are able to fund increased facility operation (preferably including staff to be based at ISIS) and facility development (e.g. instrumentation, including in-kind contributions), leading to increased capacity and capability. New partners benefit from access for their national researchers and existing partners benefit from the improved capabilities. Specific programmes to attract new users are encouraged. Partnerships at any level can be discussed, though periods less than 5 years do not tend to be sufficiently beneficial for partners.
USA	OOI http://oceanobservatories.org/	Environmental sciences - Oceanography	When completed in 2015, the Ocean Observatories Initiative (OOI) will encompass an integrated, global network of ocean sensors providing near-real time data that will transform the study of interrelated ocean processes on coastal, regional, and global spatial scales. OOI will provide a coordinated cyberinfrastructure managing a diverse, high-volume data stream, the capability to alter sampling frequency to potentially capture transient events such as ocean fronts, eddies, storms, eruptions, earthquakes, and harmful algal blooms; high frequency, long time-series sampling by advanced suites of sensors, continuous feeds of selected data sets that can be used in global models; the capability to conduct controlled experiments using instruments that can track unexpected changes and accept commands from shore; the capability to support new sensors for biological and chemical research and the potential to support the next wave of instrument and sensor innovation.	The potential level of involvement of international partners is still to be defined. NSF plans to initiate in 2016 a call for proposals for operation of the OOI with an award expected in 2017. Organizations and institutions will have the opportunity to consider potential collaborations with international partners as part of their proposal submissions.
USA	JOIDES Resolution Drill Ship http://iodp.tamu.edu/ www.iodp.org	Environmental sciences - Oceanography	The Drill Ship JOIDES Resolution operates as part of the International Ocean Discovery Program (IODP). IODP is an international marine research collaboration that explores Earth's history and dynamics using ocean-going research platforms to recover data recorded in seafloor sediments and rocks and to monitor subsurface environments. IODP depends on facilities funded by three platform providers with financial contributions from five additional partner agencies. Together, these entities represent 26 nations whose scientists are selected to staff IODP research expeditions conducted throughout the world's oceans. IODP expeditions are developed from hypothesis-driven science proposals aligned with the program's science plan <i>Illuminating Earth's Past, Present, and Future</i> . The science plan identifies 14 challenge questions in the four areas of climate change, deep life, planetary dynamics, and geohazards.	Our international partners provide approximately 2/3 of the sailing scientific party and submit over half of the IODP drilling proposals and drilling-related publications, thus adding substantial intellectual contributions. Our partners also provide substantial services for core archiving and measurement at repositories in Germany and Japan. Responsibilities (including potential liabilities) of international partners joining the project: Partners are responsible for archiving 2/3 of the obtained core, are responsible for helping determine policies, and provide approximately 1/4 to 1/3 of the operating funds for the facility.

Section II International based research infrastructures

Note: the „Country“ heading of this section does not indicate the „lead“ nation of the RI, but has only a practical traceability function with regards to the Country that originally proposed it to the Group.

Country	RI Name and web site	Scientific Domain	Description	Proposed collaboration opportunity	EoI
India	Laser Interferometric Gravity-wave Observatory - LIGO - www.gw-indigo.org/	Fundamental Physics, Astronomy	Project is for the construction and operation of an advanced interferometric gravitational wave detector in India in collaboration with LIGO Laboratory (USA) and its international partners, Australia, Germany and UK. Detection of GW and the consequent new astronomy that will open a new window to the universe. The endeavour pushes technology on many fronts.	IndIGO-LSC is a subgroup of the LIGO Scientific Collaboration (LSC) involved in many data analysis projects related to Advanced LIGO (including LIGO-India) and participation in areas of mutual interest would be possible. Two Tier 2 Data centres are planned to be set up which would be available for LSC related activities. Some specific Research and Development activities for the next generation detectors and related technologies also offer scope for collaboration around LIGO-India.	RU
Italy	European Plate Observing System – EPOS – www.epos-eu.org	Seismology, volcanology, geology, geodesy, and geomagnetism applied to Earth processes	The European Plate Observing System (EPOS) is a planned research infrastructure for solid Earth Science integrating existing and new research infrastructures to enable innovative, multidisciplinary research for a better understanding of processes controlling earthquakes, volcanic eruptions, unrest episodes, ground stability, and tsunamis as well as those processes driving tectonics and Earth surface dynamics. The overarching goal of EPOS is to create the capacity of using research infrastructures and services across disciplines not only providing access to a wealth of observational data, but offering to diverse communities data products, tools, and services for intelligible integrated analyses. The easy discovery of data and data products as well as the access to visualization, processing and modelling tools is the best way to progress and sustain the integrated approach to research and collaborations. Accessible data and new e-infrastructure will bring novel cross-fertilization of ideas and lead to innovative research and new discoveries. This will encourage scientists to share their research in way that bring new applications for society.	The perspectives guaranteed by the EPOS federated approach to research have global relevance and impact beyond the scientific communities involved. In this framework, EPOS proposes a federated approach to research infrastructures in order to foster integrated access to data and products of relevance for science and society. The implication of this federated approach goes beyond the access to multidisciplinary solid Earth data and services and, in general, it might involve governance issues at global level. The possibility that this global landscape for solid Earth science could contribute to the financial sustainability of regional research infrastructures requires a profound analysis and political decisions.	CA RU

Italy	Genome Mapping	The IMPC is an integrated network of 16 leading research Institutions around the World, which manage international excellence centres in basic and applied biomedical sciences.	Interest in contributing to a fully international dimension of the IMPC research programme and distributed infrastructure.	RU ZA IN
International Mouse Phenotyping Consortium - MMC IMPC - www.impc.org		<p>IMPC is providing the first encyclopedia of mammalian gene function, a critical step forward in biomedical sciences, and will underpin future developments in systems biology and drug development.</p> <p>IMPC builds on the efforts in the International Knockout Mouse Consortium (IKMC) to generate and characterize mutant mice strains for every gene in the mouse genome.</p> <p>The IMPC integrated mouse genetics centres carry out large scale, standardized, high-throughput mouse mutant production, phenotyping, cryopreservation and world-wide distribution. The ultimate goal is to produce, phenotype and disseminate the resulting 20,000+ individual mouse mutant lines, as innovative ad-hoc models of human diseases.</p> <p>The IMPC has envisaged two phases to its programme: Phase 1, 2011-2016, is already well underway and is carrying out the phenotyping of around 5000 mouse lines; Phase 2, 2016-2021, will undertake the analysis of 15,000+ mouse lines.</p> <p>All data from each production and phenotyping centre are being uploaded to a central Data Coordination Centre. Following quality control and analysis they are archived and disseminated to the wider biomedical sciences community, with appropriate annotation tools and state-of-the-art data storage and preservation facilities, according to global e-infrastructure standards.</p>		

Italy	IPERION CH Research Infrastructure for Heritage Science (RIHS) Web site: TBD	Cultural Heritage	Preservation of cultural and natural heritage is a global challenge for science and society at large. RIHS integrates national facilities of recognized excellence in heritage science making up a distributed RI with a sustainable plan of activities, including joint research, access to a wide range of high-level scientific instruments, methodologies, data and tools, advancing and sharing knowledge in conservation, interpretation and management of heritage. The European Infrastructure for Heritage Science, operating since ten years under the project names of EU-AR-TECH (FP6), CHARISMA (FP7) and now applying for the project IPERION CH (H2020) is collecting a strong interest by prominent international institutions and is ready to start assembling a world-wide network of affiliated partners.	Interest in establishing a global dimension of E-RIHS, the European Research Infrastructure on Heritage Science, via the establishment of a steady relationship at institutional and ministerial level on the definition of international organizations and research infrastructures, concerning scientific, data management and governance topics. The GRI dimension of RIHS can then be reached by building on this partnership, reinforcing the commitments of all its members and, with the guide of the intergovernmental organization ICCROM, leading to the creation of a fully functional global RI. International partners will be asked to play seminal roles by introducing in their regional ecosystems the innovations and the cutting-edge tools provided by the global infrastructure. Furthermore, they will make it possible for the distributed infrastructure to widen its scope providing access to highly advanced facilities to an extended community of users. International partners are key stakeholders that engage local communities in study and preservation of heritage. They are instrumental in disseminating, communicating, and using best practices, standards and protocols. Global partners will be integrated in the governance bodies of the EU infrastructure, making thus possible to extend the very strong European cooperation, already established between the partners of IPERION CH, to the global level, producing a better mutual understanding and stimulating the growth of a global research area for heritage science.	CA RU UK
South Africa / Australia	Square Kilometre Array - SKA - www.skatelescope.org	Astronomy, astrophysics	The SKA project is an international effort to build the world's largest radio telescope, with a square kilometre (one million square metres) of collecting area. The scale of the SKA represents a huge leap forward in both the engineering and research & development of radio telescopes, and will deliver a transformational increase in science capability when operational. Deploying thousands of radio telescopes, in three unique configurations, it will enable astronomers to monitor the sky in unprecedented detail and survey the entire sky thousands of times faster than any system currently in existence. The SKA telescope will be co-located in Africa and in Australia. It will have an unprecedented scope in observations, exceeding the image resolution quality of the Hubble Space Telescope by a factor of 50 times, whilst also having the ability to image huge areas of sky simultaneously. With a range of other large telescopes in the optical and infrared being built and launched into space over the coming decades, the SKA will perfectly augment, complement and lead the way in scientific discovery. The SKA Organisation, with its headquarters at Jodrell Bank Observatory, near Manchester, UK, was established in December 2011 as a not-for-profit company in order to formalise relationships between the international partners and to centralise the leadership of the project. Eleven countries are currently members of the SKA Organisation	RU	

United Kingdom	European Life Sciences Infra-structure for Biological Information – ELIXIR – www.elixir-europe.org	State of the art ICT provision to support biological and medical data processing and managing.	ELIXIR is the European Life Sciences Infrastructure for Biological Information. ELIXIR is nominated because it is a world-leading infrastructure, vital for enabling the life sciences to derive maximum knowledge and understanding from biological, medical and environmental 'Big Data', which will deliver benefits to research and innovation in the UK and beyond. Importantly, ELIXIR will play a key role in linking global data resources since one of its key aims is to network and integrate life science data resources. The UK is the home of many of the major data archives in Europe, yet in the era of personalised medicine all countries need to develop their own national bioinformatics capacities in a coordinated manner. The life science community and the data it uses are global in nature with Europe and the USA the main players. Indeed, global usage of the databases and services that are run by ELIXIR partners is already high. For example, the website of EMBL-EBI receives over 8 million web hits a day from all over the world. ELIXIR's service registry will act as a repository of all bioinformatics analysis tools from across the globe, and which will be used and accessed by researchers anywhere. Equally, ELIXIR's emerging training portal will act as a global entry point into free training courses and e-learning content.	Global integration of life science data is essential and will require close links between ELIXIR and the USA (in addition to other) resources to provide rapid and efficient access to biological 'Big Data'. A key role of ELIXIR is dissemination of data standards, which requires close links with other global resources. ELIXIR is currently a unique, world-leading infrastructure but the USA, Canada and Australia are moving towards developing similar infrastructures and ELIXIR can play an important role in developing and disseminating best practice. Initially partnership will be by scientific collaboration between centres, but membership of ELIXIR is welcome where new members would commit to maintain their national node and contribute to the joint costs on an NNI shared basis. Discussions are already taking place with the US Big Knowledge to Data Initiative (BD2K), Genome Canada and Australia's Bioplatforms.	FR RU
European Commission (Euroforum)	European Southern Observatory ESO www.eso.org	Astronomy and Astrophysics	ESO, the European Southern Observatory, is the foremost intergovernmental astronomy organisation in Europe and the world's most productive astronomical observatory. ESO provides state-of-the-art research facilities to astronomers and is supported by 14 Member States. In addition two countries are currently in the process of joining. Several other countries have expressed an interest in membership.	ESO's preferred mode of partnership is through full membership of the organisation and thus participation in the entire ESO programme and decision-making processes with all rights and obligations. The ESO Council has opened up for membership of non-European countries that are deemed able and willing to contribute to the aims of the organisation and to further its activities. Non-EU countries can join thus apply for membership upon invitation by the ESO Council. This notwithstanding, ESO has, in specific cases, itself become a partner in projects. In the case of ALMA, it represents the ESO Member States in that project. In such cases, the role of the partners is regulated by an appropriate agreement. In case of the APEX collaboration, ESO is the operating partner in charge of running the facility in Chile.	RU

<p>European Commission (EIROforum)</p>	<p>European Molecular Biology Laboratory EMBL www.embl.org</p>	<p>Molecular Life Sciences</p>	<p>EMBL is the only laboratory-based intergovernmental organisation specialising in basic research in the life sciences. It is supported by 21 Member States and 2 Associate Member States, and has also three Prospect Member States. EMBL has a fivefold mission which includes:</p> <ul style="list-style-type: none"> • performing state-of-the-art basic research in molecular biology; • training scientists, students and visitors at all levels; • offering vital scientific services to scientists in the member and associate member states; • developing new instruments and methods and actively engaging in technology transfer; • integrating life sciences across Europe and globally 	<p>All opportunities under EMBL's five missions – collaborative research, training of young talent, access to cutting-edge technology, facilities and expertise, integration of national scientific communities in the larger EMBL network of excellence, etc. – are made available to Member and Associate Member States of EMBL.</p> <p>Non-European countries with a well-developed national life science programme can become an Associate Member State of EMBL, benefiting from a reduced membership fee. European Countries, i.e. countries-members of the Council of Europe, can join EMBL as Member States.</p> <p>The membership offers an important opportunity to EMBL and the Member or Associate Member to improve the quality of research through competitively striving for excellence, assembling critical mass, facilitating the flow of ideas and perspectives, avoiding duplication, and enabling complementarity and synergy at the national, regional and international level.</p>	
<p>European Commission (ESFRI)</p>	<p>European Spallation Source http://european-spallationsource.se/</p>	<p>Neutron Science</p>	<p>The European Spallation Source (ESS) will be a multi-disciplinary research centre and will provide the scientific community with new opportunities for research using neutrons. This new facility will be around 30 times brighter than today's leading facilities and is one of the largest science and technology infrastructure projects being built today. It is the result of Europe's need for an advanced, high-power neutron facility which was articulated already 20 years ago. Relevant research fields include life sciences, energy, environmental technology, cultural heritage and fundamental physics. Together with the adjacent MAX IV synchrotron ESS will become a world-leading centre for materials research. To ensure a successful project it is key that its development is governed by the scientific needs of the future users.</p>	<p>The European project ESS with its, at present, 17 Partner Countries, would be glad to welcome additional Partner Countries interested in taking part in construction and operations. Now is the time to get involved in the scientific and technological development of ESS, and ESS is keen to collaborate with both the academic and the industrial research sector.</p> <p>Countries joining now during construction will have a unique opportunity to participate in the development of ESS as the project will be highly dependent on contributions of knowledge and technology from leading universities, laboratories and companies. This means that a significant proportion of Partner Countries' contribution to the ESS can be provided as in-kind contributions. It is estimated that approximately 35 % of the ESS construction budget may be accounted as in-kind contributions.</p> <p>Becoming a Partner also gives the Country's neutron user community the possibility to take part in defining the scientific possibilities at ESS, as well as access to the facility once in operation. An access policy for the future neutron users at ESS is yet to be produced but it is proposed that the share of the operation costs should set proportionally to the use of the facility.</p> <p>There can also be possibilities for In-kind contributions to ESS in the operation phase. One opportunity is the financing of staff, that maintain and operate instruments that they construct as part of their In-kind contributions to construction.</p>	<p>MX</p>

Annex 7.

Declaration on Open Scientific Research Data (G8/UK 2013)

Open enquiry is at the heart of scientific endeavour, and rapid technological change has profound implications for the way that science is both conducted and its results communicated. It can provide society with the necessary information to solve global challenges. We are committed to openness in scientific research data to speed up the progress of scientific discovery, create innovation, ensure that the results of scientific research are as widely available as practical, enable transparency in science and engage the public in the scientific process. We have decided to support the set of principles for open scientific research data outlined below as a basis for further discussions.

- To the greatest extent and with the fewest constraints possible publicly funded scientific research data should be open, while at the same time respecting concerns in relation to privacy, safety, security and commercial interests, whilst acknowledging the legitimate concerns of private partners.
- Open scientific research data should be easily discoverable, accessible, assessable, intelligible, useable, and wherever possible interoperable to specific quality standards.
- To maximise the value that can be realised from data, the mechanisms for delivering open scientific research data should be efficient and cost effective, and consistent with the potential benefits.
- To ensure successful adoption by scientific communities, open scientific research data principles will need to be underpinned by an appropriate policy environment, including recognition of researchers fulfilling these principles, and appropriate digital infrastructure .

We decide to build on the existing work to coordinate and enable international data collaboration.

Expanding Access to Scientific Research Results

We recognise that effective global scientific research and public understanding of science and commercial innovation by enterprises is supported by free and rapid public access to published, publicly funded research. The generation, sharing and exploitation of scientific knowledge are integral to the creation of wealth and the enhancement of our quality of life. We recognise that G8 nations have an important opportunity and responsibility to promote policies that increase access to the results of publicly funded research results to spur scientific discovery, enable better international collaboration and coordination of research, enhance the engagement of society and help support economic prosperity.

- a) We endorse the principle that increasing access to the peer-reviewed, published results of publicly funded published research will accelerate research, drive innovation, and benefit the economy.
- b) We recognise the importance of peer review and the valuable role played by publishers, including Learned Societies. Increasing free access to peer reviewed, published research results will require sustainable solutions.
- c) We recognise the potential benefits of immediate global access to and unrestricted use of published peer-reviewed, publicly funded research results in line with the necessity of IP protection.
- d) We recognise that there are different routes to open access (green, gold and other innovative models) which need to be explored and potentially developed in a complementary way.
- e) We recognise that the long-term preservation of the increasingly digitized body of scientific publications and data requires careful consideration at the national and international levels to ensure that the scientific results of our time will be available also to future generations.
- f) We recognise that further work is required to optimise increasing public access to peer-reviewed, publicly funded published research and its underlying data and that international coordination and cooperation will provide for an efficient transition to „open access“.
- g) We share the intention, therefore to continue our cooperative efforts and will consider how best to address the global promotion of increasing public access to the results of publicly funded published research including to peer-reviewed published research and research data.

We recognise the role of our national science academies and research organisations across these important agendas, working regionally , nationally and globally through their respective networks.

