GROUP OF SENIOR OFFICIALS ON GLOBAL RESEARCH INFRASTRUCTURES

GSO Framework

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GSO FRAMEWORK

The GSO implements the Framework as a living document that integrates the results of the Policy Areas as they are enhanced to incorporate the GRI best practises. The 2017 update to the Framework is as follows.

FRAMEWORK FOR GLOBAL RESEARCH INFRASTRUCTURES

Research Infrastructures (RIs) are recognised as key elements in research and innovation policies, for boosting scientific knowledge generation, for accelerating technology development, for enhancing both technological and social innovation, and for providing advanced scientific training for new generations of scientists and science managers. Furthermore, they provide an enabling environment for established researchers to improve their performance and knowledge and innovation outputs.

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 realisation of **Global Research Infrastructures (GRIs)**. The interest in a GRI relies on its capacity to address the research needs of world-wide scientific communities by combining the best available knowledge, human capital and resources in one specific scientific area with multi-source funding.

The potential for increased international cooperation on issues related to Global Research Infrastructures has been recognised during international high-level meetings on science policy and in different fora 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)**[1] to take stock and explore cooperation on Global Research Infrastructures. This document reflects the main observations and recommendations of the GSO and provides a Framework for the GSO's continued consideration of Global Research Infrastructures.

The GSO recognises the vital role of Global Research Infrastructures in addressing world-wide S&T challenges and the benefits of coordinating investments in Global Research Infrastructures to efficiently use the available resources and fully realise their potential benefits.

Taking due account of national or regional strategies for S&T and Research Infrastructures, a common framework is needed to allow each country to take informed decisions on prioritisation, design of efficient governance structures, appropriate funding schemes, policies for access and utilisation, etc. While keeping in mind specificities of domains and projects, the existence of such a framework facilitates a common approach to address these elements in GRI initiatives and foster the use by international consortia of stable procedures for decision-making and operation, as well as opening of national facilities of global interest on the basis of internationally recognised best practice.

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.

1. The 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 facilities and international relations.

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 lifecycle 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 lifecycle; the use of harmonized evaluation criteria to assess the benefits of a Global Research Infrastructure; and clear rules for accepting additional partners.

The GSO will regularly compare long-term strategies or national or regional strategic roadmaps (including roadmaps prepared by scientific communities) in order to facilitate the **identification of Research Infrastructures of global relevance**. Sharing this information will help ensure that governments and scientific communities can effectively focus the resources they devote to development of Global Research Infrastructures, while considering national or regional laws and strategies.

National facilities of global interest should be identified considering policies agreed upon, including those agreed in wider international context. The adoption of the Framework by perspective GRIs will create the basis for opening their governance and funding schemes to stakeholders from other countries.

The **GSO therefore considers it essential to continue its activity in the context of this Framework** and to periodically report to the relevant authorities on its progress and proposed updates. The GSO should periodically share scientific Research Infrastructure interests of national priority among the participants to identify priority projects of mutual interest, and to also identify project-specific challenges to international collaboration that will need further attention.

FRAMEWORK CRITERIA

The following recommendations form the basis for the Framework for Global Research Infrastructures. The Framework is a living document that builds on the continuous work of the GSO and is based on previous experience with existing Global Research Infrastructures available worldwide, on the analysis of selected case studies, and on updates in the relevant Policy Areas addressed. The GSO proceeds with the **periodic review and refinement of the Framework** as well as to its **testing** on carefully selected case studies in the context of international cooperation in Global Research Infrastructures initiatives.

1. **Core purpose of Global Research Infrastructures.** Global Research Infrastructures should address the most pressing global research challenges, 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 lifecycle: 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 lifecycle 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 goal based on merit review.** The GRI policies should reflect the global-Excellence-driven Access (gEA) paradigm through publication of a clear and transparent access goal. The goal should incorporate a peer-reviewed process that recommends access based on the most promising emergent ideas, regardless of the country of origin or the ability of the proposer to contribute financially.

9. **E-infrastructure.** Global Research Infrastructure initiatives should recognize the utility of the integrated use of advanced e-infrastructures, 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 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 lifecycle of the project. The GSO will refer also to the OECD Global Science Forum work on the socio-economic impact of Research Infrastructure[2].

2. OECD Global Science Forum 2017: Establishing a reference framework for assessing the socio-economic impact of Research Infrastructures.
https://demo-ipp.nuvole.org/socio-economic-impact-research-infrastructures/ri-impact-files/oecd-gsf-activity-socio-economic