

# ESFRI Landscape Study

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## Introduction

The ambitions of OPERAS to provide pan-European infrastructure and services for open access to social science and humanities research requires widespread co-ordination and support, as well as funding from supporting countries. This can best be achieved by application to the Roadmap of the European Strategy Forum on Research Infrastructures (ESFRI) which supports the development and implementation of mature pan-European research infrastructures. This study will describe the purpose, origins and development of ESFRI, and will introduce some of the projects and landmarks already on the ESFRI Roadmap that bear similarities with OPERAS. It will also describe the typical lifecycle of an ESFRI project, and the governance and legal structures that have typically been adopted by other ESFRIs, in order to help inform the OPERAS consortium in its application to the ESFRI Roadmap.

## 1: ESFRI Background Information

The European Strategy Forum on Research Infrastructures (ESFRI) is a strategic organisation first launched in 2002 to develop the scientific integration of Europe and to strengthen its international outreach. Competitive open access to high-quality Research Infrastructures supports and benchmarks the quality of the activities of European scientists, and attracts the best researchers from around the world. (ESFRI website: <http://www.esfri.eu/about>) ESFRI selects a limited number of projects with a high degree of maturity, that enhance European science and innovation competitiveness. Research Infrastructures of pan-European relevance provide unique opportunities for world-class research and training as well as stimulating knowledge and technology transfer, in brief for European capacity building. ([https://ec.europa.eu/research/infrastructures/pdf/esfri/esfri\\_roadmap/roadmap\\_2006/esfri\\_roadmap\\_2006\\_en.pdf](https://ec.europa.eu/research/infrastructures/pdf/esfri/esfri_roadmap/roadmap_2006/esfri_roadmap_2006_en.pdf))

### 1.1 Purpose

ESFRI identifies Research Infrastructures (RIs) to meet the long-term needs of Europe's research communities across all scientific areas. ESFRI designs Roadmaps every two years that provide a coherent and strategic vision to ensure Europe has excellent RIs accessible to all leading researchers. (ESFRI Roadmap 2016) Via ESFRI, national commitments to the implementation of the Roadmap are ensured, and advice and guidance on overcoming legal, technical and financial obstacles to implementation is provided. (ESFRI Roadmap 2018)

ESFRI's key objectives are to:

- to support a coherent and strategy-led approach to policy making on research infrastructures in Europe;
- to facilitate multilateral initiatives leading to a better use and development of research infrastructures acting as an incubator for pan-European and global research infrastructures;
- to establish a European Roadmap for research infrastructures (new and major upgrades, pan-European interest) for the coming 10-20 years, stimulate the implementation of these facilities, and update the Roadmap as the need arises;

- to ensure the follow-up of implementation of already ongoing ESFRI projects after a comprehensive assessment, as well as the prioritisation of the infrastructure projects listed in the ESFRI Roadmap. (ESFRI Roadmap 2016)

## **1.2 Origins and development**

Since ESFRI was set up in 2002 as an informal forum following a mandate of the EU Council of June 2001, it has developed five roadmaps (2006, 2008, 2020, 2016, 2018) which have each time seen an increase in the number of projects as well as development of the programme itself, based on reviews of progress of existing projects, in order to continuously improve the system.

One of the key reasons for setting up ESFRI was a recognition that Europe's centres of research excellence often failed to reach critical mass. By bringing resources together, ESFRI's goal is to build a research and innovation area equivalent to the 'common market' for goods and services.

([https://ec.europa.eu/research/infrastructures/pdf/esfri/esfri\\_roadmap/roadmap\\_2006/esfri\\_roadmap\\_2006\\_en.pdf](https://ec.europa.eu/research/infrastructures/pdf/esfri/esfri_roadmap/roadmap_2006/esfri_roadmap_2006_en.pdf))

Further, the importance of planning future large-scale research infrastructures on timescales approaching one or two decades was recognised. While there are national roadmaps that plan their aspirations on a 10-20 year timescale, many of these will be funded and managed as European facilities so ESFRI proposed a synthesis of such activities to coordinate international activities.

## **1.3 Operation and governance structure of ESFRI**

ESFRI meets around four times a year and its key role is to oversee, analyse, enhance, make recommendations and assess ESFRI projects, in order to shepherd them on the Roadmap from the point of acceptance to realisation.

ESFRI is overseen and informed by a number of special interest working groups and strategic working groups. The special interest working groups include Investment Strategies in e-Infrastructures, Long-term Sustainability, Innovation and Implementation. The strategic working groups oversee key subject categories under which ESFRI projects fall. (<http://www.esfri.eu/working-groups>)

## **1.4 Development and implementation**

European RIs usually develop their scientific case and technical design at a national level, or through 'Design Study' contracts under the EC Framework Programmes (FPs). Once admitted on to the ESFRI Roadmap, the Projects become eligible for competitive 'Preparatory Phase' contracts devoted to the refinement of the technical design, development of the governance, definition of legal status and financial sustainability, leading to the start of the implementation phase. A firm agreement by the stakeholders to proceed to the adoption of a legal status engages substantial funding for implementing the RI. (Lifecycle of a Research Infrastructure, ESFRI Roadmap 2016, [https://ec.europa.eu/research/infrastructures/pdf/esfri/esfri\\_roadmap/esfri\\_roadmap\\_2016\\_full.pdf](https://ec.europa.eu/research/infrastructures/pdf/esfri/esfri_roadmap/esfri_roadmap_2016_full.pdf))

As seen from some of the case studies below, ESFRIs take a varying length of time to progress from entry onto the Roadmap, through Preparatory Phases towards Implementation. During the Preparatory Phase the members of the RI agree such matters as infrastructure, governance status, legal status, operational procedures, business plan and funding. ESFRIs typically take between three and seven years to go through the implementation phase, and many also use this time to prepare for the establishment of the legal entity ERIC (European Research Infrastructure Consortium).

## 2: ESFRI Projects and Landmarks

There are currently 21 ESFRI Projects and 29 ESFRI Landmarks. ESFRI Landmarks are the RIs that were implemented or started implementation under an early ESFRI Roadmap and are now established as major elements of competitiveness of the European Research Area, successfully implementing their operation and effectively advancing in their construction.

The ESFRI subject categories are: Energy, Environment, Health and Food, Physical Sciences and Engineering, and Social and Cultural Innovation. OPERAS will fall into the Social and Cultural Innovation category, in which there is currently one ESFRI Project (E-RIHS – European Research Infrastructure for Heritage Science) and five ESFRI Landmarks: CESSDA, CLARIN ERIC, DARIAH ERIC, ESS ERIC, and SHARE ERIC.

The Social and Cultural Innovation SWG (Strategic Working Group) proposes possible solutions related to RIs that are able to help tackle the Grand Challenges facing society, such as health or demographic change, or the ‘Inclusive, innovative and secure societies’ challenge from the third pillar of Horizon 2020, called ‘Tackling societal challenges’. It establishes possible methods through which social sciences and humanities could be used as an evaluation criterion for the activity of other RIs in the ESFRI roadmap (e.g. social impact). It also explores how RIs can contribute to social innovation or better knowledge transfer towards society. (<http://www.esfri.eu/working-groups/social-and-cultural-innovation>)

### 2.1 Social and Cultural Innovation category (ESFRI Roadmap 2016)

The following ESFRIs are also Distributed RIs. Below are brief descriptions of the main activities of each, with some details of their timeline for development and their governance structures.

- E-RIHS – European Research Infrastructure for Heritage Science  
Supporting research on heritage interpretation, preservation, documentation and management, E-RIHS will comprise fixed and mobile national infrastructures of recognised excellence, physically accessible collections and archives and virtually accessible heritage data. It entered the Roadmap in 2016 and its preparation phase will last until 2019, construction phase 2020-21, and operation start in 2022. It is a distributed RI with numerous participating countries, centrally coordinated from Italy. Due to the nature of the materials being studied, such as artefacts and artworks, the national centres are of key importance, and some are setting up their own Distributed RIs at national level, such as that in the UK.

This research area was identified as suffering from fragmentation, duplication of efforts and isolation of small research groups, putting at risk the competitive advantage of European heritage science. To address this, E-RIHS will provide state-of-the-art tools and services to cross-disciplinary research committees to advance understanding and preservation of global heritage. Key features are:

- Cutting-edge scientific infrastructures, methodologies, data and tools
- Training
- Public engagement
- Access to repositories for standardised data storage, analysis and interpretation

- CESSDA – Consortium of European Social Science Data Archives

This large-scale, integrated and sustainable platform provides access to research data from archives across Europe. It entered the Roadmap in 2006 and started operation in 2013. Norway is its coordinating country and its legal status is a Norwegian Limited Company. There are 14 members of CESSDA and it brings together social science data archives across Europe, with the aim of facilitating social, economic and political research. Members of CESSDA nominate a national service provider and CESSDA integrates the work of the service providers by establishing a one-stop shop for data location, access, analysis and delivery.

CESSDA plays an active role in the development of standards and encourages and facilitates the use of metadata standards for documenting and publishing the existing inventories of research data available from national as well as cross-national data resources in Europe. Its overall ambition is to organise a range of data collections and to coordinate common activities across different national institutions. The institutions will function as a network in a flexible technical architecture, using standard open protocols and interfaces, designed to contribute to the emerging European and global information commons.

The overarching vision of CESSDA is to develop a system for data service provision that is open, extensive and evolvable, and provide a single interface to thousands of unique datasets from social science data archives across Europe. In this way, it will widen access to data, permitting European comparative research.

- CLARIN ERIC – Common language resources and technology infrastructure

CLARIN provides easy and sustainable access for scholars in the humanities and social sciences to digital language data and advanced tools to discover, explore, exploit, annotate, analyse or combine them. CLARIN is building a networked federation of language data repositories, service centres and centres of expertise, with single sign-on access for all members of the academic community in all participating countries. Tools and data from different countries are interoperable so that data collections can be combined and tools from different sources can be chained to perform complex operations to support researchers. It integrates existing data and service centres without major capital investments.

It entered the Roadmap in 2006 and started operation in 2006 and its construction phase took place between 2011 and 2015. It is a distributed RI based in the Netherlands with numerous participating countries.

It provides a range of services including (<https://www.clarin.eu/content/services>):

- Clarin Portal
- Depositing services
- Virtual language observatory
- Web services and applications
- Virtual collections
- Language resource inventory
- Consulting services

In addition to the services it provides, CLARIN participates in the development of courseware and organises workshops and data camps to stimulate the uptake and increase the insight in the usability of the services.

CLARIN stimulates the re-use of available research data, thereby enabling scholars in SSH to increase their productivity and open new research avenues in and across disciplines that address multiple societal roles of language. Working with CLARIN data and tools will increase the skills levels for data analysis among new generations of SSH students, which will be welcomed by the data science sector.

CLARIN governance (<https://www.clarin.eu/content/governance>)

- General Assembly with representatives from ministries of the member states
- Scientific Advisory Board
- Board of Directors for day-to-day operations
- National CLARINs
- Standing Committee for CLARIN technical centres
- National Coordinators Forum

- DARIAH ERIC – Digital Research Infrastructure for the Arts and Humanities

DARIAH is a network of people, expertise, information, knowledge, content, methods, tools and technologies from various countries that develops, maintains and operates an infrastructure to support ICT-based research practices. It operates a Europe-wide network of Virtual Competency Centres.

Its key services and features are:

- Shared technology platform
- Scholarly content management
- Advocacy, impact and outreach
- Provides seminars and research and education activities
- Offers teaching materials and teaching opportunities to develop digital research skills

It provides impact by demonstrating how traditional humanities research skills play a prominent role in the digital age, and how such skills can be deployed in a commercial setting. It entered the Roadmap in 2006, its preparation phase was 2008-2011, construction 2014-2018, and plans to start full operations in 2019. It became an ERIC in 2014.

DARIAH governance (<http://www.dariah.eu/about/organisation.html>)

DARIAH has 17 members from EU member countries. Its governance structure is organised as follows:

- General Assembly
- Board of Directors
- Senior Management Team
- Scientific Board
- DARIAH Co-ordination Office
- National Coordinators Committee
- Joint Research Committee
- Virtual Competence Centres
- Working Groups
- Cooperating Partners
- Affiliates

### 3: Governance and legal status

In 2016 an ESFRI Exchange of Experience Workshop took place in Amsterdam, which resulted in a report offering general advice to current ESFRI projects and landmarks as well as descriptions by the individual ESFRI projects about some of the challenges they have met in the process of development.

[http://www.esfri.eu/sites/default/files/u4/StR-ESFRI-1st-EoE-Report\\_23-11-2016\\_final\\_0.pdf](http://www.esfri.eu/sites/default/files/u4/StR-ESFRI-1st-EoE-Report_23-11-2016_final_0.pdf))

The general advice coming from the workshop was summarized as follows:

**Governance:** Keep the governance simple but robust and carefully define the role of scientific, managerial and legal responsibilities; carefully define business models at a very early stage; have a clear agreement about the services the infrastructure will offer and a clear definition of its target group; ensure processes and mechanisms are in place to be able to operate effectively during the interim phase while governance and legal structures are being put in place.

Several individual ESFRIs emphasized that the preparatory phase was long and complex and the governance structure that emerged by the end of the process was very different from the original ideas. Many also focused on the need for clarity of roles, and the need to identify clear roles and responsibilities among the partners. Some also noted the difference in time for different member states' ratification processes and the challenges that had brought, and identified the need for clarity regarding the balance in decision-making between the European and local levels in



order to avoid a lack of framework or loss of momentum. A task force was recommended for the preparatory phase to assist the national nodes in their application processes.

**Funding:** Governance and funding are inherently connected; clear processes are needed for well-balanced cash and in-kind contribution, management and control mechanisms; there needs to be a co-ordinated approach between management authorities who understand the project as a whole and the interdependence of national and European funding programmes and the nodes of distributed RIs planning to make use of structural funds; funding management questions should not put burdens on the competitive character of the research infrastructure.

Several individual ESFRI projects also commented on the different funding perspectives between countries, with some understanding better than others the need for long-term funding commitments. Some also highlighted the need for a funding strategy, a clear investment proposition to ensure delivery of the work packages. Identifying key performance indicators in funding proposals and measuring them during the preparatory phase was considered crucial by some projects.

**Legal:** Involve legal services and expertise at an early stage; get informal feedback from the European Commission at an early stage; consider other legal statuses as well as ERIC.

**ERIC:** Keep close contact with the national ministries as early as possible; involve the finance ministries at an early stage to make sure they will allow tax exemptions; ensure a clear perspective of getting long-term funding.

### **3.1 Legal requirements and options for distributed RIs**

ESFRI projects typically establish an interim legal entity during their preparation phase, and many then progress to the ERIC (European Research Infrastructure Consortium) legal entity, which was specially developed for European RIs. The different options for legal entities and the topics they need to cover are described in more detail below.

The ESFRI Roadmap 2018

([http://www.esfri.eu/sites/default/files/docs/ESFRI\\_Roadmap\\_2018\\_Public\\_Guide\\_f.pdf](http://www.esfri.eu/sites/default/files/docs/ESFRI_Roadmap_2018_Public_Guide_f.pdf)) lays out the legal requirements for distributed RIs very clearly as follows. A distributed RI is characterised as having a Central Hub and interlinked National Nodes and needs to:

- have a unique specific name and legal status and governance structure with clear responsibilities and reporting lines, including international supervisory and appropriate external advisory bodies;
- have legally binding attributions of coordination competences and resources to the Central Hub;

- identify and agree upon relevant and measurable Key Performance Indicators (KPI) addressing both excellence of scientific services and sustainability of operation;
- have a human resources policy adequate to warrant the necessary competences for the effective operation of the Central Hub and to support the user's programme, and to encompass hiring, equal opportunities, secondments, education and training;
- define a joint investment strategy aimed at strengthening the RI through the Nodes and common/shared facilities. (ESFRI Roadmap 2018: [http://www.esfri.eu/sites/default/files/docs/ESFRI\\_Roadmap\\_2018\\_Public\\_Guide\\_f.pdf](http://www.esfri.eu/sites/default/files/docs/ESFRI_Roadmap_2018_Public_Guide_f.pdf))

### *3.1.1 The national 'nodes'*

Distributed RIs are usually organized into National Nodes around a Central Hub. The capacity and amount of resources devoted to the RI must be clearly identified, coordinated and managed by the Central Hub according to agreed statutes and common rules and procedures of the RI consortium, even though the Nodes may be only partially absorbed by the distributed RI maintaining their national or institutional programmes.

The distributed RI must assign optimal personnel capacity and coordinating power to the Central Hub in order to demonstrate a high level of integration of the National Nodes. Examples of high integration include for example a unique portal with thorough explanation and guidance towards the common access policy; harmonised and coherent IPR & data policies; adequate central resources; procurement and upgrading of technological infrastructure; human resources policy allowing for staff exchange and secondment. It must also display added value compared with the merits of a research cooperation network open to external use. The Central Hub therefore must represent a truly international organisation capable of operating with a high level of efficiency and mediating across different scientific cultures. (ESFRI Roadmap 2018: [http://www.esfri.eu/sites/default/files/docs/ESFRI\\_Roadmap\\_2018\\_Public\\_Guide\\_f.pdf](http://www.esfri.eu/sites/default/files/docs/ESFRI_Roadmap_2018_Public_Guide_f.pdf))

### *3.1.2 What a legal document should contain*

Independent of the legal form the RI chooses to adopt, the basic legal document should contain the following elements:

- The frame of agreement
- The scope and objective
- The governance and management
- The seat
- The resources and commitments
- General provisions
- The option for internal regulations to regulate the functioning of the consortium (monitoring, adjustments, winding-up)

Different legal entities are chosen depending on the type of Research Infrastructure. These include arrangements for commercial entities, European consortia, national organisations, associations, and foundations. OPERAS needs to adopt a legal status that reflects its international nature, and one of the legal entities that would be suitable for the circumstances of OPERAS during its preparatory phase, and which has been adopted by other ESFRIs, is a Belgian legal arrangement called an AISBL (Les Associations Internationales Sans But Lucratif – International Non-Profit Association).

The key features of an AISBL are:

- The location in Belgium considering the neutrality of this country towards the partners of the RI
- Constitute a suitable transitional legal structure on the way to ERIC
- No initial capital needed
- Flexibility when defining the Articles of Association
- Limited liability
- Full legal personality
- Tax exemption
- Fast creation/foundation process (about two months after submission to Belgian Ministry)
- International image and European character
- Flexible governance structure, reallocation of shares, non-profit status and benefits
- Personnel regulations that can be applied to all kinds of employees and allow for staff prerequisites
- Needs a statute in French language
- Head address must be in Belgium
- Not suitable for big investments
- Members may not receive monetary benefits from the association

The ELIXIR ESFRI has drawn up a Consortium Agreement for its preparatory phase which covers the following:

- Objectives and tasks of the infrastructure
- Membership
- Obligations of the Members
- Governance structure (mission and powers of the governance bodies)
- Finance
- ELIXIR Nodes (e.g. selection and evaluation process of Nodes)
- Intellectual Property
- Liability
- Entry into force
- Duration and evaluation of the infrastructure, etc.

### *3.1.3 ERIC*

In the longer term, the most beneficial legal arrangement associated with Distributed RIs at an advanced stage of development is ERIC (European Research

Infrastructure Consortium). A number of ESFRI Landmarks have successfully established an ERIC. ERICs were developed in 2009 in response to the need for a legal framework for global entities like Distributed RIs. The main features include:

- High political acceptance and visibility
- Especially designed for pan-European research organizations
- Very favorable solutions for the issue of the European non-profit character of the organization can accommodate its distributed nature
- Tax exemption
- Very flexible internal structure which is also not based on national law
- Funding might be safer due to internationally binding contacts
- Financial support pro community easier
- Easier for entity to get national funding
- Short regulation
- Limited economic activities are allowed
- No national privileges

### **3.2 Governance models**

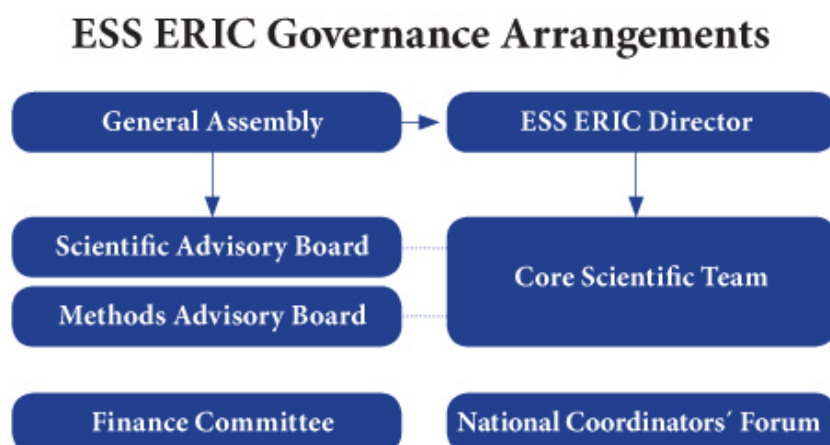
The options for the governing structure are linked to the selected legal form (if there is one), and some of the governance models for existing ESFRI projects have been described above. Many ESFRIs advise that it is best to set up a governance structure during the preparatory phase that can easily transfer to an ERIC. A common governance model used among the Distributed Research Infrastructures, regardless of the category or the type of legal form, incorporates a governing body (such as a general assembly) representing the collective interests of the partners and that is the ultimate decision-making body, a director (or Board of Directors) in charge of implementing the decisions of the governing body, and an executive management (secretariat) in charge of operating the infrastructure. Operating the infrastructure is often undertaken by National Nodes. (International Distributed Research Infrastructures: Issues and Options, OECD Publications, 2013 <https://www.oecd.org/sti/sci-tech/international-distributed-research-infrastructures.pdf>)

The governance structure often also includes a 'Heads of Nodes' Committee and a Scientific Advisory Board, made up of leading academic experts in their field and which is usually an independent body offering scientific expertise to the General Assembly or main governing body. In some cases, Members of the General Assembly are represented by a National Representative (National Representatives are from the Ministries or Research Councils) – this is the case for the ELIXIR ESFRI.

National Nodes enter into a collaboration agreement with the Central Hub and their role is usually to provide the delivery of technical services. Each National Node is usually hosted by an institute that has its own legal personality and provides a defined set of services on behalf of or for the Central Hub. In some ESFRIs, National Nodes are only accepted into the RI after successfully passing a selection process. Nodes usually provide services that are important on a European or global level and which have an added value for the ESFRI. (<https://www.elixir-europe.org/about->

us/governance/)

An alternative structure is that of the European Social Survey, which does not have National Nodes but has a National Representative from member states on its General Assembly, usually a Minister, and then has a Core Scientific Team of seven (a bit like OPERAS Core Group) and four Deputy Directors from among the institutions in the Core Scientific Team. In addition to the General Assembly, ESS also has Scientific Advisory Board, Methods Advisory Board and Finance Committee.



**Table 1: ESS ERIC Governance structure**

The MIRRI ESFRI has also opted for a lean governance structure, as follows: The Assembly of Members is the decision-making body of MIRRI-ERIC and is composed of delegates of all Members and Observers of MIRRI-ERIC. It decides the strategic developments and governance of MIRRI as a research infrastructure.

The Advisory Board evaluates the activities of MIRRI-ERIC and advises the Assembly of Members with regard to proposals of the Executive Director on the implementation of the MIRRI-ERIC Work Program. It is an independent body of distinguished scientists or experts in the fields of science, ethics and business appointed in their own right and reflecting the relevant application areas of MIRRI-ERIC.

The Executive Director is the legal representative of MIRRI. He/She will lead and administrate the MIRRI legal entity including the Central Coordinating Unit (CCU), which is the central executive management office for the MIRRI-ERIC. The Executive Director will be assisted in performing his/her managerial functions by staff of the CCU.

The operative level of MIRRI-ERIC is built by the National Coordinators Forum and the mBRC Directors Forum. The National Coordinators Forum consists of all National Coordinators of MIRRI-ERIC. This Forum shall implement the directions and decisions

taken by the Assembly of Members, as well as the counsel from the Advisory Board, at the level of the Partners and their national institutions. One of its members will be appointed as Chair, being the main contact person for the Executive Director in terms of reporting National Nodes' activities.  
(<http://www.mirri.org/legaldocuments.html>)

## 4: Conclusions

Establishing an ESFRI is a lengthy and complex process that requires considerable planning and preparation, and there are a number of models and options for legal status and governance that need to be considered. ESFRI is looking for projects that can demonstrate that they will be more effective as a Distributed RI on the ESFRI Roadmap than they would simply as a consortium. Clear demonstration of significant communities that require the services of the project, along with maturity and having clear business plans and funding in place are key characteristics of successful ESFRI projects.

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State of Play of the Implementation of the Projects on the Esfri Roadmap 2010

ELIXIR: <https://www.elixir-europe.org/about-us/governance/faqs>

Emphasis project: relationship between the central hub and the national nodes:

<https://emphasis.plant-phenotyping.eu/index.php?index=59&type=4>

ESFRI Annual Report 2016

[http://www.esfri.eu/sites/default/files/docs/ESFRI%20Annual%20report%2016\\_web.pdf](http://www.esfri.eu/sites/default/files/docs/ESFRI%20Annual%20report%2016_web.pdf)

ESFRI Exchange of Experience Workshop Report 2016

[http://www.esfri.eu/sites/default/files/u4/StR-ESFRI-1st-EoE-Report\\_23-11-2016\\_final\\_0.pdf](http://www.esfri.eu/sites/default/files/u4/StR-ESFRI-1st-EoE-Report_23-11-2016_final_0.pdf)

ESFRI Roadmap 2016

<http://www.esfri.eu/roadmap-2016>

The ESFRI Roadmap 2018

([http://www.esfri.eu/sites/default/files/docs/ESFRI\\_Roadmap\\_2018\\_Public\\_Guide\\_f.pdf](http://www.esfri.eu/sites/default/files/docs/ESFRI_Roadmap_2018_Public_Guide_f.pdf))

Guidelines for ERIC application

[https://ec.europa.eu/research/infrastructures/pdf/eric\\_en.pdf#view=fit&pagemode=none](https://ec.europa.eu/research/infrastructures/pdf/eric_en.pdf#view=fit&pagemode=none)

*International Distributed Research Infrastructures: Issues and Options*, OECD Publications, 2013

<https://www.oecd.org/sti/sci-tech/international-distributed-research-infrastructures.pdf>

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