ENVRI^{plus} DELIVERABLE

D10.1
Guidelines on access to RIs

WORK PACKAGE 10 – GOVERNANCE FOR SUSTAINABLE AND ADJUSTABLE ACCESS TO RIS

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ABSTRACT

The overall objective of this document is to give a set of recommendations to be used as a reference for the Environmental Research Infrastructures when defining data and access policies. This set of recommendations is based on the existing policies in ESFRI and other Research Infrastructures, research institutions and international projects as well as on the current European policies and regulations in place.

The document comprises a set of definitions, principles and guidelines for the access to Environmental Research Infrastructures, being for the most part distributed research infrastructures presenting specific challenges and opportunities. It explores several aspects related to the access to Research Infrastructures such as the types of access provided, the selection modes, the procedures to select users, the support provided to users, post-access provisions, data and access policies, as well as the considerations related to access costs, confidentiality and IPR rules, legal and ethical issues, and principles for the monitoring of Research Infrastructures performance.

The document takes as its starting point the information gathered through a questionnaire sent to the Research Infrastructures participating in ENVRIplus with the purpose to get a picture of the existing access policies, the procedures in place or envisaged to select users, the kind of users and their provenance, the specific provisions for the commercial use of data and for the access from private sector users, the specific outreach measures to attract users as well as legal and ethical issues.

This deliverable covers various aspects trying to establish guidelines of best practice to assist Environmental Research Infrastructures in the definition of their policies for the access to facilities and services.

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PROJECT SUMMARY

ENVRIplus is a Horizon 2020 project bringing together Environmental and Earth System Research Infrastructures, projects and networks together with technical specialist partners to create a more coherent, interdisciplinary and interoperable cluster of Environmental Research Infrastructures across Europe. It is driven by three overarching goals: 1) promoting cross-fertilization between infrastructures, 2) implementing innovative concepts and devices across RIs, and 3) facilitating research and innovation in the field of environment for an increasing number of users outside the RIs.

ENVRIplus aligns its activities to a core strategic plan where sharing multi-disciplinary expertise will be most effective. The project aims to improve Earth observation monitoring systems and strategies, including actions to improve harmonization and innovation, and generate common solutions to many shared information technology and data related challenges. It also seeks to harmonize policies for access and provide strategies for knowledge transfer amongst RIs. ENVRIplus develops guidelines to enhance transdisciplinary use of data and data-products supported by applied use-cases involving RIs from different domains. The project coordinates actions to improve communication and cooperation, addressing Environmental RIs at all levels, from management to end-users, implementing RI-staff exchange programs, generating material for RI personnel, and proposing common strategic developments and actions for enhancing services to users and evaluating the socio-economic impacts.

ENVRIplus is expected to facilitate structuration and improve quality of services offered both within single RIs and at the pan-RI level. It promotes efficient and multi-disciplinary research offering new opportunities to users, new tools to RI managers and new communication strategies for environmental RI communities. The resulting solutions, services and other project outcomes are made available to all environmental RI initiatives, thus contributing to the development of a coherent European RI ecosystem.

1. INTRODUCTION

European world-class Research Infrastructures are nowadays crucial to maximize the European potential of research, the returns of public investments in infrastructures and in human resources.

Research Infrastructures enable users from academia, public services, business and industry to access the best available knowledge, facilitating innovation and knowledge-sharing. They attract users from around the world increasing the use of data, data products, digital tools, state-of-the-art research laboratories, instruments, equipment and other resources.

Research Infrastructures strongly contribute to the achievement of the EU Commission's strategic priorities, the three "Os":

- ✓ *Open science* - promoting access and maximising research result thanks to an open access policy to scientific publication and research data, and also providing "suites" of frontier scientific research as reference points for education and training of researchers and students;
- ✓ *Open innovation* - facilitating access from business, industry and SMEs while respecting confidentiality and commercial sensitivity, and thus, stimulating private investment towards long-term sustainable Research Infrastructures;
- ✓ *Open to the world* - building bridges between different communities and contributing to meet global challenges as climate change, efficient use of resources as well as health challenges.

Access to Environmental Research Infrastructures play an important role not only for the scientific community itself but also for the society at large by:

- ✓ producing and delivering essential data for more reliable communication to the general public on events such as volcanic eruptions, earthquakes, extreme weather conditions, air pollution, state of the seas and oceans, as well as information related to biodiversity impacts, energy consumption, energy efficiency, and so on;
- ✓ increasing scientific and technical knowledge supporting decision making and favoring the establishment of smart regulations and policies;
- ✓ developing new technologies, sensors, networks, systems, in partnership with the private sector which leads to additional benefits in terms of economic growth.

Environmental research infrastructures focus on improving the understanding of the complex Earth system and comprise a variety of research infrastructures in the Earth's subdomains of the biosphere, atmosphere, hydrosphere, and the lithosphere. Environmental Research Infrastructures provide access to data, digital tools and physical infrastructures.

Several Environmental Research Infrastructures have already implemented data policies enabling access to real-time data and data repositories. Some Environmental Research Infrastructures provide access to their facilities, resources, and services, mostly under the transnational access programme which has been significantly funded since the seventh Framework Programme for Research and Technological Development (FP7) and under Horizon 2020. However, very few distributed Research Infrastructures have an official access policy for the physical and remote access in place[1]. Several Environmental Research Infrastructures are actually in the implementation phase and are actively working to defining their access policies which need to be in line with their own organizational, operational and strategic frameworks, including technical, legal, governance, financial and administrative aspects.

There is a need to establish common grounds for the definition of policies for the access to data and for the access to physical infrastructures which, taking in due consideration the peculiarities of each Infrastructure, may allow access

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[1]   The research infrastructure SIOS, (Svalbard Integrated arctic Earth Observation System) is one of the first Research Infrastructures having adopted an official access policy (approved in 2018).

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to be managed by keeping certain basic principles, such as the promotion of an open access to science, the provision of quality services, support of the innovation chain through access from private sector and, at the same time, taking the necessary measures to ensure long-term sustainability of Research Infrastructures. Particularly the distributed nature of many Research Infrastructures requires further considerations, such as the need to have a unique access policy in line with multiple national and local legal constraints, as well as the need to harmonise the different national priorities in a single, sound access strategy.

Within the activities of Work Package 10 in ENVRIplus, a questionnaire has been developed to collect information about the procedures, modalities and policies for access implemented within the Research Infrastructures participating in ENVRIplus. This exercise highlighted the different policy needs of the Infrastructures, due to their differences in terms of scientific domain and maturity level. The questionnaire has been used to gather information about i) the modalities of access foreseen by the ENVRI Research Infrastructures, ii) the procedures in place or envisaged to select users, iii) the kind of users they host and their provenance, iv) the specific provisions for the commercial use of data and for the access from private sector users, v) the specific outreach measures to attract users, vi) legal and ethical issues. An analysis of the results of this exercise can be found in the Annex 1 of this document.

This deliverable covers all essential aspects, trying to elaborate a synthesis of best practice for the definition of policies for the access to Research Infrastructures' facilities and services.

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2. DEFINITIONS

2.1 Research Infrastructures

Research Infrastructures (RIs) are facilities, resources and services that are used by the research communities to conduct research and foster innovation in their fields. Where relevant, they may be used beyond research, for education or public services.

They include:

- major scientific equipment or sets of instruments;
- knowledge-based resources such as collections, archives or scientific data;
- e-infrastructures such as data and computing systems and communication networks;
- and any other infrastructure of a unique nature essential to achieving excellence in research and innovation.

Such infrastructures may be "single-sited", "virtual" or "distributed"[2].

2.2 Access

"Access" refers to 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 data, data-communication services, digital tools, computing resources, sample, archives, observational facilities, experimental facilities, exploratory platforms, simulation chambers, education and training, expert support and analytical services.

2.3 User

"User" refers to an individual, a team, or an institution from any sector, including public and private sector, making use of the Research Infrastructure's facilities, services or data to enhance his level of expertise and improving methods and systems. The user is not only a beneficiary of services, but is often fully involved in the conception and creation of new knowledge, products, processes, methods and systems.

2.4 Access Unit

"Access Unit" is a measure to specify the quantity of access provided by RIs to the users. RIs are responsible for the definition of Access Units that are in line with the service provided.

This measure may be, amongst others:

- a precise value like working-time (e.g. working-hour / working-day), processing time, amount of gigabytes transmitted, etc.;
- the provision of a service (e.g. the calibration of an instrument, a training session, the download of a data set / data product, one-time use of a digital tool, one-time support, etc.).

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[2]   Article 2 (6) of Regulation (EU) No 1291/2013 of 11 December 2013: "Establishing Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020)"

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3. PRINCIPLES

3.1 Open Access

The Open Access principle is crucial for scientific research. Open access to research data and results, as well as physical access to RIs, foster a better and more efficient science, and therefore stimulate innovation in the public and private sectors, with an ultimate benefit for society.

Particularly with regard to the private sector, an open access to RIs represents a unique opportunity to use the best technology and expertise, to test new products for market and to solve technical problems.

The European Union is strongly pushing towards open access within the general framework of an Open Science strategy[3] aiming to improve knowledge circulation and innovation. In this respect, the European Commission issued a Recommendation in 2012[4] encouraging all Member States to define clear policies for the dissemination of and open access to scientific publications and research data resulting from publicly funded research. In the context of Horizon 2020, for instance, all projects receiving funding are required to publish any peer-reviewed article in openly accessible journals or repositories, free of charge (article 29.2. H2020 Model Grant Agreement). They should also take measures to make it possible for third parties to access, mine, exploit, reproduce and disseminate, free of charge for any user, any data except if the achievement of the project's main objective would be jeopardized by making those specific parts of the research data openly accessible (article 29.3. H2020 Model Grant Agreement)[5].

Open access may be *wide* or *competitive* (when a competitive selection is required). Open access to data and digital tools may be *restricted* (the User must be authorized to access the service, for instance, when there is an authentication process before the access) or *embargoed* (when access is restricted for a given period of time, for instance, to allow exploitation of IPRs).

Open access may be *free of charge* or *subject to possible fees* depending on the RIs capacity and human and financial resources or on the user (e.g., from the private sector).

Reasonable limitations and restrictions, still in line with the principle of open access, may be applied when, especially for data, the access could compromise a potential industrial or commercial use of the data, or when the access could lead to a breach in personal data protection or confidentiality rules, or when the access could affect the human subject or the protection of endangered species.

The open access to scientific information, peer-reviewed scientific publications (primarily research articles published in academic journals) and scientific research data is normally expected free-of-charge.

For physical access, free open access has been often sustained through short-term project funds (for instance the TNA Programme[6]). However, it is extremely necessary to explore new funding options to allow free open access in the long run.

3.2 FAIR Data Principles

There is an urgent need to improve the efficiency of managing data across the different RIs.

After several consultations, a group of diverse stakeholders from academia, funding agencies and RIs, launched an initiative called Data FAIRport[7] aimed to design a set of principles to enhance access, sharing and use of data.

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[3]   Open Science (http://ec.europa.eu/research/openscience/index.cfm?pg=openaccess)

[4]   EC Recommendation C(2012) 4890 final on Access to and preservation of scientific information

[5]   H2020 AGA — Horizon 2020 Annotated Model Grant Agreement

[6]   TNA - Trans National Access

[7]   Data FAIRport initiative (http://www.datafairport.org/)

From this initiative a set of principles were drafted in order to provide guidelines and specify a minimum set of standards to improve the management of data.

The FAIR (Findable, Accessible, Interoperable, Reusable) Data Principles received recognition by several organizations including the European Commission[8] as a useful framework to improve sharing of data, access, interoperability and maximize use and reuse.

Given the crucial importance of data interoperability and reusability, RIs should adhere to these Principles implementing as much as possible a FAIR data and access policy.

3.3 Sustainability

It is clear that, in a long-term perspective, it is necessary to create mechanisms allowing RIs to be self-sustainable. Concerning the sustainability of open access to RIs, the development of appropriate business models and funding models for the access to facilities and the data provided by the RIs is nowadays extremely important.
Openness, indeed, means access *on equal terms for the international research community at the lowest possible cost, preferably at no more than the marginal cost of dissemination[9]*.

The costs for access can be shared by the RIs participating countries and the access to facilities and services can be free-of-charge for users from member countries, who pay a membership fee to the RI. Users may nevertheless be required to pay fees for benefiting from access, within the limits of the RIs' capacities.

While for virtual access to data the marginal cost[10] of a service is close to zero (even though some costs may occur when support to users is needed), for physical or remote access this cost rises strongly due to the need for additional supporting/training staff (administrative and logistic support, training on instruments), scientific expertise, and for the use of facilities and consumables which requires additional financial resources (power and water consumption, etc.).
This kind of assessment is often not included in the RIs financial models. However, it is crucial for some specific user communities.

For these reasons, a careful evaluation of the funding models is more than needed in order to develop mechanisms to partially or totally compensate the costs incurred by the RIs for the provision of access.

The deliverable 10.4 *RI strategy for flexibility and sustainability* addresses the costs issue and explores possible funding models for a sustainable access to RIs.

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[8]   Guidelines on FAIR Data Management in Horizon 2020, EC DG R&I, 2016

[9]   OECD - Principles and Guidelines for Access to Research Data from Public Funding, OECD 2007

[10]   The marginal cost is the change in total cost producing one additional item. In this context, it is the change in total cost that comes from providing one additional Unit of Access

4. RECOMMENDATIONS

These recommendations are based on the existing policies in ESFRI and other RIs, research institutions and international projects. They take into account the existing legal frameworks and policies related to the access to RIs.

The recommendations address the issue of physical access to RIs, the access and usage of data, also beyond basic research considering the commercial use of data for services with societal relevance which is particularly relevant for Environmental RIs. Scientific, legal, and organizational aspects are taken into account, aside from the possibly arising ethical issues.

This document may serve as a reference for RIs when defining or re-defining access policies. It is also important to take into consideration that each RI has a different level of maturity, governance structure and user community, thus, these are general recommendations.

Policies for the access to RIs should be as much user-oriented as possible.
A clear identification of users (academia, business, industry, public services, citizens, NGOs, etc.) is needed, as well as a continuous evaluation of user demands and needs. This aspect is crucial in order to be able to adjust the services to evolving needs and to optimize the provision of services.

4.1 Classification of Access

RIs should make an effort to adopt a proper classification of the access provided, to ensure a sound organization and management of the access system.

Access can be classified based on:

- ✓ the different conditions under which it is given (W*ide Access* / *Competitive Access* which requires a selection procedure as it is provided within the limits of the RI's capacities);

- ✓ the expected process (direct access with no interaction required with the providers / access requiring interaction);

- ✓ the different types of access, based on the means though which access is provided (P*hysical access*, *Remote access*, *Virtual access*);

- ✓ the different modes according to which selection is done (*Excellence-driven*, *Market-driven* and *Technical need-driven* selection modes);

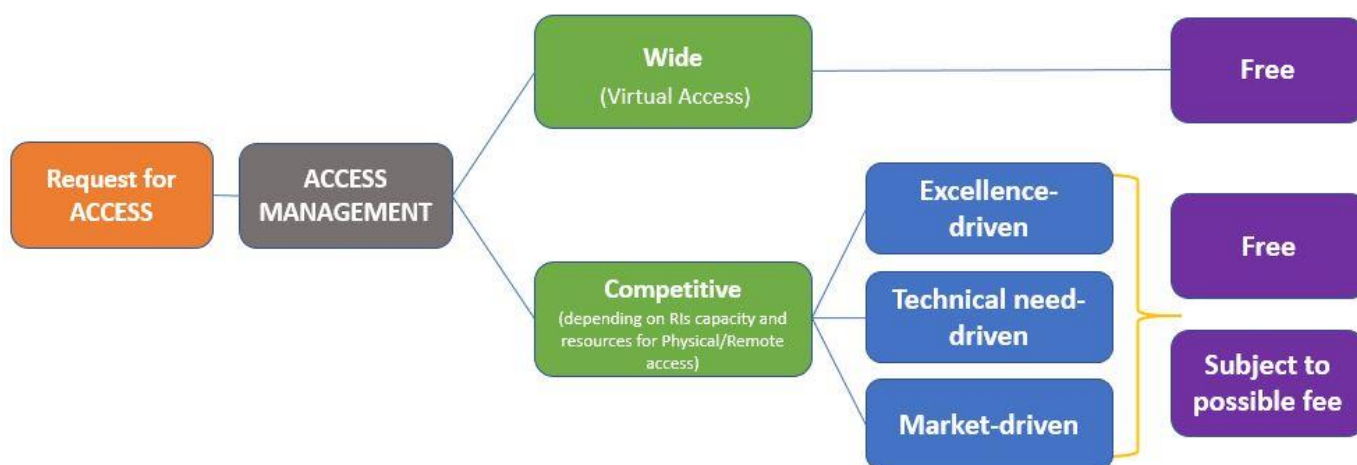- ✓ possible charges (free access / access subject to fee).

FIGURE 1 SHOWS A POSSIBLE SUMMARY SCHEME FOR THE CLASSIFICATION OF ACCESS ACCORDING TO DIFFERENT CRITERIA

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4.1.1 Wide Access vs Competitive Access

In line with the different conditions under which it is given, the access can be classified as *Wide* or *Competitive*:

- *Wide Access* can be defined as the broadest possible access to scientific data and digital services provided by the RI to users wherever they are based. The Wide Access is usually open and free of charge and does not foresee any selection procedure. This is the typical case of the virtual access to data, metadata, data products, digital tools, etc.

- *Competitive Access* can be defined as an access which requires a selection procedure as it is provided within the limits of the RI's capacities. Selection procedures take into account the different access purposes by establishing the most appropriate criteria and procedures for each access mode (Excellence-driven, Market-driven, Technical need-driven Access, see 4.1.3). The Competitive Access may be free of charge or subject to possible fees. This is the typical case of the physical and remote access to RI facilities and services;

4.1.2 Type of Access

RIs provide access to different types of installations (observational stations, experimental facilities, exploratory platforms, data repositories, etc.), and services (computing resources, technical and analytical services, expert support, education and training, etc.).

Given the variety of resources to be accessed, three main types of access to RIs can be distinguished: *Physical*, *Remote,* and *Virtual* access.

Physical

The Physical Access can be defined as the access involving hands-on access of any user, i.e., the users physically visit the RI installation. The resources to be accessed are not unlimited and a competitive selection is needed. This includes access to different facilities, observatories, laboratories, stations, platforms, research vessels, instruments, etc.

Remote

The Remote Access can be defined as the non-physical access of a person at the installation. The resources to be accessed are not unlimited and a competitive selection is needed. This includes remote access to sensors, access to calibration facilities for instrument calibration, access to machine time, distribution of reference samples, etc.

Virtual

The Virtual Access can be defined as any access through communication networks in which resources can be simultaneously accessed by an unlimited number of users. A competitive selection is not needed. This is the typical case of the access to data.

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4.1.3 Access modes

The access modes, acknowledging the different purposes of access, define the conditions on which the selection of access to the RI is made. Each mode implies a set of selection criteria that must be established by the RIs.

The access to RIs may be granted according to one mode or any coherent combination of them.

Excellence-driven Access

The Excellence-driven access mode is dependent on the scientific excellence, originality, quality, technical and ethical feasibility of an access proposal for scientific purposes.
The purpose for Excellence-driven access is typically for basic/applied research activities, for instance to study a phenomenon, to solve a specific scientific question, or to enhance knowledge and understanding.

This mode implies a competitive process with the establishment of a clear and transparent selection and evaluation procedure of the applications is needed. Proposals shall be evaluated through peer review conducted by an independent review panel of experts.

The Excellence-driven access may foster collaborative research, transfer of knowledge and best practice, training of young scientists, and may also lead to technological innovation.

Technical need-driven Access

The Technical need-driven access mode is based on a technical need that can be satisfied through an access to RI services and/or facilities.
Typically, the access is competitive and a selection procedure applies. The Technical need-driven access is needed to ensure the quality of equipment and instruments (e.g. test, calibration, comparison, etc.) and high performance measurements, training on instruments and best practice transfer.

Market-driven Access

The Market-driven access mode applies when there is a market need that can be satisfied through an access to RI to find market-oriented technical or scientific solutions.
The purpose for Market-driven access is typically for applied/industrial research activities, for instance to develop and test a specific product/process or to deliver tailored user services.
In this case the access is considered competitive and is defined through an agreement between the User and the RI. The agreement may involve a user fee for the access and the fee may remain confidential.
The Market-driven access contributes to strengthening the innovation chain because the access promotes direct, close and effective links between research and innovation.

4.2 Data Policy

The Data Policy is a document aimed at users to set the principles for the use, sharing, and exploitation of and the access to data, data products and digital tools.

The policy should state what procedure is appropriate given the nature of the data and tools, make clear who can use them and for what purpose, indicate any restrictions that may need to be applied. Also, the Data Policy should take into account aspects such as the handling of Intellectual Property Rights, licenses, and any other legal issues related to access and use of data, data products and digital tools.

4.3 Data Management Plan

Based on the principles stated in the Data Policy, the Data Management Plan (DMP) describes methods and procedures for the management of data and description of the entire data lifecycle, covering the collection, processing, data production, organization, storage, curation, publishing, use and sharing of data.

The DMP should detail how access to different data levels, data sets and products is provided, including provisions for open and free access to data and for data curation services. The DMP should also identify responsibilities, highlight potential problems and propose possible solutions before the problem/risk materializes. The DMP is closely related to an RI's data policy and shall be in line the EU open data policy principles, and with all the relevant regulations in place.

4.4 Access Policy

The Access Policy gives guidelines and describes the general principles for access to RI facilities, resources and services provided to users.

Access Policies shall contain clear, simple statements of guiding principles on how the RI intends to regulate, grant and support access to its users from any sector (academia, business, industry, public services, citizens, non-governmental organizations, etc.).

Access Policies should cast light on the crucial elements of the access program to be established, indicating the key actors (users, as beneficiaries – facilities as providers – RI's access management unit), what type of services are offered, what type of access is provided and in which way. Policies should also define issues related to Intellectual Property Rights as well as any other possible principle related to access.

4.5 Access Management Plan

Based on the principles stated in the Access Policy, the Access Management Plan (AMP) describes methods and procedures for the management of access of users to RI services. In order to efficiently manage the access, RIs shall establish clear access rules covering, at least, access selection procedures, type of support provided (if any), confidentiality rules, Intellectual Property Rights, post-access provisions (if any), data management plan and possible fees for the Access.

Procedure documents, such as for instance an AMP, should detail how the Access Policy will be implemented within each RI, describing the management system, roles and responsibilities, as well as rules and processes to support users demand and provide access.

Provisions included in the plan should clarify the conditions for access and lay down all arrangements relating to the provision of the services.

4.5.1 Access management

For distributed Environmental Research Infrastructures, it is fundamental that access management is centralized in an organizational unit serving as a single entry point for users.

This central management unit represents the interface between the users and the RI services and should be in charge of implementing the access and service provisions and coordinating the access process, receiving the access proposals and managing the competitive selection procedure.
It should provide support to users and be responsible of the implementation of the User strategy and its harmonization over time.

The central management unit should also advertise the access opportunities and promote the access to potential new User communities, as well as disseminate the access output and collect User feedback to improve the RI service provision to users.

4.5.2 Access procedure and modalities

Research Infrastructure aim to provide open access for users, according to the user needs but within the limits of the facilities' capacities.

The access procedure shall describe the processes and interactions needed to grant the access to RI facilities and services. Selection shall be made according to clear and well-designed criteria which should apply as a function of Access modes.

Access procedures should establish, at least, rules and conditions for:

- promotion of RI services;
- submitting applications;
- eligibility criteria;
- feasibility check, based on the facilities' capacities;
- the review panel;
- evaluation and selection criteria;
- an iteration process with applicants.

The Excellence-driven selection should include a selection panel of experts for a peer-review, with composition and functioning of the panel based on principles of transparency, fairness and impartiality. The Technical need-driven selection also involves a selection panel of experts but not necessarily a peer review procedure.

Rules and conditions of the access process should be clear and precise, and as easy as possible, to facilitate the access of users to the RI services. The applicants should have the opportunity to reply on possible questions or concerns that may be raised by the key actors in the access process. The decision on the request for access to the RI is communicated to the applicants by the centralized access management unit.

RI should foresee all necessary steps to ensure that the whole process is based on the principles of non-discrimination and transparency, implementing an Access Policy inspired to equal opportunities and encouraging the access by new users.

4.5.3 Support

RIs are encouraged to provide support to users in order to promote and sustain an efficient and effective access to RIs. A user service helpdesk within the centralized access management unit should be set up for any user enquires, providing support and information to users willing or admitted to access whenever they have any issues with or questions about the RI services.

In case of remote and physical access to RI facilities and services, support and/or guidance on site must be ensured by the access provider, or, in case of virtual access, it may be necessary to train the users on how to use RI services.

Support measures may consist in:

- scientific and technical support such as information on instruments handling and operation, training on instruments, data handling, user manuals, scientific advises, etc.;
- administrative and logistic support such as information on transport and shipping of instruments, specific local permissions (also related to residence and immigration permissions), information related to accommodations, travel, etc.

4.5.4 Post-Access provisions

RI shall establish post-access provisions in order to:

- monitor the user access provision;
- record the scientific output of the users resulting from the access (e.g., publications, exploitation of results, patents, data, etc.);
- request the acknowledgement of the contribution and support provided by the RI in the publication of the results from access. Users are also expected to acknowledge the use of the facility and the contribution of those persons working at the ACTRIS facilities;
- require co-authorship in case of substantial RI data use and / or in case of substantial work contributions by RI employees worked for the access;
- establish feed-back mechanisms where users can report their access experience and their future needs, in order to improve the RI services provision, also in order to use the users' opinion for a RI self-evaluation.

In any case, in line with good scientific practice, users are encouraged to acknowledge the RI and to offer co-authorship to those working at the RI having made genuine scientific contributions to their work.[11]

4.6 Sustaining access to RIs

The design of flexible funding models to allow sustainable open access to RIs in the long run is nowadays more than needed. Access to distributed RIs is an added value allowing users to benefit from services that are unique and may be beneficial for science and innovation. However, access to distributed RIs causes additional costs to the facilities which RIs should account for. There are different possible access funding models and each RI should choose its own best solution to ensure sustainability.

Establishing user fees for access may be economically sustainable and may contribute to the financial sustainability of RIs over time, even though a systematic charge could compromise the attractiveness of RIs and reduce the demand for access. A smart combination between different financial sources may enable RIs to cover costs keeping low fees for access at the same time.

Given the specificity of different RIs, an access funding model shall be developed according to the business model chosen by the RIs. A fee for access may partially or totally cover the costs incurred by the RI facility for the provision of access.

RIs should undertake to keep as low as possible the fees for users from academics and non-profit research organizations in order to support scientific research.

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[11]   European Charter for Access to Research Infrastructures

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For users from industry, SMEs and private research sector, a balance needs to be found between the need to cover costs and the need to facilitate private sector involvement in order to stimulate innovation and keep the role of RIs as knowledge-based innovation drivers allowing a continuous interplay between science challenges and technical responses.

4.7 Legal compliance

Several national and international regulations apply for access and use of Environmental RIs facilities and services. Especially for the access to data, information and databases, European and international legislation is extensive. In particular, the *Directive 2003/4/EC on public access to environmental information*, the *Directive 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)* and the UNECE[12] *"Aarhus Convention" on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters*, ensure citizens' access to environmental information and data, establishing also some limitations. Other national laws, international regulations and policies protect privacy of individuals, preventing the use, managing and sharing of personal data. The General Data Protection Regulation entered into force in 2016[13], provides one set of data protection rules for all European citizens, private and public entities, strengthening the rules for protecting privacy.

In designing the rules and conditions for access to and use of RIs, especially concerning physical (and remote) access, RIs should duly take into consideration applicable national and local legislation, e.g. on residence permits, customs, workplace safety requirements, insurance obligations, public health and security regulations, etc.

When access leads to a potential disclosure of personal data, information data which may jeopardize the protection of the environment, protection of rare species, etc., RIs should take the necessary steps to ensure the compliance with the applicable regulations.

RIs should support users to be compliant with any applicable national/regional/local law and regulations, as well as health and safety requirements, facilitating the production of the needed documentation. RIs may also consider setting up an "user code of conduct" which may facilitate users to comply with the requirements.

Access to RIs facilities and services may be limited or restricted due to several reasons:

- national and international regulations;
- protection of privacy and confidentiality;
- Intellectual Property Rights and commercial sensitivity;
- ethical considerations;
- health, public security and national defense.

Restrictions to access may be requested by law when the access pertain to sensible data such as data relevant for national defense, military activities and intelligence as well as data under consideration in legal actions or relevant for political decision making.

Access limitations may also occur in order to respect potential Intellectual Property Rights, trade secrets, commercial sensitivity or to protect the confidentiality of certain information which may not be accessible for research.

In the definition of their Access Policy RIs should take into account and describe any possible case of restriction to access.

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[12]   United Nations Economic Commission for Europe

[13]   General Data Protection Regulation, EU, 2016

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4.8 Confidentiality and Intellectual Property Rights

Intellectual Property Rights (IPR) are regulations to protect Intellectual Property (IP), namely ownership on intangible creations of the human intellect. IPRs regulate the rights and duties over property such as copyrights, patents, trademarks, etc.

IPRs give to the creator exclusive rights to use and benefit from its own work, and thus to provide access rights to users under certain conditions.

There is a need to establish a balance between the protection of the human intellect work and the openness of science as the main driver to boost innovation with immediate return in terms of scientific, economic and social benefit.

There is also a need to find mechanisms to protect possible proprietary rights resulting from the access, while maintaining a high level of openness which allows to make the most potential of RIs as incubators of science and innovation.

RIs are expected to use licenses that provide legal clarity about open data access, use, sharing, and exploitation of RI data, and give explicit permission to use work created by the owner. It is recommended to use licenses that i) include the attribution condition to ensure that credits are given to the author, ii) are applicable to most jurisdictions, and iii) allow copying and redistribution of the material in any medium or format, and to remix, transform, and build upon the material for any purpose, even commercially.

A good balance can be found in the usage of Creative Commons licenses[14], for instance the type license "Attribution International" (CC BY license) which allows the original creator to retain proprietary rights and, at the same time, lets users copy, share, redistribute, adapt and build upon the original material for any purpose, even commercially, as long as they credit the creator. Several other types of licenses with different degrees of openness are available.

RIs should establish a protocol to regulate the management of potential Intellectual Property Rights (IPRs) resulting from the access and to protect the confidentiality from both sides, access providers and users.

This is a crucial issue when the access concerns private sector, industry or SMEs involvement and, thus, it may pertain the commercial use of scientific data and information.

An agreement between access providers and user can help to clarify mutual rights and obligations.

4.9 Ethical Issues

Environmental RIs conduct research and provide services which are particularly relevant for society and the environment. Planet earth is their lab and environmental research, investigating on the delicate mechanisms which allow the environment (and life) to perpetuate over time, clearly implies ethical considerations.

Ethical review is nowadays a standard part of the approval phase for most publicly funded scientific research projects, and many projects and RIs foresee the establishment of ethical reviews, ethical guidelines, ethical committees, etc.

Ethical standards promote social and scientific values which are essential to collaborative research work: honesty, objectivity, impartiality and independence, transparency, mutual respect, non-discrimination, fairness, competence, accountability, openness and accessibility, etc.

It is important to enforce a set of ethical standards to promote research integrity, respect of IPRs, confidentiality, compliance with the law, social responsibility, as well as animal care and welfare, forest preservation and human protection.

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[14]   Creative Commons (https://creativecommons.org/)

Thus, it is recommended to RIs to adhere to the most appropriate ethical standards with respect to their scientific domain, the research performed and services offered.

RIs should also make sure that users adhere to the common codes of conduct which promote standard ethical behavior in scientific research.

4.10 Key Performance Indicators for access

Key performance indicators (KPIs) are metrics which allow to describe the performance and success of a RI

Recently, the EU Competitiveness Council "*invited Member States and the Commission within the framework of ESFRI to develop a common approach for monitoring of their performance and invited the Pan-European Research Infrastructures, on a voluntary basis, to include it in their governance and explore options to support this through the use of Key Performance Indicators*"[15]

The usage of KPIs by RIs is not yet systematic, even though needed in order to track performance over time and to evaluate the Pan-European relevance of RIs with the aim of achieving long-term sustainability.

Each RI should develop its own indicators, which are intrinsically linked to its own business plan and level of maturity. KPIs should follow, in this sense, the specific objectives and specific strategies of the RI.

RIs should be careful when formulating their own KPIs. There is a risk that badly identified KPIs could make an RI attempt maximising them which could potentially compromise the construction of the RI or jeopardize its operation over time. Reasonable KPIs should be defined which could produce long-term benefits for RIs.

The scope of indicators should remain reasonable and compatible with the administrative capacity of each RI without imposing excessive burdens on the administration. A short set of KPIs suitable to describe the access performance of RIs is recommended. These KPIs should help RIs to adopt the necessary strategy and measures to provide a high quality service and attract users.

A set of general principles may help RIs to design good indicators and secure an effective assessment of performances.
The KPIs should be:

- Agreed, accepted by RI staff and stakeholders;
- Appropriate, intrinsically linked to the RI business plan and thus to the objectives to be achieved;
- Clear, explicit and well defined;
- Reliable, against manipulation and difficult to misinterpret;
- Easy to monitor, the data collection should be possible at low cost.

The Deliverable 10.3 *Description of performance criteria for open access and list of performance indicators* describes a range of key performance criteria for Environmental RIs with respect to their open access activities and provides a list of possible key performance indicators.

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[15] Council conclusions on "*Accelerating knowledge circulation in the EU*", 9507/18, 29 May 2018, *Long-term sustainability of Research Infrastructures, art. 19b*

ENVRI

5. CONCLUSIONS

This document comprises guidelines of best practice to assist Environmental Research Infrastructures in the definition of their policies for the access to facilities and services. These guidelines are based on the existing policies in ESFRI and other Research Infrastructures, research institutions and international projects as well as on the current European policies and regulations in place.

5.1 Impact on project

This document is one result of the activities in Work Package 10 on developing governance tools and recommendations for access to environmental research infrastructures. It is one of four complementary deliverables providing tools to facilitate and encourage access, key performance indicators for access provision, and a strategy to ensure the sustainability of the access provision. It considers the results from work package 11 on new tools concepts for physical access provision.

5.2 Impact on stakeholders

The Guidelines on Access to RIs provide recommendations of considerable interest for RIs.
They offer a synthesis of best practice for the definition of policies for the access to Research Infrastructures' facilities and services.
Currently, a large number of RIs deal with the definition of their official access policies. The principles and best practices presented here can serve as a guide for different RIs and can be easily adapted to specific situations and contexts for the definition of the most suited Access Policy.

ENVRI

6. REFERENCES

- Convention on *Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters* (Aarhus Convention), UNECE, 1998

- Council conclusions on *Accelerating knowledge circulation in the EU*, 9507/18, 29 May 2018

- Directive 2003/4/EC on *Public access to environmental information*

- Directive 2007/2/EC establishing an *Infrastructure for Spatial Information in the European Community* (INSPIRE)

- EC Recommendation C(2012) 4890 final on *Access to and preservation of scientific information*

- *European Charter for Access to Research Infrastructures*, European Union, 2016

- *Four Golden Principles for Enhancing the Quality, Access and Impact of Research Infrastructures*, League of European Research Universities, November 2017

- *Guidelines to the Rules on Open Access to Scientific Publications and Open Access to Research Data in Horizon 2020*, EC, V3.2, 2017

- H2020 AGA — *Annotated Model Grant Agreement*, EC, V5.0, 2018

- *Long-Term Sustainability of Research Infrastructures*, ESFRI Scripta Volume II, 2017

- OECD - *Principles and Guidelines for Access to Research Data from Public Funding*, OECD 2007

- *Open innovation, open science, open to the world. A vision for Europe.* EU publications, 2016

- Public Roadmap 2018 Guide, Final version December 2016

- Regulation (EU) No 1291/2013 *Establishing Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020)*

- Regulation (EU) No 2016/679 *on the protection of natural persons with regard to the processing of personal data and on the free movement of such data*

- Svalbard Integrated arctic Earth Observation System - Access Policy, January 2018

ENVRI

7. APPENDICES

7.1 ANNEX 1: Results of the questionnaire on Access to RIs

As part of the activities in ENVRIplus WP10 "Governance for sustainable and adjustable Access to RIs" a questionnaire has been developed to collect information about the current procedures, modalities, and policies for access implemented within the RIs participating in ENVIplus. The feedback gathered through this questionnaire has been used as a basis to develop the Deliverable 10.1 *Guidelines on Access to RIs*.

The questionnaire consisted of more than 40 questions divided into 9 sections:

- A) *Infrastructure* (description of RI, services);

- B) *Modality of access* (type of access, access selection modes, units of access, costs, ownership of data);

- C) *Selection procedures for providing access to users* (criteria, selection panel);

- D) *Users* (kind of users, provenance, purpose of access, IPR rules applied);

- E) *Commercial use* (specific access fee for commercial use, legal issues);

- F) *Outreach to users* (measure to attract users and to record the scientific output);

- G) *Ethical aspects* (ethical issues in providing access or which could derive from the access);

- H) *Post-access provisions* (specific post-access provisions, feed-back mechanisms in place);

- I) *General aspects* (experiences, objectives, achievements, difficulties).

The questionnaire was sent out at the end of 2016 to all RIs participating in ENVRIplus and the results were elaborated in spring 2017.

Unfortunately, only 10 RIs out of almost 30 in ENVRIplus responded to the questionnaire:

• **ACTRIS** *Aerosols, Clouds, and Trace Gases Research Infrastructures*

• **EGI** e-Infrastructure providing advanced computing services for research and innovation

• **EISCAT 3D** *European Incoherent Scatter Scientific Association*

• **EMSO** *European Multidisciplinary Seafloor and water column Observatory*

• **EPOS** *European Plate Observing System*

• **ESONET-Vi** *European Seafloor Observatory NETwork*

• **Euro-Argo ERIC** *Euro-Argo European Research Infrastructure Consortium*

• **FixO3** *Fixed-point Open Ocean Observatories*

• **SIOS** *Svalbard Integrated arctic Earth Observation System*

• **SOERE ACBB** *Agroecosystem, Biogeochemical Cycles and Biodiversity*

Nevertheless, the sample is fairly representative, both at the science domain level and at the level of maturity of the infrastructures.

Below, an overview of the main results.

A) Infrastructure

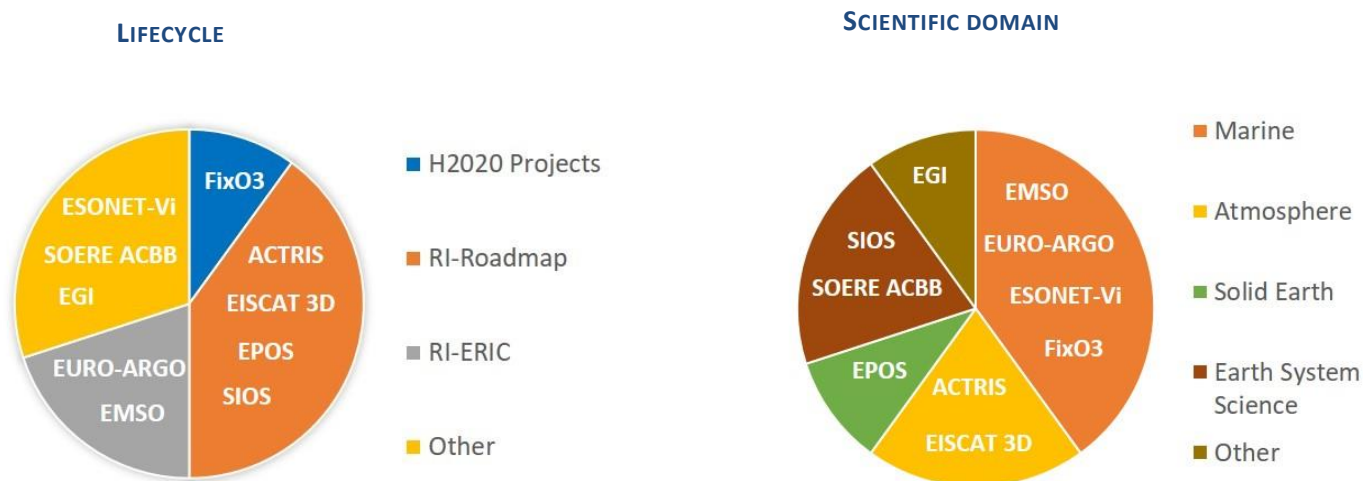**LIFECYCLE**

SCIENTIFIC DOMAIN

FIGURE 1: DISTRIBUTION OF THE RIS' SAMPLE AT THE LEVEL OF SCIENTIFIC DOMAIN AND RIS' LIFECYCLE

The sample of RIs is fairly representative, both at the science domain level and at the level of maturity of the infrastructures with respect to the RIs' lifecycle.

Different levels of infrastructure maturity are represented:

- **ERIC** (European Research Infrastructure Consortium);
- RIs included in the **ESFRI Roadmap**;
- **H2020 projects**;
- networks and federations **(Other)**.

Moreover, the sample includes RIs working in all the different scientific domains represented in ENVRIplus:

- **Atmosphere**;
- **Earth System**;
- **Marine**;
- **Solid Earth**.

B) Modality of access

Different questions were addressed to take note of the existing policies for the access to infrastructures and data.

ACCESS POLICY
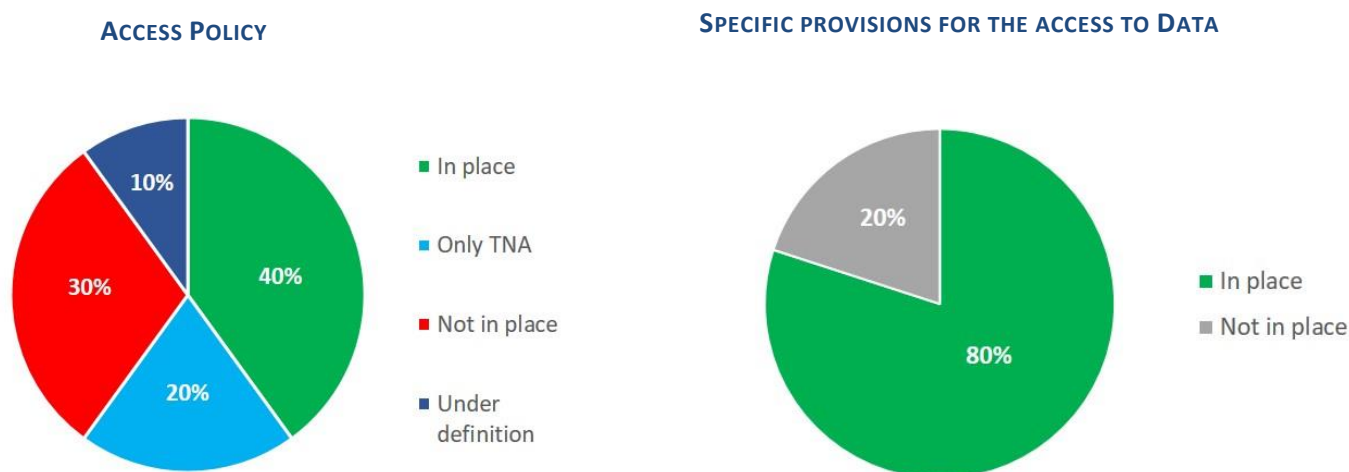
SPECIFIC PROVISIONS FOR THE ACCESS TO DATA

FIGURE 2: STATUS OF POLICIES IN PLACE FOR THE ACCESS TO INFRASTRUCTURES AND DATA

The results shown that 60% of the sample has already adopted an Access policy (20% only related to TNA). 40% of the sample has not yet adopted an Access policy even if 10% declared that this policy is being defined.

80% of the sample has already in place specific provisions for the access to data and the same percentage applies to RIs with a structured Data Policy into force.

100% of the sample provides open access to data, mostly for free. In few cases fees for access are envisaged for private sector as well as for non-RIs member countries or organizations.

Other questions were addressed to understand how much access is granted through a selection procedure (*Competitive Access*) and how much through *Wide Access* which does not require any selection.
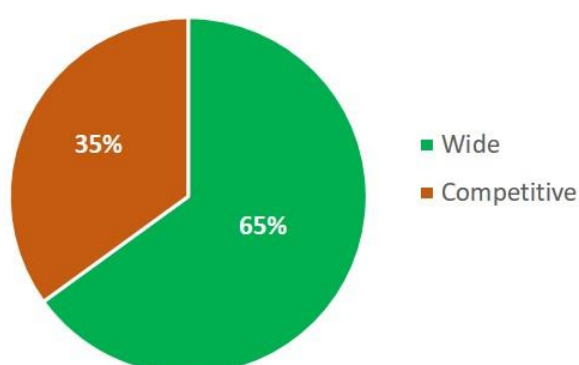
CLASSIFICATION OF ACCESS

FIGURE 3: CLASSIFICATION OF ACCESS BASED ON THE NEED FOR A SELECTION PROCEDURE

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65% of the access to the RIs' sample is granted via Wide Access without any user selection procedure. This data could suggest that RIs are essentially data providers (access to data > virtual access > no selection needed > wide access). Nevertheless, the sample is too small to state it and the following results show that many Environmental RIs provide good percentage of other types of access.

Status of the different types of access provided within the RIs' sample.

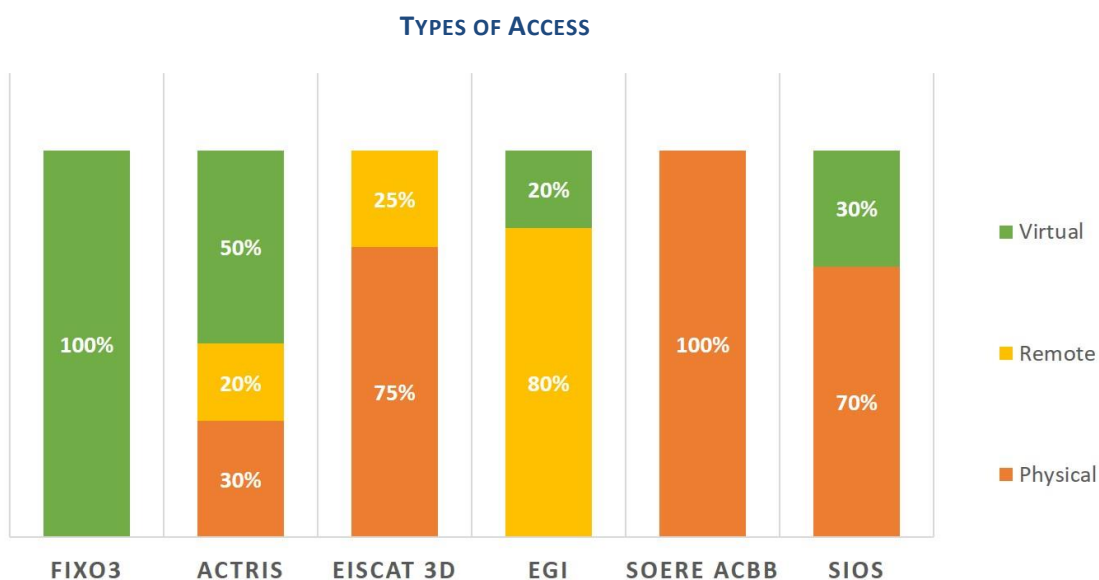Three types of access have been identified: Physical, Remote and Virtual Access.

TYPES OF ACCESS

FIGURE 4: TYPES OF ACCESS PROVIDED BY RIS

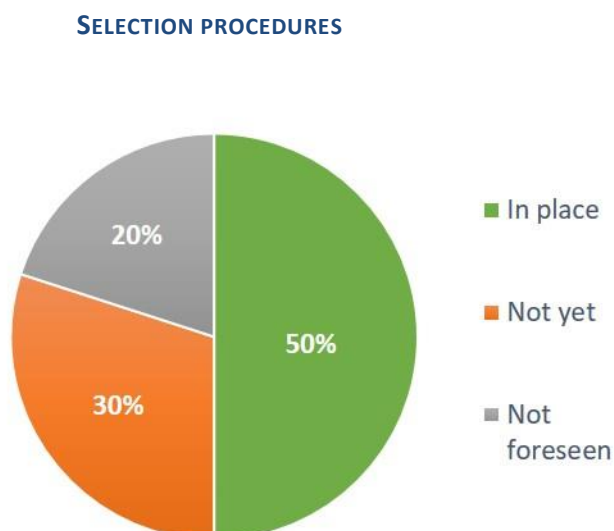## C) Selection procedures for providing access to users

FIGURE 5: ACCESS SELECTION PROCEDURES WITHIN THE RIS SAMPLE

5 RIs out of 10 have already a structured selection procedure in place. 3 RIs stated that a selection procedure for access is being defined. For 2 RIs there is no selection procedure in place, nor it is foreseen.

For 50% of the sample, criteria for selecting users must still be defined.
For those who have already defined selection criteria, the predominant aspect is the scientific relevance of the access proposals.
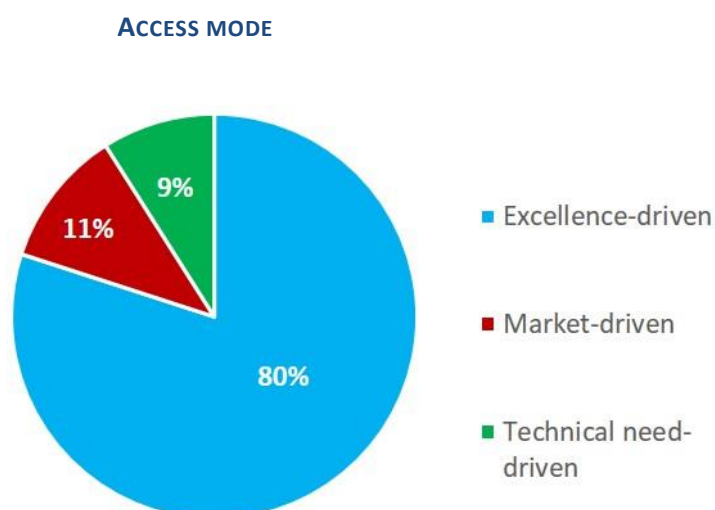
ACCESS MODE

FIGURE 6: ACCESS MODES WITHIN THE RIS SAMPLE

The selection of access proposals within the sample is mainly Excellence-driven (80%). Then the selection is driven by the market (11%) and by technical needs (9%).

Only 30% of RIs' sample envisage an independent selection panel for the peer-review of proposals.

D) Users

KIND OF USERS

PROVENANCE OF USERS

- Scientific community (87%) ■ Education (7,5%)
- Public Authorities (3%) ■ Private sector (2,5%)

- RI member countries (72,6%)
- non RI members - Europe (18%)
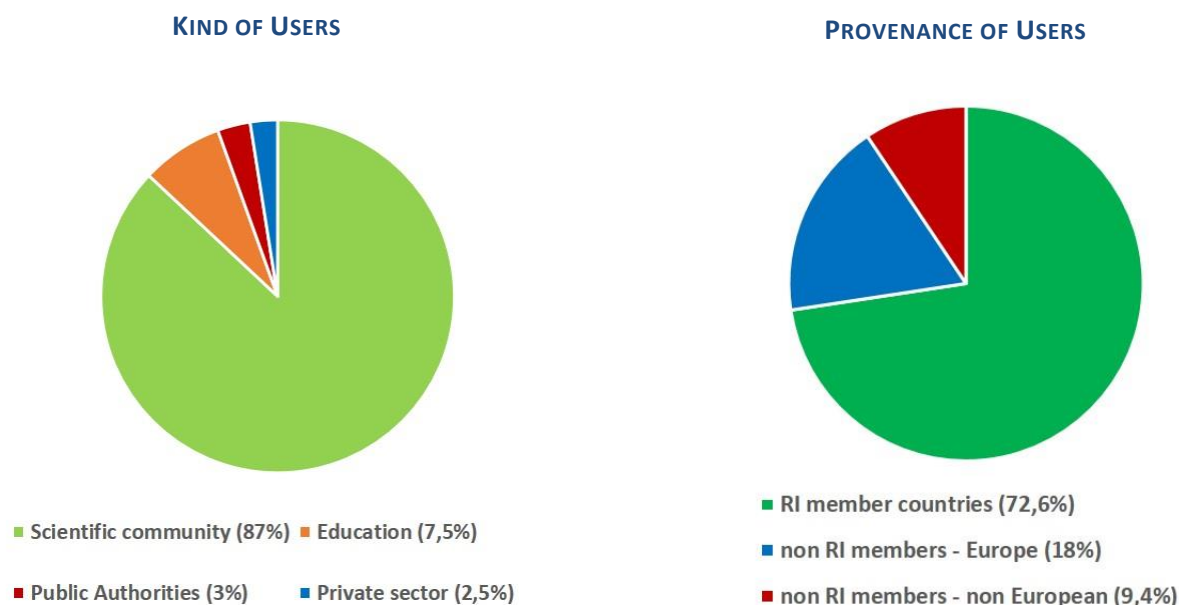- non RI members - non European (9,4%)

FIGURE 7: KIND OF USERS AND THEIR PROVENANCE

Users are primarily coming from the Scientific community (87%). Access of users from school and university is significant (7,5%), then from Public Authorities (3%) and from Private sector (2,5%).

Users mainly come from RI member countries (72,6%), 18% from European non RI member countries and 9,4% from RI non-member countries outside Europe. The RIs sample indicated that a 21% of users are internal users, staff (not considered in the figure as staff cannot really be considered an RI's user).

Probably a better and common definition of "User" is needed.

In this section of the questionnaire, RIs were also asked to indicate the purpose of access.
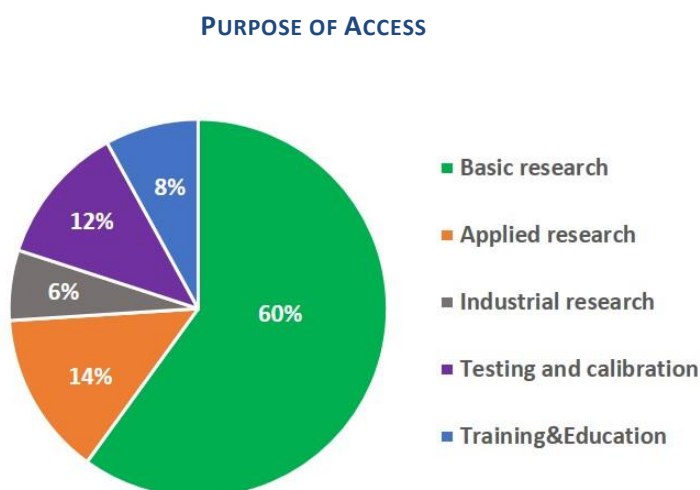
PURPOSE OF ACCESS

- Basic research
- Applied research
- Industrial research
- Testing and calibration
- Training&Education

FIGURE 8: PURPOSE OF ACCESS FOR PHYSICAL AND REMOTE ACCESS

In case of Physical and Remote Access the purpose is mainly to carry out basic research (60%), 14% to carry out applied research, 12% for instruments testing and calibration, 8% for training and education activities and 6% for industrial research. The share of access for basic research purposes appears disproportionate with respect to Environmental RIs' activities. Probably a better and common definition of "Basic research" is needed.

E) Commercial use

In this section, RIs were asked if a specific access fee for industrial users is envisaged, and to comment about any legal issues linked with industrial access and cooperation with industry.
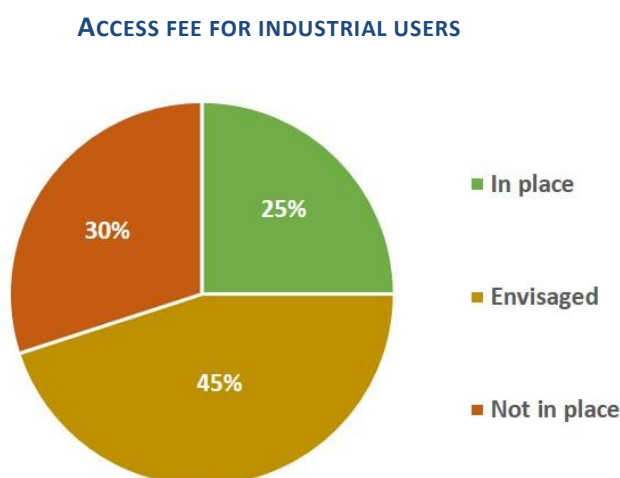
ACCESS FEE FOR INDUSTRIAL USERS

FIGURE 9: ACCESS FEE FOR INDUSTRIAL USERS WITHIN THE RIS' SAMPLE

Within the sample, a specific access fee for industrial users is in place (25%) on a case by case scenario, envisaged but not yet defined (45%), not in place (30%). Therefore, for the time being several RIs envisage free open access also for private sector's users.

Comments about legal issues linked with industrial access and cooperation with industry are mainly concerned the management of IPR.

IPR rules related to collaborative research show that RIs generally seek to encourage open access. For commercial use of data RIs seek to maintain ownership of the data provider and to secure the rights for free use of the results. In some case CC licenses are envisaged.

F) Outreach to users

In this section RIs were asked to expose about any measures in place to attract users and to record the scientific output deriving from access.

RIs are very active in promotion of opportunities, mainly via websites (RIs websites or via the websites of the involved research Institutions), mailing lists and relevant workshops, conferences and meetings. Outreach material (leaflets, brochures) is widespread.

Strategies to promote access and to attract new (or specific type of) users are already in place for the 70% of the sample. Those activities are related primarily to the promotion of funds opportunities, targeted calls, open calls, targeted criteria to promote new access, but also to the organization of summer schools, showcases and user meetings.

Record of the scientific output is regularly carried out from 60% of the RIs sample. 20% has a partial record of the scientific output, relying on proper citation and acknowledgement. The remaining 20% has apparently no measure to record the scientific output deriving from access.

G) Ethical aspects

In this section RIs were asked if there are specific ethical issues in providing access or which could derive from the access.

50% of the sample does not see any specific ethical issues in providing Access.

Some ethical issues brought to attention are:

- protection of personal data;
- impact on environment during the physical access;
- animal welfare in biological research;
- use of advanced facilities to collect data on military sensitive objects.

H) Post-access provisions

In this section RIs were asked if specific post-access provisions are envisaged and if there are feed-back mechanisms where the users can report back to the RI their experiences, scientific activities and future needs.

Only 50% of the sample has already specific post-access provisions in place, mostly related to the compilation of post-access reports or questionnaires.

Some feed-back mechanisms are envisaged in order to allow users to report their experiences and future needs, but this is mostly achieved through personal interactions between RI staff and users (emails, requests for support, reports of malfunctions) during and after the access, as well as during meetings and conferences.

Only 20% of the sample has established structured feedback mechanisms so far.

I) General aspects

In the last section of the questionnaire it has been asked, with respect to access to the RI, what are the experiences, objectives on mid and long-term, what are the main difficulties or problems experienced in providing access as well as to list potential weak points of the access policies.

Since several RIs are actually under construction or in implementation phase, many underlined that their Access policy is not completely defined yet.

Many expressed the difficulty to encourage access from the private sector.
Another issue of major concern is the traceability of data use, due to open access policies.

Moreover, mainly for virtual access, measuring and tracking access as a requirement by the EC, could have an impact on the attractiveness of European RIs and might turn potential users away if the same (or similar) service is available elsewhere (internationally) with less control.

Difficulties also in defining legal ownership of data in cases where users bring their own data recording equipment to connect directly to the RI systems*.*