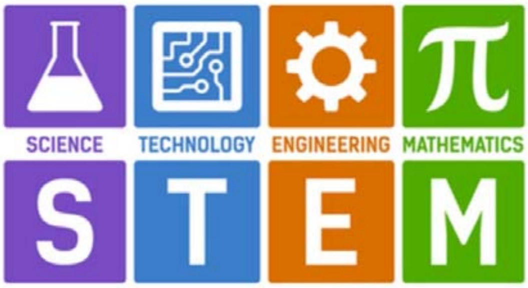
Principals and Guidelines
for creating a
Policy for Open Access to Research Infrastructures



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June 2020

Note on the document

This document is based on one originally produced by Dr Jelena Angelis, with contributions from Dr Lisa Cowey, under the EU4TECH WB project (2017-2019). It has been revised for use with the RCC Open Access Research Infrastructure in the Western Balkans Support Programme (2020).

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Table of acronyms

CERN	European Organization for Nuclear Research
EPSRC	Engineering and Physical Sciences Research Council
ERDF	European Regional Development Fund
ESFRI	European Strategy Forum for Research Infrastructure
EU	European Union
HEI	Higher Education Institution
ICT	Information and Communication Technology
IPR	Intellectual Property Rights
MRI	Magnetic Resonance Imaging
NGO	Non-Governmental Organisation
NMR	Nuclear Magnetic Resonance
OA	Open Access
PRO	Public research organisations
RI	Research Infrastructure
R&D	Research and development
TRAC	Transparent Approach to Costing
TTO	Technology Transfer Office
WB	Western Balkans
WB6	Western Balkans Six
XFEL	X-Ray Free-Electron Laser Facility
ZMF	Centre for Medical Research

Introduction to the RCC action

In 2020 the Regional Cooperation Council Secretariat launched an **Open Access Research Infrastructure in the Western Balkans Support Programme** to assist development of research infrastructures in the region within the Multi-annual Action Plan for a Regional Economic Area (MAP REA) endorsed at the Leader's Summit in July 2017 in Trieste.

A part of MAP REA is focused on removing obstacles to mobility of students, researchers and academics through joint policies, measures and instruments aimed at increasing academic and research mobility and cooperation.

In April 2020 the RCC Secretariat contracted external consultant services to support the Programme implementation with two specific purposes:

(1) to guide the preparation of the Open Access policies for 30 selected Research Infrastructures in the Western Balkans, specifically, Albania, Bosnia and Herzegovina, Kosovo[*], Montenegro,

North Macedonia and Serbia, and

(2) to train management, administrative and research staff to introduce principles of Open Access to 30 selected Research Infrastructures in the Western Balkans.

The RCC program is designed to not only contribute to the development of the Open Science practices in the higher education and public research organisations in the region, but will lay the foundation for the establishment of the **Network of Open Research Infrastructures in the Western Balkans**, which the RCC is pioneering in the region. The development of Open Access policies is an essential part for the well-functioning research infrastructures.

The work on developing the Open Access policies is planned to take place in close cooperation with the management, administrative and research staff of the selected Research Infrastructures.

This present document is based on one originally produced by Dr Jelena Angelis, with contributions from Dr Lisa Cowey, under the EU4TECH WB project (Capacity building for technology transfer in the Western Balkans EuropeAid/137885/DH/SER/Multi 2017-2019). It has been revised for use with the RCC Open Access Research Infrastructure in the Western Balkans Support Programme (2020).

The document presents Good Practice Principals on developing an Open Access Policy to Research Infrastructures (Open Access to RIs). It is intended for Higher Education Institutions (HEIs) and other Public Research Organisations (PROs) across the Western Balkans region, interested in making their research infrastructure available for use by a broader user group.

Its purpose is to clarify the notion of 'access' and 'open access' to research infrastructures (RIs); help universities and research organisations develop their own open access policy by highlighting various dimensions of access management and connections between these dimensions; and understand and consider the consequences of the provision of access, on their own organisation's research culture and overall strategic planning. To make it easier for the users of this document to understand and apply the presented topics, this document contains a number of practical examples, as well as a number of questions for internal work by PROs. The document ends with a Template Policy (Annex 2) based on examples from EU Member States (MS). Links to illustrative examples of OA Polices are also integrated in to the text and are outlined in multiple case studies.

The various guidelines presented in this rule book should enable PROs to develop their own protocols for Open Access to RIs. It highlights the key principles and concepts, areas of particular importance that need to be addressed rapidly, as well as various issues to be taken into account and addressed.

[*] This designation is without prejudice to positions on status, and is in line with UNSC 1244 and the ICJ Opinion on the Kosovo Declaration of Independence

The principles outlined in this rule book were presented during two remote half day workshop (29th and 30th June 2020).

1. The movement towards Open Access

The European Union, as well as other developed economies, has been moving for many years towards a more 'Open' approach to research, development and innovation (RDI).This can be seen through a number of well established initiatives, including '**Open Innovation**' where academia and industry work together to boost innovation. Triple helix mechanisms to boost Open Innovation, with a particular emphasis on SMEs, are now well established across Europe. It is also inherent in the '**Open Access to research publications and data**' initiative that seeks to make all publications available to as wide an audience as possible to help disseminate knowledge and learning. This now forms a corner stone of the Horizon 2020 program[1]. From Open Innovation and Open Access to publication and data, the European Commission has further broadened the Open Agenda to 'Open Science[2]' to cover how research is performed as well as how knowledge is shared. This now includes making access to research infrastructure more widely available.

Research Infrastructure (RI) can provide the basis for attracting and retaining good researchers as well as providing contract research services to enterprises and other external organisations. While highly specialised RI such as CERN and ELI can form the basis for global collaborative research programs, smaller laboratories, facilities and expertise can form the basis for strengthening Open Innovation at local, national and regional levels, with associated benefit to the economy. Smaller RIs can also form the nucleus for a Centre of Excellence (CoE) to promote collaboration between science, technology and industry and to provide a platform for education of young scientists and engineers.

The EU has published its Open Access Charter for Access to RIs[3] and some EU MS like the Republic of Ireland have also developed their own national level guidelines[4]. Others, like Poland and Lithuania have encoded 'Open Access' in to national regulations[5]. Individual organisations are then encouraged or compelled to develop their own policies as well as 'protocols' , 'principals' and regulations that lay out who can use the RI and under what conditions[6], [7], [8].

Open Access policies and protocols to Research Infrastructure can enable better efficiency and use of the existing RIs, streamline the investments into the future RIs, to ensure optimisation of access to RIs by industry and wider research community, public sector and civil society, as well as cross-border cooperation. Open Access policies and protocols to RI can be a good entry point for a wider discussion and development of long-term management plans for RIs.

[1] See for example https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf

[2] See https://ec.europa.eu/research/openscience/index.cfm

[3] https://ec.europa.eu/research/infrastructures/pdf/2016_charterforaccessto-ris.pdf

[4] http://hea.ie/assets/uploads/2017/09/National-Principles-For-Access-To-Research-Infrastructure.pdf

[5] See for example LT: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.375571/asr.

[6] For Kaunas University of Technology see https://apcis.ktu.edu/help/operating_rules.pdf.

[7] For Vilnius University of Technology see https://www.vu.lt/site_files/MID/APC/VU_open_access_ENG.pdf

[8] For the Terms And Conditions Of Use Of The Research Infrastructure Of The National Synchrotron Radiation Centre Solaris see https://synchrotron.uj.edu.pl/documents/1457771/138966987/terms-and-conditions.pdf/9abd9044-042c-47b5-a87f-8fcaa42b0a12

Q1. **Your rational for adoption 'Open Access'**

Why might your institution adopt an Open Access Policy? What are the objectives? What are their relative priorities? What do you want to achieve? What is the timeframe for meeting your objectives? (short, medium and long term?)

2. Understanding Research Infrastructures and access

Key terms to consider in relation to this topic include: 'research infrastructure', 'types of research infrastructure', 'access', and 'open access'. These are briefly presented and defined further.

1.1 Ways to define Research Infrastructures

Research Infrastructures (RIs) range from very large and complex research facilities for carrying out cutting edge fundamental research, such as CERN, to small laboratories with specialised R&D equipment that can be used for routine testing. Different types of RIs will have uses for different target groups. The European Commission's (EC) definition of research infrastructures is largely directed towards large and highly specialised facilities; this definition can be found in Annex 1. However the concept of Open Access is not limited to the EU – many other countries including Australia and the USA have embraced this approach to widening access to facilities that have been purchased with tax-payer money.

This publication is mainly concerned with smaller facilities within PROs that can be made available to researchers from other research institutions and to commercial entities, including SMEs, but it draws on the EC framework as the principals for open access are universal.

A research infrastructures may be 'single-sited', 'distributed' (an organised network of resources), 'mobile' or 'virtual':

- A single-sited infrastructure is a single infrastructure / resource available at a single location.
- A distributed infrastructure is an infrastructure having facilities located in different sites, operated by one legal entity, or an infrastructure set up as a central hub which is responsible for the coordinated operation of several closely coordinated distributed facilities, which might however retain their legal personality.
- A mobile facility involves vehicles or vessels specially designed for scientific research (for example ships, aircraft, etc.).
- A virtual infrastructure, or a virtual research environment, implies that the service is provided electronically. Such research environments are considered to be increasingly crucial in maintaining the competitiveness of European scientists in a global context[9].

It is also useful, when considering a specific RI or facility, to distinguish between **capital-bearing** (for example buildings and equipment) and **non-capital-bearing** research infrastructure (people) and between **knowledge-bearing** (researchers, laboratories, collections, etc.) and **non-knowledge-bearing** research infrastructure (support staff, office space, "ordinary" computers, etc.) available to the RI management.

As noted above, one of the key definitional issues of importance is the scale (or geographic scope of relevance) of the RI. The EC definitions (see Annex 1) have been generally set as part of discussions on 'large-scale' infrastructure of pan-European relevance (within the framework of the European Strategy Forum for Research Infrastructure, ESFRI). The scale of a RI can be defined partly in terms of the financial investment required but also in terms of the strategic objectives of the RI management e.g. a business plan may define an objective to encourage use of the RI by researchers from neighbouring countries or to become a 'regional research facility' linked to an European large-scale research facility. This regional aspect may become increasingly important for the Western Balkans.

Examples from Sweden and Australia show how these international dimensions and definition have been adopted to the national contexts.

[9] Communication from the Commission on ICT infrastructures for e-science [COM(2009) 108 final]. See: http://europa.eu/legislation_summaries/information_society/internet/si0006_en.htm

Example 1. Swedish Research Council, Sweden

The Swedish Research Council divided research infrastructures into six categories based on their accessibility to Swedish researchers and on how the responsibility for their operation and use is regulated. The categories are:

- Infrastructures operating under international conventions.
- Infrastructures operating via other international collaboration and that are openly accessible.
- Infrastructures at the national level that are openly accessible to all researchers.
- Networks of type-E nodes (below) at the national level that promote open accessibility among researchers and specialisation and complementary support among the nodes.
- Equipment or databases used jointly by research groups, mainly at a faculty or larger institution.
- Equipment in a research group's laboratory, or databases at the research group level. Used mainly by the research group, but also partly in collaboration with other research groups

Example 2. Australian Strategic Framework, Australia

The 2011 Australian Strategic Framework identifies three categories of RI investments:

- **Local** – research infrastructure which could be expected to be owned and operated within a single institution.
- **National** – research infrastructure on a scale generally not appropriate to be owned or operated by a single institution and which often supports collaborative research and is generally regarded as part of the national research capability.
- **Landmark** – large scale facilities (which may be single-site or distributed) that serve large and diverse user communities, are generally regarded as part of the global research capability, and engage national and international collaborators in investment and access protocols.

1.2 Benefits of Open Access to RIs

The benefits of open access to research infrastructures for a PRO are numerous. To name just a few, opening up infrastructure of different type and size can lead to stronger scientific results (a key goal for all research-focused organisations), stronger effects in other domains (e.g. innovation when performed experiments/research lead to new commercially viable discoveries and results), and more collaborative research by involved various research groups. It can also potentially bring additional financial benefits in cases where access to the research infrastructures can be offered for a fee.

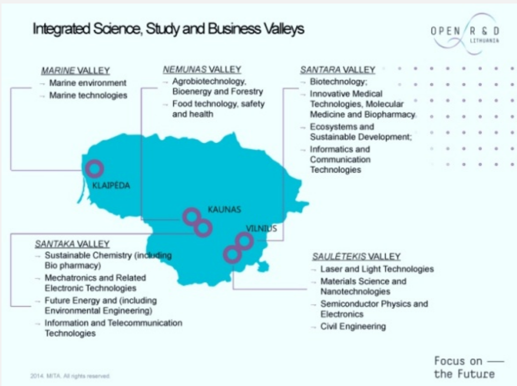
Policy makers also receive benefits. In many scientific fields, specific instruments are so costly or not used frequently enough for every laboratory to justify purchasing them: sharing of equipment and a reduction in duplication of equipment is attractive to Ministries as a more efficient approach to allocation of funds. In addition, interactions between research groups and companies can encourage long term collaboration including those that are interdisciplinary in nature. This desire to avoid duplication and encourage sharing can be at the heart of a move by policy makers towards Open Access.

The Case Study below outlines the policy towards Open Access adopted in Lithuania when it invested c.300 million uros of EU Structural Funding in R&D 'Valleys' in the country.

Case study 1: Establishing regional R&D valleys and Open Access Laboratories – Lithuania

The R&I potential of Lithuania includes a pool of nearly 18 000 R&D professionals. One third of research and experimental development research is carried out at universities.

Using Structural Funds Lithuania has developed a network of five R&D 'valleys'. The valleys are based in Vilnius, the capital of Lithuania, in Kaunas, the country's second largest city and industrial centre, and in Klaipėda, the non-freezing seaport city. They comprise Santara Valley (Vilnius), Sunrise Valley (Vilnius), Santaka Valley (Kaunas), Nemunas Valley (Kaunas), and Maritime Valley (Klaipėda). Each valley specialises in a number of scientific research fields and involves one or more of the main Lithuanian research institutions.



Nearly 300 million Euros of EU Structural Funds have been invested to the development of the infrastructure of R&D valleys. The investment was made in regard to the expertise already possessed by research institutions in order to strengthen their capacities in respective R&D areas. For the new financial period of 2014-2020, structural support was narrowed and aimed at national priorities distinguished under national Smart Specialisation Strategy.

According to the national rules, all R&D resources located in the valleys must be available for the public on the basis of Open Access. For this reason, universities and research institutes in the valleys established **Open Access centres** to provide access to their R&D resources. Other entities which possess R&D equipment were also eligible to establish an Open Access centre.

The Regulation of Management of Open-Access Centres defines the following aspects:

- **Principles of formation, management and the manner of use of the resources;**
- **Equipment use time ratio between separate subjects, maintenance costs, and the accumulation and investment of the funds received for the use of resources;**
- **Indicators of activity effectiveness;**
- **Principles of intellectual property protection;**
- **Provisions on solving the disputes.**

This strategic investment of the EU Structural Funds has permitted the development of high-quality infrastructure and premises at the Open Access Centres – infrastructure for research, innovation and new technology development and comfortable conditions to establish new technology-oriented businesses – offices, labs, business incubators. So far, more than 26 Open Access centres have been created in Lithuania - centres of excellence with modern equipment, advanced technologies and world-class scientific potential. They specialise in laser, nanotechnologies, semiconductor physics, electronics, engineering, biotech, energy, environment, ICT and agriculture.

The high-quality infrastructure and premises at the Open Access Centres enable private companies to undertake experimental research and/or measurements, construct prototypes, create new advanced research-based products and improve existing technology. They also enable firms to access professional assistance in research, technology and innovation issues by working with both researchers and qualified technology transfer professionals.

Alongside high-quality infrastructure and premises the valleys structure also helps to promote:

- **Access to skills and networking – concentration of scientists, researchers, developers and university academia, close collaboration of knowledge-intensive businesses with science and study institutions, opportunity to be co-located with other companies in the same sector (clusters) and region.**
- **Research excellence – Open Access labs, R&D projects supported by EU/state, application of research results in industry and business**
- **Increased international competitiveness**

For more information on Lithuania's Open R&D see: https://openlithuania.com

Q2. Drivers and Barriers

What might help you to achieve the OA objective (drivers?)

What might prevent your realising this objective (barriers?)

1.3 Defining scale and value

As a starting point, it can be useful to differentiate between the scale of instrumentation. Procedures or types of public funding may then be adjusted to reflect this scale, for example:

- **Small-scale instrumentation** of local (i.e. national or regional in larger EU Member States) relevance, e.g. laboratory equipment. This is instrumentation that is typically owned and operated by single laboratories. Organisation of access is typically done at a local level.
- **Mid-size instrumentation** lies in between the local and the large pan-European scale and a sharp distinction either on the lower or the upper limit is difficult. However, for instance, in the life sciences field, mid-size instrumentation comprises equipment, such as electron microscopes, nuclear magnetic resonance (NMR) and magnetic resonance imaging (MRI) scanners that have become so elaborate and technically challenging (as well as expensive) that not every laboratory can possibly have its own. The instruments are at least national to inter-regional (e.g. the Baltic Sea region) relevance and attractive to external users, particularly when the facility can provide special expertise. Typical costs for mid-size instruments range between €0.5m and €20m.
- **Large scale instrumentation** are facilities of pan-European relevance. Such facility is typically unique in Europe and serves the whole European, or even international scientific community. Typical examples are known from physics, such as CERN and XFEL. Large-scale facilities require typically an individual and multinational organisational structure and funding agreement.

A similar scale distinction can be found in other countries. For example, in the UK, the EPSRC[10] defines a mid-range facility as a research facility providing resources that are of limited availability to the UK researchers for one of several reasons including:

- The relative cost of the equipment.
- Dedicated equipment in every University is not needed.
- Particular expertise is needed to operate the equipment or interpret the results or
- Sharing information or software enhances progress.

1.4 Inventory of RI

In order to assess the RI available, many counties or individual PROs have initiated an 'inventory exercise' (sometimes also called an 'equipment audit') of 'capital equipment' and then established online database. Examples of this approach can be found at national level in Croatia and a University in Lithuania. In Croatia, capital equipment was defined as being worth more than 130 000 Euros while in Lithuania the University involved audited all equipment worth more than 5 000 Euros.

Other countries that have used auditing to improve transparency and visibility include Slovenia and the Republic of Ireland. All these are captured in short case studies below.

Case Study 2: Auditing and establishing databases of research equipment - Croatia

The Croatian Ministry of Science, Education and Sports (MSES) first carried out an audit of research equipment in 2013. The Ministry requested that all public universities and public research institutes supply information on their "capital" equipment, defined as being worth more than 1 million Kuna (0.13 million Euros).

The primary objective of the exercise was to provide scientists and other relevant stakeholders with data on existing equipment and information on the possibilities for using the equipment.

[10] See: http://www.epsrc.ac.uk

MSES then published the results on their website in PDF format. The list of research equipment was quite simple but it provided enough information to be useful. Importantly, it included the contact details of a relevant individual so that anyone who was interested could make direct contact with the responsible person. It was intended that the database would be regularly up-dated.

The Croatian RI catalogue is published as a PDF document in the Croatian language. This is arguably not the most optimal format to encourage use. A Good Practice example that is guided by national principals, covers the full spectrum of Research Infrastructures at national level and makes them available on an IT platform with multiple search approaches is the **Republic of Ireland's Large Items of Research Equipment database** See Case study 4 below.

Case Study 3: Auditing and establishing databases of research equipment – KTU Lithuania

Kaunas University of Technology in Lithuania audited all equipment with a replacement value of > 3 000 Euros and established an online 'booking' system for all research equipment. Three different categories of 'user' are defined:

1. internal academic research,

2. external academic research and

3. external 'economic' research by an enterprise

KTU has placed the database online where is now used to booked equipment by the three types of users.

Case study 3: Transparency of Slovenian research infrastructure – SICRIS

Providing Slovenian researchers with access to developed and large research infrastructures is essential in order to reach and maintain a level of scientific development on a globally comparable scale. In Slovenia, the main instrument for developing research infrastructures are provided by the Slovenian Research Agency, in terms of co-financing and allocation of funds through calls for proposals, which subsidise the purchase of equipment needed by organisations to carry out scientific and research activities. The Slovenian Research Agency earmarks 2 to 4 million EUR annually for the purchase of new equipment, in addition to 7 to 8 million for research institutions' infrastructural programmes. The Agency subsidises the purchase of research, information and communications equipment on the basis of public tender. A subsidy for the purchase of research equipment within this programme can amount to a maximum of 75% the cost per unit of research equipment.

Slovenian research infrastructure is very spread out, partly obsolete, and in most cases does not attain the critical mass, neither excellence comparable with large European and global research infrastructures. Better exploitation of the existing national research infrastructure is therefore one of the key target of the Research and Innovation Strategy. In order to enhance access to research equipment (which is at the disposal of PROs in Slovenia), a transparent and publicly accessible virtual portal (SICRIS) was established. This platform provides transparent information for all the stakeholders on how to access research equipment. It is possible to search for research equipment by the name of equipment or by their classification, by the research organisation or by the person who is responsible for equipment.

In the future the platform will connect to similar ones in neighbouring countries, and will enable equipment to be linked up and fully exploited. It will also facilitate the international exchange of spare capacities and establish a mechanism for the usage of the available capacities.

For more information on SICRIS, visit their website:
http://www.sicris.si/public/jqm/cris.aspx?lang=eng&opdescr=equipSearch&opt=2&subopt=8.

Case study 41: Ireland's National Principles for Access to Research Infrastructure and Large Items of Research Equipment Database

The Republic of Ireland (Ireland or Éire) has made significant investment in research infrastructure throughout the higher education sector in the last 10-12 years. The Higher Education Authority (HEA) of Ireland has stated that facilitating the widest possible access to this research infrastructure is essential in order to achieve the greatest return on investment and value for money for the state and for the research community in general.

Until recently there was no nationally accepted set of guidelines in place governing access to items of research infrastructure hosted within publically funded institutions. This has been addressed by the **National Principles for Access to Research Infrastructure ('Principals')**. These set out a set of agreed national guidelines that should apply, 'in so far as is practicable', to all items of research infrastructure within these institutions.

In doing so, it acknowledges that the enabling of access to research infrastructure by other researchers from Ireland and internationally and industry has cost implications. It also recognises that **proper access to research infrastructure requires that there be in place a professional and customer-orientated support service** including inter alia:

(i) open and transparent access policies;

(ii) auditable access cost basis;

(iii) proper record keeping including records of access requests including where relevant, decisions and reasons in the event of a refusal, usage data etc;

(iv) proper service and maintenance contracts in place, where relevant and

(v) support staff who can operate the research infrastructure and assist in the training of postgraduate students and other researchers.

The HEA has taken a deliberate decision to define the term Research Infrastructure broadly and not to use arbitrary monetary threshold values. The Large Item of Research Equipment database has a 100 000 Euros threshold and it is not anticipated that the Principals should apply to routine items of research equipment that are required for a normal functioning laboratory. However, the 100 000 Euros threshold is not intended to suggest that only those items of research equipment listed on the database fall under the scope of the access guidelines.

System Regulation

Then system is self-regulatory – it is the responsibility of the host institutions to determine what items of Research Infrastructure should/should not be accessible to external researchers. However, the exclusions of any item of RI from the access policy must be adequately justified. It is expected that access will be largely self-regulating, with other stakeholders seeking access to certain Research Infrastructure challenging a host institution if it is not accessible. In the absence of satisfactory justification, HEA/funding body may require the host institution to make the Research Infrastructure accessible to other researchers. The HEA may conduct periodic audits of higher education institutions and other research bodies in respect of their access policies.

For more information on the Large Items of Research Equipment Database and National Principles for Access to Research Infrastructure see: https://hea.ie/assets/uploads/2017/09/NATIONAL-PRINCIPLES-FOR-ACCESS-TO-RESEARCH-INFRASTRUCTURE.pdf

Q3. Your research infrastructure and its current management

What type of research infrastructures (RI) do you have within your organisation or in your network?

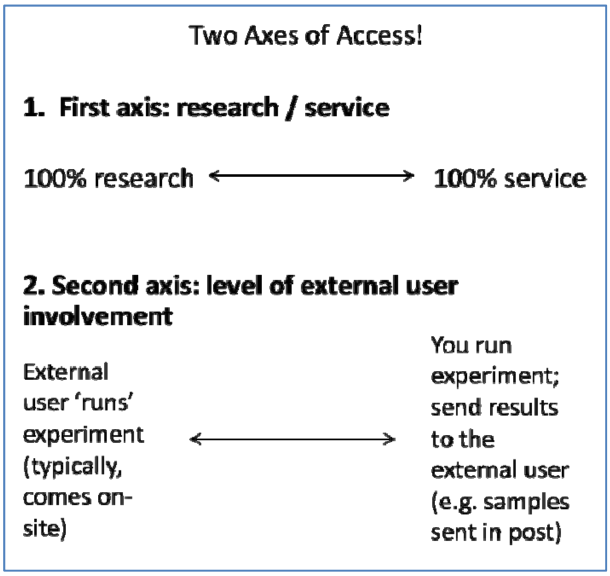
Do you have an inventory of RI within your organisation?

What unit manages this research infrastructure (i.e. university itself, faculty, individual laboratory)?

Who has overall responsibility?

1.5 Understanding access to research infrastructures

Once it is clear what type and scale of research infrastructures a PRO has and where this RI sits (e.g. individual faculty, research department, laboratory) , a second question to consider is the position of this RI on a spectrum of access. A graphical representation of two axes of access are presented in the figure below.



On the one hand, an access to a RI can be viewed on a spectrum of research vs. service, ranging from an infrastructure 100% focusing on research (e.g. a research-intensive laboratory at the university) to an infrastructure providing 100% service (e.g. an incubator focusing on transferring research results into start-ups can be viewed as such service-focused infrastructure) to all options in-between.

On the other hand, an access to a RI can be defined based on a level of external user involvement. This ranges from external users running experiments themselves by spending time on-site and performing all needed research (e.g. this is typical for large-scale RI of pan-European relevance) to a university laboratory carrying out R&D under a contract fora 'client' (user) to all options in-between.

An example from the Centre for Medical Research (ZMF) in Graz, Austria shows that this facility is leaning towards the '100% research' side on the research-services access axis and is somewhere on the right-hand side on the external user involvement access axis.

Example 3. Centre for Medical Research (ZMF), Graz, Austria

ZMF is a separate organisational unit within the Medical University Graz. A new 4 000 m2 building equipped with technical equipment (imaging machines etc.) but also with a Clinical Investigation Centre.

ZMF's "business" is not about services, but about the quality of research.

The key success factors as defined by the facility include:

- Core Facilities are operated by highly qualified staff
- ZMF staff supports external research teams in the specification of their samples and interpretation of results
- ZMF staff is part of the research activity ranging from the specification of the research project to (joint) publication

A key principle of most publicly funded research infrastructures is that access to them is defined as 'open access'. At European level, ESFRI infrastructures must apply an open access policy for non-proprietary[11] research, i.e. be open to all interested researchers, based on open competition and selection of the proposals evaluated on the sole scientific excellence by international peer review. At national levels, given that funding for national-level infrastructures mostly comes from national budgets, open access to research infrastructures supported by public funds is a widespread conditionality for funding. However, the exact conditions for access and obligations on beneficiaries of funding vary. For example, in Finland open access constitutes one of the key elements for the selection of proposals, and service availability to users should be guaranteed while in Sweden, research infrastructures must be used by multiple research groups or users at several higher education institutions (thus implicitly encouraging the institutions to open up their facilities). Poland is also 'encouraging' an Open Access approach to use of research facilities that were funded through Structural Funds. Up to 20% 'ancillary use' (e.g. use for commercial purposes) is permitted without any need to apply State Aid Rules. Polish PROs are now focused on developing methodologies to clearly demonstrate that either they are within the 20% limit, or that if they exceed it they have taken State Aid into consideration. Lithuania, who also made significant investment in to R&D facilities using structural funds is using Open Access to help them generate funds to maintain and repair the new equipment.

Once A PRO has decided why and how they will opening up their RI for a wider use, the time comes to define what such 'open access' means exactly.

Q4. Spectrum of access (Position of your organisation on the 2 axis of access)

Where does your facility sit along these two axes?

What RI do you offer?

What benefits of 'open access' to research infrastructures do you see for your organisation / country?

[11] Non-proprietary refers to scientific research for which the research results are published in the open scientific or technical literature. The research results are thus accessible to other interested parties.
Proprietary refers to research for which the knowledge, technical data and inventions generated during the scientific work are treated as proprietary by the user. Results are not published, in general.

1.6 Defining 'open access'

"Open access" needs to be clearly defined in order to avoid any confusion.

First, the term 'open access' (OA) should not be confused with the concept of open access to published research in scientific publications, in this case OA refers to unrestricted online access to articles published in scholarly journals, and also increasingly to book chapters or monographs.[12] Second, 'open access' does not necessarily mean 'free access'. Third, when talking about 'open access' the talk is about principles according to which access to research infrastructures is being offered. It is, therefore, quite sensible to talk about 'open access principles'.

There is no set definition of 'open access to research infrastructure'. The definition used by the European Strategy Forum for Research Infrastructure (ESFRI) can serve as an inspiration for other institutions and organisations in defining 'open access' to research infrastructures in their organisations and countries:

"Research Infrastructure is open to all interested researchers, based on an open competition and selection of the proposals evaluated on the sole criteria of scientific excellence by international peer review."

However, for many PROs who are trying to strengthen their third stream mission by working more strongly on innovation with local SMEs, Open Access to RIs can simply mean *making some R&D facilities 'available' to external users under clear, transparent and fair terms and conditions*.

Q5. Open Access at your organisation

How would you define 'open access' in the context of your organisation?

[12] For more information on open access to scientific publications see: http://www.openaire.eu

3. Creating Open Access policy / guidelines

A typical Open Access policy / guidelines could contain several items / clauses. The four key topics to consider and describe are

- users
- use of infrastructures
- contractual and legal aspects, and
- costs.

An example from Lithuania shows the key areas defined in the Open Access Centre Management Regulations adopted in 2010.

Example 4. Open Access Regulation in Lithuania

The Order No. V-852 "On Approval of Open Access Centre Management Regulations" of the Minister of Education and Science of 8 June 2010[13]

The regulation defines:

- Principles of formation, management and the manner of use of the resources
- Equipment use time ratio between types of users, maintenance costs, and the accumulation and investment of revenue generated
- Indicators of activity effectiveness
- Principles of intellectual property protection
- Provisions on solving disputes

2.1 Defining users of a research infrastructure

In the context of the RI topic, a traditional way to define users of RI is to split them into **internal** and **external** users.

Internal users can be all employees of a university / research institution that owns/manages that research infrastructure. These could be scientists of different level of seniority, post-doctoral researchers, technicians etc. In case a RI is part of a distributed network of research infrastructures, members of these network institutions are also defined as internal users. Students (PhD, Master programme level or even at Bachelor programme level) can be considered as internal users; however, certain considerations need to be made (as described later in the text).

External users, on the other hand, are all other users who wish to use a given RI but are not part of the university / research institution (or their network) that manages this research infrastructure. These users – both national and international – can be scientists and researchers from other universities / research organisations (outside the network in case a university / research organisations is part of a network), industrial users, NGOs, users from government organisations and individual citizens (e.g. when access to social sciences databases is needed for work). In short, all users who are not considered internal users will be external.

One caveat that needs special attention and discussion is **the inclusion of students** (especially at the Master and Bachelor programmes' level) into the user group. Students, of course, can be users of a PROs RI. However, it is important to decide if the same RI will be used for teaching, research and private orders. It is possible theoretically, but practically needs to be carefully considered and discussed. In many cases users from the private sector might decline services from an RI which is

[13] For an EN translation see https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.375571/asr.

being used by students, including for educational purposes (even under a tight supervision by a researcher/scientist).

The following example shows how use of RI resources is suggested under the Open Access Regulation in Lithuania. Use of resources in itself indicates possible user groups.

Example 5. Open Access Regulation in Lithuania

Use of resources:

- On a contractual basis implementing joint projects
- For practical use by PhDs or PhD students
- For ordered/requested research and/or experiments
- For ordered/requested jobs with the elements of the Open Access Centre resources

Q6. Current and future users

Who, in your opinion, are the users of your research infrastructure? Now and in the future?

Why? (or why not?)

- ❑ In-house university users?
- ❑ Other academic entities?
- ❑ Industrial users?

In answering remember the access axes.

2.2 Offering and managing access

Once it is clear who the potential users – both internal and external – of a RI are, a university / research organisation should design a process for offering and managing access to their facilities.

A first step in this process is to **decide what RI offers**, whether it has (or can offer) a standardised service/ product or whether it adapts its services to the requirements of the users. In answering these questions it will help to review the mission of an organisation that owns that RI. It can be fully focused on basic research, applied research or prioritise pure industry-focused interaction. In most cases – and especially in case of a university – it is often a combination of all three. Discussion on the mission of an organisation helps it to decide on its position along the access axes (as presented in previous sections).

An example from the Centre for NanoHealth at Swansea University in Wales in the UK shows how this open access facility presents itself as both research and service facility.

Example 6. Centre for NanoHealth, Wales, the UK

The Centre for NanoHealth is located within a Clinical and Biomedical research environment on a hospital site, giving access to patients and offering an integrated facility in which novel devices and sensors can be designed, manufactured, functionalised, tested and evaluated.

Opened in 2012 this open access facility with more than 50 academic staff "provides a technology and innovation base for industry and academia".

It offers a strong pool of expertise which is essential. This way a user can access e.g. engineer/physicist + clinician + biomedical scientist in order to discuss a project therefore needs some level of teamwork and external coherence to present a service to outside.

A non-academic business engagement team allows for a smoother interaction with users, not too familiar with too technical or too academic speak.

A second step in the process is to decide on **how the users apply and are selected** for access to a research infrastructure. For that a request and assessment a system needs to be set up. It should be transparent and available for the management of a unit responsible for a given RI as well as the management of a university / research organisation. This would not only allow tracking and processing of incoming request but could also be of use in scheduling the workload of the personnel (especially technicians) at a research infrastructure. Clear and precise workload scheduling and tracking will allow for a more precise understanding of the costs (see later sections).

A mix of different approaches in selecting internal and external users can be used:

- On a first-come/first-served basis
- On a basis of scientific excellence (peer-reviewed access) or another criteria of important (e.g. “technological pertinence” or “innovation potential”)
- Offering a fast-track access to prioritised users, e.g. to who generate the greatest revenue or those who have a long-term collaboration agreement with the owner of this research infrastructure
- Setting aside a proportion of RI time/resource for dedicated use by users coming from the organisation that owns this research infrastructure
- Setting aside a proportion of RI time/resource for industrial use on a full-time basis
- A “rapid access” mode for quick services that can be made using existing equipment and minimal manpower. This mode could bypass the standard proposal and review process and, because of this, should not exploit more than a small (e.g. 5%) of the research infrastructure’s total capabilities.
- “Discretionary equipment time” that could be decided by the head of the RI or a specific laboratory. The use of this access must necessarily be limited, but it can be especially useful in preliminary phases of a project, to establish basic feasibility.
- In case of external users, a “sample mail-in” mode can be implemented for routine experiments / services provided by a given RI that can be easily and quickly carried out by the facilities’ staff.
- Combination of various modes presented above.

An example from the Jagiellonian University in Poland shows modes of access chosen at their National Synchrotron Radiation Centre.

Example 7. National Synchrotron Radiation Centre SOLARIS at the Jagiellonian University, Poland

RI operating time is divided into experimental time, technical time and off time. Users may use the RI within the experimental time.

Experimental time is further divided into:

- “Open access” (for free)
- “guaranteed access” (for those entities which made in-kind or financial contribution in supporting the infrastructure)
- “commercial access” (for a fee)

The Centre may make the RI accessible to an external entity for remuneration. The access provided to the RI within the proprietary time window must not collide with the use of the RI within the open access time or the guaranteed time window.

A third step in the process is to set a system in place to **track the usage of a RI**. Unless required to allow the PRO to demonstrate that it is in-line with State Aid rules or the terms and conditions of the original grant used to fund equipment purchase, it does not need to be a complex system or a lengthy process but it should allow the owner of the RI track the type of usage (e.g. long-term research projects, short-term research projects, one-off experiments or measurements), types of usage per different type of user, frequency of usage by different types of users, level and intensity of usage, breakdown of users or types of project between different thematic areas, type of funding used by different users in getting access to the RI (i.e. if access was for a fee) etc. Collecting such information over time will longer-term allow to assess the effectiveness of RI activity.

Q7. Offering and Managing access for users

How would you select users of your research infrastructure?

Would you offer "guaranteed" and / or "prioritised" access? If yes, to which users and under which conditions?

If you are at capacity, do you prioritise your own research? the highest-paying research? the most scientifically important research?

Which elements around access to RI will you prioritise to track?

What types of RI usage indicators would be most beneficial for your organisation?

2.3 Contractual and intellectual property aspects

In order to avoid any misunderstandings an Open Access policy should describe various contractual and legal formalities linked to access to research infrastructure. A nature of the contractual links between the owner of the RI and the user should be clearly described in a contract, (or in some cases a different documentation, e.g. Memorandum of Understanding (MoU), can be used). In case of an external user it could be an internal university document specifying details related to the use of a given research infrastructure.

As an example, the Jagiellonian University in Poland specify 'terms and conditions of use' in their Rule of the Use of the RI of the National Synchrotron Radiation Centre SOLARIS.

Example 8. National Synchrotron Radiation Centre SOLARIS at the Jagiellonian University, Poland

The method and the detailed principles and procedures to be followed while submitting a proposal for the open access time shall be defined in the *terms and conditions of use* or each time on an individual basis in the announcement on an open call for proposals.

In terms of contracts for using RI on behalf of external users (e.g. carrying out testing or research), the owner of the RI should review each request for use of the infrastructure to ensure that:

a) the requirements, including the research methods to be used, are adequately defined, documented and understood;

b) the RI has the capability and resources to meet the requirements; capability means that the RI possesses the necessary physical, intellectual and information resources, and that the research infrastructure's personnel have the skills, expertise and equipment necessary for the performance of the research project;

c) the contract is acceptable to the research infrastructure.

One important element of the contract – and especially with external users – is **responsibility in case of equipment damage**. It is a common practice for an external user to designate a person responsible for ensuring that the RI is used correctly and with due care required in the given circumstances. Conditions on what happens in an unlikely event of equipment damage should be clearly specified.

Another important topic that should be described in the contract is around **ownership of the intellectual property** coming out of the research conducted with the help of a given research infrastructure. It becomes a core concern particularly when there is a need to negotiate contracts for use of equipment or conducting of contract research with a user from the private sector.

Different IPR policies can be put in places (or at least clauses in the Open Access Guidelines specified) for different kinds of users. Most typically, the biggest difference is between an internal and an external user and what type of access to a RI they had. In case of open access which is offered free of charge,, the rights to intellectual results and industrial goods produced by the external user typically continues to be the intellectual property of the external user unless otherwise specified in other resolutions. In case of proprietary access (which is offered for remuneration), the property rights to intellectual goods and industrial goods produced by external user within the proprietary time are determined in the agreement concluded between the owner of the RI and the external user.

Issues of **confidentially and acknowledgments** should also be explicitly outlined in the contract. Confidentially of performed research is typically a well-understood and accepted topic and accepted without any concerns or problems. Whereas the issue of acknowledgments is still widely discussed. The contract between an owner of a RI and a user should clearly describe how the use of a given research equipment will be described and acknowledged. In case of a publication, for example, it could be done by explicitly stating which experiment was performed using which piece of equipment. The contract should also state how the RI personnel (incl. technical staff) will be mentioned / acknowledged in a resulting publication or any other documentation.

Q8. Contractual and intellectual property aspects

What type of contract would your organisation sign with a user of your research infrastructure?

Can your organisation's typical contracts be used for that or should more specific contract be prepared?

Does your organisation typical IP management contract be used for research infrastructure?

What rules do you have at your organisation for acknowledging the use of various facilities and support staff in contractual research?

2.4 Costing and pricing

Costing and pricing – although different – are intimately linked concepts.

The RI management team must be able to calculate as precisely as possible **current operating costs and future reinvestment** needs as part of their financial planning. The costs should include directly incurred costs (e.g. research staff; technical and clerical staff costs; non-staff costs such as consumables, equipment purchase, etc.); directly allocated costs (e.g. principal and co-investigators' time and costs, estates costs, charges for laboratory technicians and major research facilities); and indirect costs, e.g. cost of capital employed.

When a RI is in **receipt of EU Structural Funds** support there may be a need to respect specific cost eligibility rules set by the national authorities, in line with the ERDF regulation. If the RI also secures awards from other European programmes (e.g. Horizon 2020) there will be a need to ensure strict cost-accounting to ensure that both sources of funding can be separately accounted for and that, currently, different rules on eligible costs and financial report are respect.

Moreover, **State Aid rules** need to be respected when providing services or access to the infrastructure to private users requires. This may involve keeping a log of firms that have used the equipment and the fees or costs charged to them in order to show that the firm was charged commercial rates (at least marginal cost) or where the service was provided at less than cost or for free to declare the support under the *de minimis* procedure. It may also be necessary to demonstrate that the '20% ancillary use' limit has not been broken or, if it has, that the resulting support was fully in line with State Aid Rules.

Managing for the depreciation, and subsequent replacement, of installed equipment is a core issue that is handled across the countries reviewed in diverse manners with differential rates of support from funding agencies. RI need to ensure their level of annual investment in asset maintenance, renewal and replacement meets generally accepted norms. For instance, in the UK university sector, the norm for buildings renewal and replacement is in the region of 4-5% of current replacement cost. In Flanders (Belgium), in principle a fixed depreciation period of five years is assumed, with the exception of ICT equipment (hardware and software) where the depreciation period is set at three years. In the framework of the Hercules Foundation, the calculation of the depreciation period is carried out in conformance with the rules of the institution of the promoter.

For such reasons, there is a need for a proper cost-accounting procedure that allows the management of the RI to take operational decisions on costs charged on to users and to ensure that in the longer-term the equipment can be maintained and re-investment costs covered.

An example from the UK shows that higher education and research institutions are obliged to recover full economic cost or a proportion thereof, which is generally significantly different from the marginal cost option.

Example 9. Charge out rates for major research facilities in the UK

In the UK, the TRAC (Transparent Approach to Costing) rules provide that the cost of equipment, including major research facilities, should be directly allocated to research projects. This means that it should not appear in the indirect cost rate. A research facility can be a single piece of equipment, or a group of equipment. Major research facilities include specialist animal facilities, greenhouses, and specialist IT research facilities.

The TRAC rules suggest an approach to calculating the charge-out rate for a research facility.

https://www.trac.ac.uk/tracguidance/

Being able to calculate the cost of making RI facilities available and of equipment usage (including the longer-run recovery of capital investment costs that went into purchasing this research infrastructure) is clearly a key determinant in price setting. However, other factors than cost recovery may come into play when a RI owner or manager is considering the price to set for usage of the facilities. In some cases, the owner institution may consider that they have a strategic vested interest (e.g. for post-graduate teaching or in line with strategic research objectives) in maintaining the infrastructure and decide to fix prices for usage that do not recover 100 per cent of direct operating costs. In others, the public funding agency may decide to subsidise access to facilities to encourage mobility of researchers, interdisciplinary research, or from an equipment capacity utilisation optimisation perspective, etc.

In terms of access policies, one option is that RI should be made accessible to publicly funded researchers on the basis of merit at no more than marginal cost. Marginal costs can be defined “the cost of accommodating one additional user at the facility. In most instances, this will equate to the avoidable costs related to that extra user, such as consumables and any additional support staff”. However, this definition can vary depending on the nature of funding that goes in to the operating costs of research infrastructures.

An example of the Nuclear Magnetic Resonance facility in the UK shows their differentiated fee rates for access.

Example 10. Nuclear Magnetic Resonance facility, England

NMR is a scientific facility that provides researchers from across the United Kingdom with access to powerful magnets and robotics for molecular research. Over £10m has been invested to acquire and house the latest NMR technology, including the UK’s only 900 MHz spectrometer and cryogenic probe which provides the highest sensitivity and resolution available.

Access to each spectrometer is charged based on hourly login time to cover essential running costs.

A low academic fee is charged since academic uses are largely cost driven, and represents approximately 5% of the total direct costs of an average NMR-based academic research grant. The academic user fees are kept as low as possible to stimulate initial demand.

Equal fees are charged to all academic users to provide equitable access. However, there is a rational system of user prioritisation which is based upon the source of funding.

Free access is offered to UK-based academic users for as long as operating costs covered by the grant. When this support is insufficient, users will be charged the lowest possible fee to cover cryogen and repair costs. When this support is over, fee waivers for newly established investigators at UK universities are available upon application to gain access to some instruments. This is to allow them to generate preliminary NMR data to apply for grants.

Subsidised access is offered for non-profit users by external funds and University support.

Industrial users are technology and service driven, and are generally willing to pay for the real and reasonable costs **if** quality, turnaround, data security and IP issues are satisfactorily addressed. Industrial users have access to a maximum of 10% of time and charged internationally competitive rates that are calculated to cover unsubsidised running costs.

Lower introductory rates offered to entice new and collaborative users during the initial period of operation in order to build user demand and optimise services.

A fee for a dedicated operator assistance for training, NMR experiment set-up, optimisation, remote access & data processing is charged.

The NRM facility is also offered for rent by external groups for small scientific meetings, computer workshops, etc.

Q9. Costing and pricing

What is the cost structure at your research infrastructure?

What are the real costs of running your research infrastructure?

How do you measure the access unit cost (e.g. cost incurred for one hour of access)?

How do you charge (or calculate) your RI usage? For example, in hours based on 8-hour cycle, 24-hour cycle, capacity usage or other?

4. Summary and key points to remember

In summary, there are a number of key considerations that need to be made when preparing Open Access principles / guidelines for access to a research infrastructure. These include:

- Research infrastructures range from large scale multi-functional and multi-dimensional facilities to a single instrument for a specific research.
- Any laboratory and equipment within a university / research organisation is a RI and can be offered for open access by users.
- Open access has numerous benefits and is an integral part in modern day research environment.
- Each university / research organisation should have an up-to-date inventory of their research infrastructures and principles of Open Access clearly described.
- ‘Open access’ does not mean ‘free access’.
- RI can be used by numerous groups of users, both from within and outside the organisation that hosts/owns a specific research infrastructure.
- Use of RIs by students (especially at the Master and Bachelor programme’s level) should have a special attention as this may affect commercial use.
- A clear offering of services by a RI should be prepared, thus making it easier for potential users to understand what can be and when from the facility.
- User application and assessment process should be clearly defined. The latter is linked to the mission of the research organisation and its position on the access axes.
- Depending on the mission and strategic decision, it is possible to prioritise some users, i.e. SMEs or those companies which have signed strategic cooperation agreement.
- Usage tracking system should be put in place. These will not only be helpful in planning the workload of the RI but may also be needed to comply with State Aid Rules or with the conditions of the original grant. Tracking will also be beneficial in the longer-term in assessing the effectiveness of the RI and the results and impacts it generates.
- Obligations of both the users and a RI (as well as its hosting organisation) should be clearly described in a contract (or a similar document). Apart from the typical contractual clauses, some of the key points include ownership of Intellectual Property, confidentially and acknowledgements.
- Costing and pricing of RI are governed by different concepts.
- The costs of running a RI as well as various services provided at this RI should be carefully calculated. All possible costs and rules need to be taken into account, including in case of the receipts of Structural Funds.
- State Aid rules and VAT rules need to be respected.
- Access fees for RIs can vary (from free to a fee) but are easy to set once the costs of a RI are known.

Annex 1: Definitions

EC definition of RIs

The Directorate-General for Research European Commission defines **Research Infrastructures** as[14]

"research infrastructure" means facilities, resources and related services that are used by the scientific community to conduct top-level research in their respective fields and covers major scientific equipment or sets of instruments; knowledge-based resources such as collections, archives or structures for scientific information; enabling Information and Communications Technology-based infrastructures such as Grid, computing, software and communication, or any other entity of a unique nature essential to achieve excellence in research. Such infrastructures may be "single-sited" or "distributed" (an organised network of resources)."

It includes:

- Major equipment or group(s) of instruments used for research purposes;
- Permanently attached instruments, managed by the facility operator for the benefit of researchers, industrial partners and society in general;
- Knowledge-based resources such as collections, archives, structured information or systems related to data management, used in scientific research;
- Enabling information and communication technology-based (ICT) or 'e-infrastructures' such as Grid, computing, software and communications;
- Any other entity of a unique nature (incl. laboratory / equipment) that is used for scientific research.

Such infrastructures include singular large-scale research installations, collections, special habitats, libraries, databases, biological archives, clean rooms, integrated arrays of small research installations, high-capacity/high-speed communications networks (e.g. GÉANT), networks of computing facilities, research vessels, satellite and aircraft observation facilities, coastal observatories, telescopes, etc.

Interdisciplinary Research

The US Committee on Facilitating Interdisciplinary Research, Committee on Science, Engineering, and Public Policy (2004) defines interdisciplinary research as[15]

> " a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice."

[14] European Commission: Legal framework for a European Research Infrastructure Consortium – ERIC Practical Guidelines, DOI: 10.2777/79873. This definition of "research infrastructure" corresponds to the one used for the research infrastructure action within the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007-13).

[15] Committee on Facilitating Interdisciplinary Research, Committee on Science, Engineering, and Public Policy (2004). Facilitating interdisciplinary research. National Academies. Washington: National Academy Press, p. 2.