



Strategy Report on Research Infrastructures

ROADMAP 2021

Public Guide



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25th September 2019

FOREWORD

ESFRI, the European Strategy Forum on Research Infrastructures, is a strategic body established in 2002 by the Council of the European Union to support a coherent and strategy-led approach to policy making on Research Infrastructures in Europe. Since then ESFRI has completed the ESFRI Roadmap 2006, 2008, 2010, 2016, 2018 while the further one is foreseen for 2021. The Roadmap contains probably the best European science facilities based on a thorough evaluation and selection procedure. The Roadmap combines ESFRI Projects, which are new Research Infrastructures in progress towards implementation, and ESFRI Landmarks, successfully implemented Research Infrastructures. The document also describes the broader Landscape of research in Europe which is an important component to ESFRI methodology.

All previous ESFRI Roadmaps proved to be very influential and provide truly strategic guidance for Member States and Associated countries investments, which goes even beyond the Research Infrastructure domain. The focus is on clustering of Research Infrastructures, their horizontal linkages and the projection of the Open Science concept. There are growing demands to address social and global challenges that are reflected in the Sustainable Development Goals.

Public Roadmap 2021 Guide follows the launch of Roadmap 2021 update during the Research and Innovation Days on the 25th September 2019 in Brussels. It offers support to proposers preparing a new submission and to the Projects and Landmarks involved in the update procedure. This Guide contains the definitions, models, methods and describes the procedures applied for the update.

We believe that one of the key ingredients of ESFRI consist in ensuring that excellent scientists have access to Europe's best Research Infrastructures, irrespective of borders. These actions require truly pan-European collaboration and global outlook. ESFRI has acquired immense and valuable experience since its foundation. It is our privilege to be able to share this experience across the countries and Research Infrastructure projects.

We hope that ESFRI can provide the European Research Infrastructures' stakeholders with guidance that will help them to achieve the most of their envisaged goals.



Jan Hrušák

ESFRI Chair

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STRATEGIC ROLE

The European Strategy Forum on Research Infrastructures (ESFRI) was set-up in 2002 as an informal Forum – composed of representatives of national authorities of the Member States (MS) and Associated Countries (AC) of the European Union and the European Commission (EC) – following the original mandate¹ of the Competitiveness Council of the European Union of June 2001 – and reaffirmed in November 2004, May 2007, December 2012, May 2014, December 2015, May 2016, May 2018, November 2018 – in order to:

- support a coherent and strategy-led approach to policy making on Research Infrastructures in Europe;
- facilitate multilateral initiatives leading to a better use and development of Research Infrastructures acting as an incubator for pan-European and Global Research Infrastructures;
- establish a European Roadmap for Research Infrastructures – new and major upgrades, of pan-European interest – for the coming 10-20 years, stimulate the implementation of these facilities, and update the Roadmap as the need arises²;
- 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 Roadmap³;
- implement the ERA Priority 2b: Research Infrastructures⁴.

In this context, the EU Council asked to closely monitor the implementation of the listed ESFRI Projects and to periodically update the scientific status of ESFRI Landmarks⁵. Recently, the EU Council has invited ESFRI to develop with Member States and the European Commission a common approach for monitoring Research Infrastructures⁶ as well as to prepare the ESFRI Roadmap update in 2021⁷.

¹ **Conclusions of the Council of the European Union of 27 June 2001**

“The Council is expected to approve conclusions recognising the need to promote optimal use of infrastructures on a European scale and to invite the Commission in collaboration with Member States and Associated and Candidate Countries (as appropriate) to study the best means of providing independent scientific advice as well as to explore new arrangements to support policies on research infrastructures”.

The first meeting of ESFRI took place on 25 April 2002 in Brussels.

² **Conclusions of the Council of the European Union of 25-26 November 2004, 21-22 May 2007, 11 December 2012, 26 May 2014, 1 December 2015, 27 May 2016, 29 May 2018, 30 November 2018**

³ **Conclusions of the Competitiveness Council of 11 December 2012**

⁴ **Conclusions of the Competitiveness Council of 1 December 2015**

⁵ **Conclusions of the Council of the European Union of 27 May 2016 on FP7 and Future Outlook: Research and innovation investments for growth, jobs and solutions to societal challenges.** Doc. 9527/16

<http://data.consilium.europa.eu/doc/document/ST-9527-2016-INIT/en/pdf>

⁶ **Conclusions of the Council of the European Union of 29 May 2018 on Accelerating knowledge circulation in the EU.** Doc 9507/18

<http://data.consilium.europa.eu/doc/document/ST-9507-2018-INIT/en/pdf>

⁷ **Conclusions of the Council of the European Union of 30 November 2018 on Governance of the European Research Area.** Doc. 14989/18

<https://data.consilium.europa.eu/doc/document/ST-14989-2018-INIT/en/pdf>

The effective investment in and use of RI became one of the priorities in realising the European Research Area (ERA). The essential elements of the RI priority in the ERA are to:

- ensure national commitments to the implementation of the Roadmap;
- complete or launch construction by 2015 of 60% of the priority RI on the Roadmap;
- encourage EU Member States (MS) or Associated Countries (AC) to the EU Framework Programme for Research and Innovation to link their national RI roadmaps to the ESFRI Roadmap and smart specialisation strategies in the European Structural and Investment Funds (ESIF);
- set priorities for implementing the Roadmap and to provide advice and guidance to MS & AC on overcoming legal, financial or technical obstacles to implementation;
- define common evaluation principles, impact-assessment criteria and monitoring tools to be applied in regional, national and EU programmes to help combine funds from different sources.

In 2014, the EC concluded⁸ that “[...] the importance of excellent RI for achieving excellent research is widely acknowledged, [...] (but that) doubts were raised regarding whether some national (RI) roadmaps can really be considered roadmaps, as no specific plans were incorporated on how to achieve the targets set and coherent harmonised approaches are missing”.

The Competitiveness Council⁹ “[...] recognised the great efforts made by MS to strategically plan their investments in RI, noted the need for further coordination of country specific and European roadmaps on RI and of national funding decisions for the development and operation of RI, including those identified by ESFRI”. Similarly, the Council also emphasised the need and importance of e-Infrastructures. ESFRI thus is not only one of the seven ERA-related expert groups, but it also provides for a unique combination of scientific expertise and political competence to fulfil a strategic role at European and international level and has been a driving force for the alignment of national RI roadmaps.

ESFRI since 2002 plays the leading role in the development of pan-European RI that provide tools to science to explore the frontiers of knowledge. The strategic role of ESFRI is represented by the following actions.

- ESFRI regularly carries out analysis of RI landscapes in six reference scientific domains. ESFRI captures and describes the key RI defining the entire landscape, identifies gaps and enables stakeholders at institutional, regional, national, European and global level to position their RI initiatives within a broader context and identifies synergies and complementarities with existing RI to refine their strategic priority setting.

⁸ **Analysis of the state of play of the European Research Area in Member States and Associated Countries: focus on priority areas**, European Commission (2014)
https://www.researchgate.net/publication/266399729_Analysis_of_the_state_of_play_of_the_European_Research_Era_in_Member_States_and_Associated_Countries_focus_on_priority_areas

⁹ **Conclusions of the Council of the European Union of 5 December 2014 on European research area Progress Report 2014**
http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/intm/146063.pdf

- ESFRI addresses the entire life cycle of RI with the aim of safeguarding long-term sustainability of the ESFRI RI portfolio and the effective and efficient use of – at often times – limited private and public funds. It thereby plays an important role in the reduction of barriers to multilateral and multi-organisational co-operation and development of options for joint funding of RI.
- ESFRI organises open calls for proposals, selects proposals based on strict eligibility criteria and reviews them in a clear and transparent manner through independent and international peer review, thus contributing to a balance within the ERA between the bottom-up design of RI and the subsequent strategic top-down prioritisation of a limited portfolio of pan-European RI. ESFRI reports directly to the Council where the ministers have acknowledged ESFRI's role and value.
- ESFRI has developed and applies distinct and transparent evaluation, monitoring and periodic review mechanisms based on two independent processes, i.e. i) the evaluation of the **SCIENTIFIC CASE** through the Strategy Workings Groups (SWG) and ii) the evaluation of the **IMPLEMENTATION CASE** through the Implementation Group (IG). In both cases, international and independent external Experts are involved to provide advice, but ESFRI is solely and entirely responsible of the evaluation procedures and outcomes.
- ESFRI has also become an important point of reference for funding strategy for RI concerning national and EU funding instruments. It contributes to the alignment of RI decision making at regional, national and global level – particularly with a view on smart specialisation strategies and with national RI roadmap development.
- ESFRI has contributed to the creation of the European Charter for Access to Research Infrastructures¹⁰ and is committed to improve this reference document in the future.
- ESFRI supports its RIs to move towards implementation and promotes synergies and integration amongst them, through regular and periodic monitoring of its entire RI portfolio, by providing constructive recommendations with distinct attention for the business case of its RI and by facilitating the exchange of information and the identification of best practice.
- ESFRI ensures that the opportunities provided by the digitisation of research are fully included in its processes by collaborating with other European initiatives, such as the e-Infrastructure Reflection Group (e-IRG) or the European Open Science Cloud (EOSC), on issues related to data management, data communication and other related matters.
- ESFRI facilitates the implementation of pan-European RI, by offering non-financial support to its RI portfolio.
- ESFRI operates at the forefront of European and global science policy and contributes to its development translating political objectives into concrete advice for RI in Europe.

¹⁰ **European Charter for Access to Research Infrastructures**, European Commission (2016)
https://ec.europa.eu/research/infrastructures/pdf/2016_charterforaccessto-ris.pdf

DEFINITIONS

ESFRI engages in a fully transparent road mapping process with clearly stated rules and procedures. The definitions, models and methods described herein apply to Roadmap 2021 update.

RESEARCH INFRASTRUCTURE

The following definition for RI from Article 2 (6) of the Regulation (EU) No 1291/2013 of 11th December 2013 on *Establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)* applies:

“RI are facilities, resources and services that are used by the research communities to conduct research and foster innovation in their fields. They include: major scientific equipment (or sets of instruments), knowledge-based resources such as collections, archives and scientific data, e-Infrastructures, such as data and computing systems and communication networks and any other tools that are essential to achieve excellence in research and innovation”.

Accordingly, RI are implemented along different organisational models, including central sources and laboratories for experiments and measurement sessions, coordination and management of geographically distributed observatories or laboratories, remotely accessible resources for computing, data banks, physical sample repositories, surveys and longitudinal studies. While the above definition captures the common features of RI, there are at least three types of RI, as defined below.

SINGLE-SITED RI

Single-sited RIs are central facilities geographically localised in a single site or in a few dedicated complementary sites designed for user access, whose governance is European or international. A single-sited RI needs to:

- have a legal status and a governance structure with clear responsibilities and reporting lines, including international supervisory and relevant external advisory bodies;
- have an access policy¹⁰ and access point for external users facilitating the submission of proposals and a user programme absorbing a considerable fraction of the total capacity of the RI;
- have a user support structure to optimise access to the relevant site, such as users’ office, ancillary laboratories, accommodation arrangements and logistics;
- have a data management system providing metadata and data storage, retrieval tools and on-line/in situ/remote data reduction and analysis;
- identify relevant and measurable Key Performance Indicators (KPI) addressing both excellence of scientific services and sustainability;
- enforce a human resources policy guaranteeing the necessary competences for its operation, users support, education and training by equal opportunity hiring and secondments.

DISTRIBUTED RI

A distributed RI consists of a Central Hub and interlinked National Nodes. A distributed RI particularly needs to:

- have a unique specific name, legal status and a governance structure with clear responsibilities and reporting lines, including international supervisory and relevant external advisory bodies;
- have legally binding attributions of coordination competences and resources to the Central Hub;
- have a unique access policy¹⁰ and provide for a single point of access for all users with a support structure dedicated to optimise the access for the proposed research;
- have a user programme absorbing a relevant fraction of the total capacity of the RI;
- identify and adopt measurable Key Performance Indicators addressing both excellence of scientific services and sustainability;
- have a human resources policy adequate to guarantee the effective operation of the Central Hub supporting the research, users programme, education and training by equal opportunity hiring and secondments;
- define a joint investment strategy aimed at strengthening the RI through the Nodes and the common/shared facilities.

These features characterise a distributed RI and thus mark the difference with respect to coordinated research networks (international collaborations of fully independent research performing organizations). The Nodes may be only partially absorbed by the distributed RI maintaining their national or institutional programmes, but 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.

Importantly, distributed RI must demonstrate a capability to attribute optimal personnel capacity and coordinating power to the Central Hub, therefore displaying:

1. a high level of integration of the National Nodes (such as 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);
2. 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.

GLOBAL RESEARCH INFRASTRUCTURE

Global Research Infrastructures (GRIs), as defined by the Group of Senior Officials (GSO)¹¹, represent those Research Infrastructures with a full international dimension to serve common needs of the world scientific community, or the advanced collaboration among existing RIs that share common needs and efforts to pursue challenging upgrades needed for top research. GRI may be single-sited or distributed RI and should follow the *GSO Framework for Global Research Infrastructures* approved by the GSO in 2014 and updated in 2017¹².

MAJOR UPGRADE

A major upgrade is an upgrade to an operational RI with the goal of delivering a transformative effect to its scientific outputs, or a substantial change of technical approach and does not mean routine maintenance or incremental gains. To that end, any applications to the Roadmap, which come under the category of upgrade, will be required to include robust justification describing the degree of upgrade. An existing RI planning a major upgrade can submit a proposal to become a Project.

NEW PROPOSALS

New Proposals of RI are candidate projects for the Roadmap 2021 that undergone the selection procedure based on the evaluation of the **SCIENTIFIC CASE** and for the **IMPLEMENTATION CASE**, according to a sound expectation that the Proposal – if selected as ESFRI Project – will reach the Implementation Phase within the ten-year term. Member States, Associated Countries and EIROforum Members are eligible to submit proposals for the ESFRI Roadmap 2021. Since Roadmap 2016, in order to identify a limited number of projects with a high degree of maturity to ensure maximum likelihood to reach implementation within the ten-year deadline, ESFRI introduced important eligibility conditions: the proof of **political support** by the lead Member State or Associated Country or a resolution of the Council for EIROforum Member and at least two additional MS/AC or EIROforum Member; the expression of **funding commitment** by the lead Member State or Associated Country or a resolution of the Council for EIROforum Member; and the **inter-institutional and multi-lateral agreement** signed by the core partners formally involved in the consortium. These requirements strengthened both links with the Governments involved and the research communities, encouraged a closer dialogue among them and support from the very beginning of the RI project resulting in increased likelihood of successful implementation.

¹¹ **Group of Senior Official (GSO)**

https://ec.europa.eu/info/research-and-innovation/strategy/european-research-infrastructures/group-senior-officials-gso_en

¹² **GSO Progress Report 2017**

https://ec.europa.eu/research/infrastructures/pdf/gso_progress_report_2017.pdf

ESFRI differentiates between the following categories:

- **LEAD COUNTRY/ENTITY:** MS, AC or EIROforum Member, which leads the preparation of the RI.
- **PROSPECTIVE MEMBER COUNTRY/ENTITY:** MS, AC and third country, which have submitted Expressions of political Support (EoS) signed by the national ministries responsible for the RI, or other entity – such as EIROforum Member – whose mandated authorities have expressed interest to join the RI through a Council resolution.
- **PARTICIPANTS:** Research institutions and other entities which are partners in the RI Consortium.

ESFRI PROJECTS

Projects are RI in their Preparation Phase, which have been selected for the excellence of their [SCIENTIFIC CASE](#) and [IMPLEMENTATION CASE](#), according to a sound expectation that the Project will reach the Implementation Phase within the ten-year term. They are included in the Roadmap in order to underline their strategic importance to the ERA and to support their timely implementation. The Projects can be at different stages of their development towards implementation, according to their respective date of inclusion in the Roadmap.

ESFRI differentiates between the following categories:

- **LEAD COUNTRY/ENTITY:** MS, AC or EIROforum Member, which leads the Preparatory Phase of the RI.
- **MEMBER COUNTRY/ENTITY:** MS, AC, third country or other entity – such as EIROforum Member – which is Member of the legal entity by any formal agreement, or applied to ERIC Step2 or to other international legal form.
- **OBSERVER:** MS, AC, third country or other entity – such as EIROforum Member – which is Observer of the legal entity by any formal agreement or applied to ERIC Step2 or to other international legal form.
- **PROSPECTIVE MEMBER COUNTRY/ENTITY:** MS, AC and third country, which has submitted Expressions of political Support (EoS) signed by the national ministries responsible for the RI, or other entity – such as EIROforum Member – whose mandated authorities have expressed interest to join the RI through a Council resolution.
- **PARTICIPANTS:** Research institutions and other entities which are partners in the RI Consortium.

ESFRI LANDMARKS

Landmarks are RI that were implemented or reached the Implementation Phase under the Roadmap and that are established as major elements of competitiveness of the ERA. The Landmarks can already deliver science services and grant access, or can be in advanced stage of construction with a clear schedule for the start of operation. Landmarks need continuous support and advice for successful completion, operation and - when necessary - upgrade to ensure the provision of state-of-the-art services, optimal management and maximum return from the investment. To this end, the continuity, scope and effectiveness of the Landmarks are periodically reviewed.

ESFRI differentiates between the following categories:

- **LEAD COUNTRY/ENTITY:** MS, AC or EIROforum Member, which leads the Implementation/Operation Phases of the RI.
- **MEMBER COUNTRY/ENTITY:** MS, AC, third country or other entity – such as EIROforum Member – which is Member of the legal entity by any formal agreement or applied to ERIC Step2 or to other international legal form.
- **OBSERVER:** MS, AC, third country or other entity – such as EIROforum Member – which is Observer of the legal entity by any formal agreement or applied to ERIC Step2 or to other international legal form.
- **PROSPECTIVE MEMBER COUNTRY/ENTITY:** MS, AC and third country, which has submitted Expressions of political Support (EoS) signed by the national ministries responsible for the RI, or other entity – such as EIROforum Member – whose mandated authorities have expressed interest to join the RI through a Council resolution.
- **PARTICIPANTS:** Research institutions and other entities which are partners in the RI Consortium.

ESTIMATED AND REAL COSTS

TOTAL INVESTMENT COSTS

Total investment costs represent all investments necessary to fully implement a Research Infrastructure from the beginning of a Design Phase until the Operation Phase, and including Terminations costs¹³. In distributed RIs, these costs also include investments needed at national nodes to enable the establishment of a European RI. In some cases, they can include investments necessary already during the Operation Phase as well as costs related to Termination of a RI.

DESIGN COSTS

The design costs cover all costs (in-kind and cash) invested in the conceptual design, technical design and feasibility study, including the costs for drafting the proposal. They include specific budgets obtained to develop the project from institutional, national, European and international funds (such as Design Studies and Integration Actions of the EU Framework Programmes for Research and Innovation); labour of scientific, technical and managerial personnel dedicated to the project; prototype design and development; coordination of potential users, etc. At the time of submission of a proposal for the Roadmap, these costs actually all concern already incurred costs.

PREPARATION COSTS

The preparation costs cover all real or estimated costs for the Preparation Phase of an RI, including the funding from a Preparatory Phase under the Framework Programmes and all other in-kind and cash third party contributions. Importantly, the preparation costs also cover all costs following a Preparatory Phase project until the Implementation Phase.

¹³ Total investment costs are the sum of Design costs, Preparation costs, Implementation costs and Termination costs, representing the investments needed across the entire lifecycle of a RI.

IMPLEMENTATION COSTS

The implementation costs cover the value invested in the Implementation Phase of the RI, including hiring personnel, acquiring the site and goods, construction costs, legal costs, coordination of users' communities, data management infrastructure costs, commissioning as well as pre-operation and start-up costs. For some RI (ex. cyclical surveys) implementation costs may occur periodically also during the Operation Phase. In the cases where major upgrades to the infrastructure are planned already at the proposal stage, these should also be included in the implementation costs.

TERMINATION COSTS

Termination costs relate to any decommissioning costs and/or environmental mitigation costs that may be necessary at the end of the lifecycle of an RI. Major items are for example the costs of dismantling, disposal, land reclamation but also costs related to data preservation or personnel.

AVERAGE ANNUAL OPERATION COSTS

The average annual operation costs cover all costs of running the RI for one year, operating users' access and delivering scientific services as described by the project. They include all RI's costs (such as personnel, power, rents/mortgages, taxes, maintenance, continuous upgrade and replacement costs, users support, in-house scientific programme).

Proposals and projects are asked to specify a methodology based on which the different categories of costs have been calculated. One example of such a methodology is the model described in *Guidelines on cost estimation of Research Infrastructures*¹⁴ available at the ESFRI Website.

¹⁴ **Guidelines on cost estimation of Research Infrastructures**, StR-ESFRI Study, June 2019
https://www.esfri.eu/sites/default/files/StR-ESFRI2_STUDY_RIs_COST_ESTIMATION.pdf

MODELS AND METHODS

LIFECYCLE APPROACH

ESFRI applies a **LIFECYCLE APPROACH** coherent and consistent with RI funding under the EU Framework Programme for Research and Innovation (FP) and the GSO concerning GRI. Moreover, the lifecycle of a RI is a reference to understand the needs and targets of RI at a given time and at various levels.

The **CONCEPT** of a new RI typically emerges bottom-up from the scientific communities clustering around well identified scientific needs and goals. Such a concept can originate from completely novel approaches to answer scientific questions or to respond to the need of enhanced capacity at pan-European level as well as from new insights in existing RI – e.g. resulting in a plan for major upgrade or merger.

The **DESIGN** covers the proof of the scientific concept and technical feasibility of the RI, the analysis of the potential user community – both science and innovation oriented; the outline of a business case and the rationale for the international consortium. The feasibility study can be carried out with institutional, national or international support – e.g. Framework Programme (FP) Design Study grants. The design also includes an initial analysis of its position in the RI landscape, e-Infrastructure requirements and (open)-data management and policy. Importantly, the RI also foresees the financial and political support from governments and funding agencies necessary for the Preparatory Phase.

The **PREPARATION** – carried out at institutional, national, European or international level – is directed towards developing the RI as a fully-edged organisation. Completion of preparation for the RIs in the Roadmap is often carried out through a Preparatory Phase contract under FP resulting in a business plan, a legal entity, an agreed role for the RI also in the context of the landscape of existing RIs at European and global level, and secured funding safeguarding the financial sustainability for the Implementation Phase and extending also for the Operation Phase. Some projects face a gap of funding between the end of their Preparatory Phase contract and the final decisions for implementation – legal, funding and construction – which can lead to the establishment of *ad hoc* interim legal entities and governance to assure appropriate funding to complete the preparation and start construction.

The **IMPLEMENTATION** is different for single-sited and distributed RIs. In the first case it corresponds to an intense investment period of several years for construction engaging human and financial resources with big impact on the market – suppliers of goods and technologies. Longer-term benefits are generated to the hosting territory: employment, upgrade of services, internationalisation and up-skilling of the population, increased demand on high level services – schools, communication, financial services for international employees – and joint development of novel technologies that remain as a competitiveness legacy to the procuring firms. In case of distributed RIs, the implementation implies intense negotiations as both the Central Hub and the national nodes require specific commitments. The development of a successful governance and management structure may be of higher complexity than for single-sited RIs. Nevertheless, in several cases distributed RIs have been quite efficient at establishing their legal entities and launching services to the user community.

During their **OPERATION**, RIs produce frontier research and deliver advanced services for excellent science satisfying the users' demand, boosting brain circulation of early career scientists and trainees, therefore improving the ranking of their academic and research institutions. RIs can create spin-offs and start-ups and attract corporate partners generating a high potential for innovation. The operational costs of RIs range from 8 to 12% of the initial capital investment per year. A twenty-year operation cycle may develop before major upgrades, requiring new substantial capital investment, are needed. The upgrade cycles in case of e-Infrastructures are typically much shorter.

The **TERMINATION** may encompass dissolution of the organisation, dismantling of facilities and related safety aspects and resurrection of the original site but it does not apply in these identical terms in all research domains. The Termination Phase could also result in a new infrastructure development as part of the evolution of the field. Re-orientation of RI sites has already occurred, e.g. in nuclear research or high-energy physics, where outdated RI have been transformed into analytical facilities with new science missions built upon the presence of technological infrastructure, logistics, human resources and organisation.

For a schematic representation of the **LIFECYCLE APPROACH OF A RESEARCH INFRASTRUCTURE** see **FIGURE 1**.

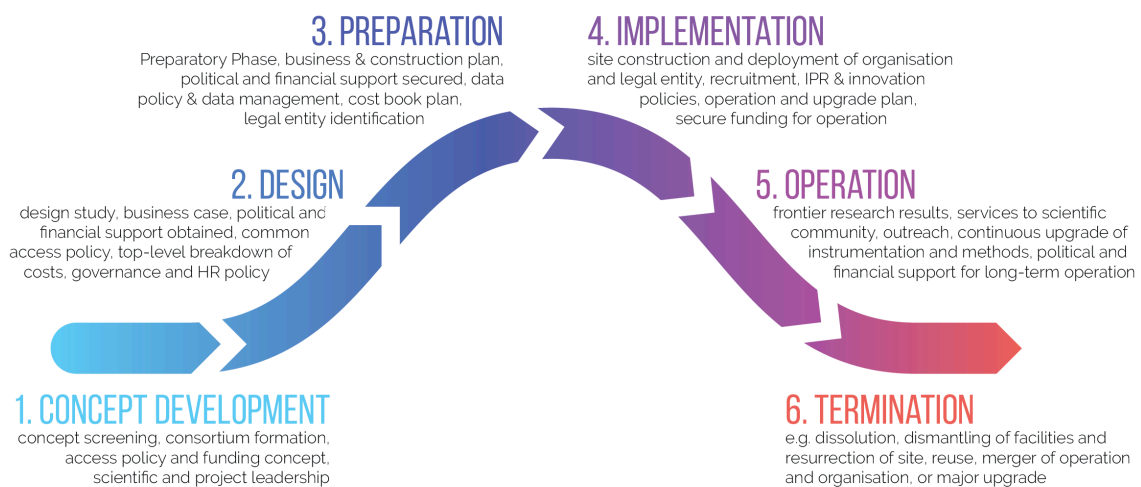


FIGURE 1: LIFECYCLE APPROACH OF A RESEARCH INFRASTRUCTURE

EVALUATION OF SCIENTIFIC CASE

The goals of the evaluation of the **SCIENTIFIC CASE** of *New Proposals* for the Roadmap (*ex ante*) and of *ESFRI Projects* and *ESFRI Landmarks* on the Roadmap (*ex post*) are to:

- evaluate which minimal key requirements along the five dimensions of the **SCIENTIFIC CASE** are met;
- assess future scientific plans;
- advise ESFRI on the strategic value of the proposals, Projects and Landmarks within the broader RI ecosystem;
- evaluate the potential of the proposals, Projects and Landmarks for further internationalisation and globalization;
- identify links and complementarities among RI and the potential of integration;
- recognise e-needs, including the integration of RI in open e-networks, the compliance with FAIR principles and the link to EOSC.

The SWGs evaluate the **SCIENTIFIC CASE** along five dimensions:

1. scientific excellence
2. pan-European relevance
3. socio-economic impact
4. user strategy and access policy
5. e-needs

When evaluating the **SCIENTIFIC CASE**, the SWGs take the dimensions of the **IMPLEMENTATION CASE** into account.

EVALUATION OF IMPLEMENTATION CASE

The goals of the evaluation of the **IMPLEMENTATION CASE** of *New Proposals* for the Roadmap (*ex ante*) and of *ESFRI Projects* and *ESFRI Landmarks* on the Roadmap (*ex post*) are to:

- assess which minimal key requirements along the five dimensions of the **IMPLEMENTATION CASE** are met;
- assess future implementation plans;
- enable specific and targeted follow-up by ESFRI and support to the projects to move towards full implementation within the ten-year rule.

The Implementation Group (IG) evaluates the **IMPLEMENTATION CASE** along five dimensions:

1. stakeholder commitment
2. preparatory work and planning

3. governance, management & human resources
4. finances
5. risks

When evaluating the **IMPLEMENTATION CASE**, the IG takes the dimensions of the **SCIENTIFIC CASE** into account.

MINIMAL KEY REQUIREMENTS ALONG DIMENSIONS AND LIFECYCLE

ESFRI applies minimal key requirements on all dimensions described above and along the RI life cycle. For the **SCIENTIFIC CASE**, these are described in **ANNEX II** and for the **IMPLEMENTATION CASE** in **ANNEX III**. These minimal key requirements serve as the basis for the scoring in the evaluations. Meeting minimal requirements is necessary, but not sufficient to be automatically listed in the Roadmap.

SCORING

The following scoring values are attributed to each dimension following the minimal key requirements described in the annexes II and III:

- **Very high**, i.e. the key requirements are outstandingly met.
- **High**, i.e. the key requirements are comprehensively met.
- **Medium**, i.e. the key requirements are partly met, but the proposal/Project/Landmark shows weaknesses with regard to specific requirements. Enhancing the RI's future success requires (significant) changes to (specific parts of) the proposal/plans.
- **Low**, i.e. the key requirements are insufficiently met and the evidence for future success of the RI is not convincing.

In order to be considered as a Project, a proposal must meet the key requirements for the Preparation Phase and score a grading of at least 'High' for both the **SCIENTIFIC CASE** and the **IMPLEMENTATION CASE**. In order to be considered as a Landmark, a Project must meet the key requirements for at least Implementation Phase and score a grading of at least 'High' for both the **SCIENTIFIC CASE** and the **IMPLEMENTATION CASE**. The status of each RI on the Roadmap is a strategic decision of the Plenary Forum that takes into account the outcomes of the evaluations.

PRINCIPLES, CONFLICT OF INTEREST (CoI) AND CONFIDENTIALITY

All evaluations must comply with the following four principles:

- **Independence**, i.e. involved persons carry out the evaluations in a personal capacity and they represent neither their employer nor their country.
- **Impartiality**, i.e. persons must treat all proposals, Projects and Landmarks equally and evaluate them impartially on their merits, irrespective of their origin or the identity of the applicants and coordinators.

- **Objectivity**, i.e. involved persons evaluate each proposal or questionnaire as submitted; meaning on its own merit, not its potential if certain changes were to be made.
- **Accuracy**, i.e. involved persons make their judgment solely against the formal evaluation criteria and the relevant ESFRI documentation.

ESFRI checks any Col with all SWG and IG Members and with all external Reviewers, which must declare non-conflict of interest and confidentiality on the proposals, Projects or Landmarks they are evaluating. A Col may arise, in particular, due to science competition, scientific and economic interests, political or national affinities, family or emotional ties, or any other relevant connection or shared interest. Strict rules for confidentiality apply.

ROADMAP 2021 UPDATE

With the Roadmap 2021, ESFRI will update the strategy on European RI. It will cover:

- landscape of RI in Europe and globally;
- gaps in the European RI ecosystem;
- new pan-European RI Projects;
- synergies with regional, national, European and international RI and strategies for optimal use;
- links between and integration of RI;
- e-Infrastructure needs and integration of RI in open e-networks;
- continuous upgrade (if necessary), long-term sustainability and end of life perspectives;
- innovation potential and socio-economic benefit analysis;
- global opportunities and science diplomacy aspects – where appropriate.

The following generic considerations and rules apply for the Roadmap 2021:

- ESFRI will continue to strengthen its strategic role;
- ESFRI will validate all information on political support and financial commitments – including the inclusion in national RI roadmaps – with the active role of the ESFRI Delegations and the Council Chairs of the EIROforum Members.

In order to realise the Roadmap 2021, ESFRI will:

- a. update the *Landscape Analysis*;
- b. monitor all *Projects 2010* and *Projects 2016*;
- c. evaluate *New Proposals* and decide upon new *Projects 2021*;
- d. monitor and evaluate and the effectiveness and efficiency of its methods and procedures, including definitions and models.

LANDSCAPE ANALYSIS

The *Landscape Analysis* is a key ingredient of the Roadmap 2021. It provides an overview of the European RI ecosystem by identifying the main RI operating transnational access in Europe, in all fields of research, and major new or ongoing projects, as well as an outlook to the global landscape of relevance. This includes national, regional, international facilities and consortia that offer integrated services and transnational access to state-of-the-art resources for research. The *Landscape Analysis* is a reference document and does not imply a prioritisation by ESFRI nor any national financial and political commitments. The SWG draft the *Landscape Analysis* broadening the view of ESFRI beyond the RI in its Roadmap. The thorough knowledge of the RI Landscape and of its dynamics is a prerequisite for developing optimal strategies in the field of RI aimed at strengthening the competitiveness and value (excellence and impact) of European research. The goals of the *Landscape Analysis* are to:

- provide a survey on major transnational RI offering open access to researchers, students, teachers, support staff, education and research institutions, business, industries and public services in all domains;
- keep track of the developments and trends from thematic roadmaps and strategy papers;
- identify the strategic role of the RIs in view of policy developments such as Sustainable Development Goals (SDGs) and Horizon Europe missions;
- understand the complementarity and effectiveness of interfaces between RI, also across areas;
- provide an overview of the European RI ecosystem enabling ESFRI to fulfil its strategic and incubator roles;
- enable ESFRI to identify gaps in the European RI landscape and promote inter- and cross-disciplinary aspects;
- help the involved governments to position their RI in the global RI landscapes;
- update evidence on the overall value and sustainability issues of the operational RI;
- highlight the interconnections between domains, vision and perspectives across thematic areas;
- describe transversal aspects (i.e. education and training, innovation, socio-economic impact, big data and e-infrastructure needs, regional impact, pan-European dimension, global dimension).

MONITORING OF ESFRI PROJECTS 2010 AND 2016

Monitoring is used to describe the evaluation of the [SCIENTIFIC CASE](#) and of the [IMPLEMENTATION CASE](#) of the *Projects* on the Roadmap. The goals of the monitoring of the *Projects 2010* and *Projects 2016* are to:

- check the overall progress towards implementation, i.e. to what degree they fulfil the minimal key requirements for the phases of lifecycle and what the plans are for reaching full implementation;
- check and report on whether and how the *Projects 2010* have addressed the conclusions and followed up on the recommendations from the 2018 evaluation of implementation and proposal evaluations for the *Projects 2016*;
- propose a status, conclusions and recommendations on the *Projects 2010* to the Plenary Forum, including the possible transition from Project to Landmark;
- update all public information on all *Projects* for the Roadmap 2021.

ESFRI will monitor the *Projects* along the following considerations:

- the monitoring involves an evaluation of the [SCIENTIFIC CASE](#) and of the [IMPLEMENTATION CASE](#) of each Project – when relevant – following up on prior conclusions and recommendations. SWG and IG together draft a specific questionnaire per Project addressing generic and specific aspects of the [SCIENTIFIC CASE](#) and of the [IMPLEMENTATION CASE](#);
- the ten-year term will expire for the *Projects 2010* and they will not appear as *Projects* in the Roadmap 2021;

- those *Projects 2010* that have successfully reached the implementation may be evaluated with respect to the requirements of Landmarks;
- any Project that wants to be re-considered after ten years on the ESFRI Project list, must re-apply, as a new proposal clearly overcoming the bottlenecks that prevented its implementation. In such case, the Project will be competing – on equal footing – with all other new proposals applying to the Roadmap;
- ESFRI will not monitor the six *Projects 2018*.

PERIODIC UPDATE OF ESFRI LANDMARKS

ESFRI performed a pilot exercise in order to test the process of periodic review. Four Landmarks took part to this exercise: ELIXIR, ESS ERIC, ICOS ERIC, and SPIRAL2. The lessons learnt from the pilot exercise were presented to the EB and Forum.

The Council Conclusions of 29th May 2018 on *Accelerating knowledge circulation in the EU* that “Stresses the importance of human resources and training skills as key factors in the success for Research Infrastructures and ACKNOWLEDGES the need for Research Infrastructures to strengthen a service-driven approach; invites Members States and the Commission within the framework of ESFRI to develop a common approach for monitoring of their performance and INVITES the Pan-European Research Infrastructures, on a voluntary basis, to include it in their governance and explore options to support this through the use of Key Performance Indicators”⁶.

In order to implement this mandate, ESFRI has set up an *ad hoc* Working Group on Monitoring of Research Infrastructure Performance – MONITORING WG – and organised two workshops in November 2018 and July 2019 respectively to collect feedback from the ESFRI Research Infrastructures and other stakeholders and to present the preliminary findings and recommendations of the MONITORING WG.

Based on the final report of the MONITORING WG, including a proposal on the methodology to be adopted for the ESFRI Landmark periodic update as well as a proposal on the monitoring methodology and set of KPIs to be adopted, on voluntary basis, by RIs and funding authorities, ESFRI will finalise its methodology on periodic review of Landmarks. This methodology and its foreseen time line for implementation will then be communicated to the ESFRI Research Infrastructures.

For a schematic representation of the [ESFRI ROADMAP DYNAMICS](#) – referred to ESFRI Projects and ESFRI Landmark – see [FIGURE 2](#).

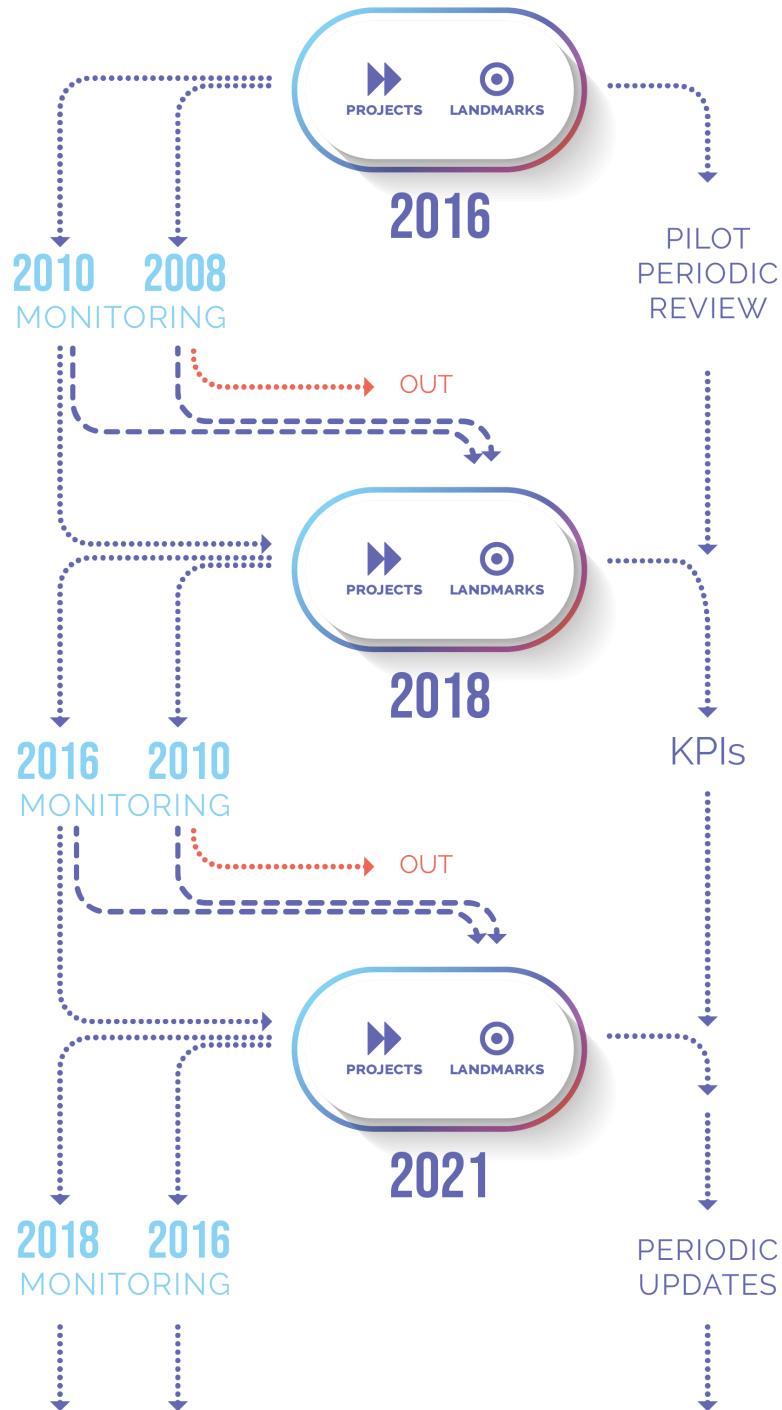


FIGURE 2: ESFRI ROADMAP DYNAMICS

SUBMISSION & SELECTION OF NEW PROPOSALS

ELIGIBILITY CRITERIA

To be eligible for evaluation, *New Proposals* must:

- provide **proof of political support**, i.e. Expression of political Support (EoS) by the LEAD country and at least two additional MS and AC signed by the national ministries responsible for RI¹⁵ – in case of an EIROforum Member provide a Council resolution;
- provide **proof of financial commitment**, i.e. Expression of Commitment (EoC) to financially contribute to the Preparation and Implementation Phases by an authority¹⁶ from the LEAD country – in case of an EIROforum Member the financial commitment should be explained in the Council resolution;
- provide **proof of an inter-institutional and multi-lateral agreement**, e.g. a Memorandum of Understanding (MoU) signed by the core partners – being research institutions – formally involved in the consortium.

ELECTRONIC SUBMISSION: THE ESFRI MoS+

The *Submission of New Proposals* is managed through the ESFRI MOS+. The online submission form consists of three parts to be fully completed and allows for a limited number of essential attachments:

PART A: GENERAL INFORMATION is used for the eligibility check by the EB, for the overall evaluation of the organisation and support to the *New Proposal* and – if selected – for the public description of the Project in the Roadmap 2021.

PART B: SCIENTIFIC CASE is used by the SWG(s) to evaluate the **SCIENTIFIC CASE** of the *New Proposal*.

PART C: IMPLEMENTATION CASE is used by the IG to evaluate the **IMPLEMENTATION CASE** of the *New Proposal*.

The following rules and considerations apply for the *Submission of New Proposals*:

- the ESFRI Delegations and the EIROforum Members are notified that the ESFRI MOS+ is open;
- the ESFRI Delegation or the EIROforum Member that lead the preparation of the proposal requests the ESFRI MOS+ to create a *New Proposal Account* upon providing some information (with reference to the Proposal Coordinator, who will receive the login details for this *New Proposal Account*);
- the ESFRI MoS+ provides a *New Proposal Account* protecting the data-entry into the MoS+ online *New Proposal Questionnaire* by the Proposal Coordinators exclusively;
- only ESFRI Delegations and EIROforum Members that lead the *New Proposal* have the responsibility to finalize the submission of the proposal by the deadline on **5th May 2020**.

¹⁵ The ESFRI Delegation will validate such EoS.

¹⁶ Any legal entity from a MS, AC or third country that can take binding decisions to financially support the RI can submit an EoC. It may concern a regional or national government (agency), an umbrella organisation negotiating and redistributing funding on behalf of its members, a Research Funding Organisation (RFO) or a Research Performing Organisation (RPO).

ELIGIBILITY CHECK AND ASSIGNMENT TO SWG

The EB will check whether the proposals are complete, submitted within the deadline, written in English and compliant with the specific eligibility criteria, i.e. **proof of political support**, **proof of financial commitment** and **proof of inter-institutional agreement**. The EB then proposes to the Plenary Forum a list of eligible proposals and their assignment to the lead SWG and any other relevant SWGs.

EVALUATION OF SCIENTIFIC CASE AND IMPLEMENTATION CASE

The SWGs perform the evaluation of the **SCIENTIFIC CASE** and the IG accomplishes the assessment of the **IMPLEMENTATION CASE** of *New Proposals*. SWGs and IG work independently with regular interactions; they deliver joint reports and contribute to the harmonisation of the conclusions and recommendations with the EB at various stages.

HARMONISATION

Harmonisation of the conclusions and recommendations occurs at various stages between the SWGs, the IG and the EB in order to:

- identify proposals – if any – which are uncompetitive and will not be invited for a hearing and thus no longer be considered as possible Projects;
- draft and agree on specific questions for clarification by the applicants of the proposals during dedicated hearings;
- ensure coherence and consistency between all evaluation results;
- achieve consensus on proposed status, conclusions and recommendations.

RECOMMENDATION TO PLENARY FORUM AND FINAL DECISION

The EB presents to the Forum its recommendation on the *Selection of Projects 2021* based on the evaluation outcomes and taking into account the strategic role, the added value in the RI landscape, the balance between the different thematic domains, the new opportunities for the ERA, and the potential as a global Research Infrastructure. The Plenary Forum discusses the status, the conclusions and the recommendations per proposal and decides upon new Projects to be included in the ESFRI Roadmap 2021.

For a schematic representation of the **ESFRI SUBMISSION & SELECTION OF NEW PROPOSALS** see **FIGURE 3**.

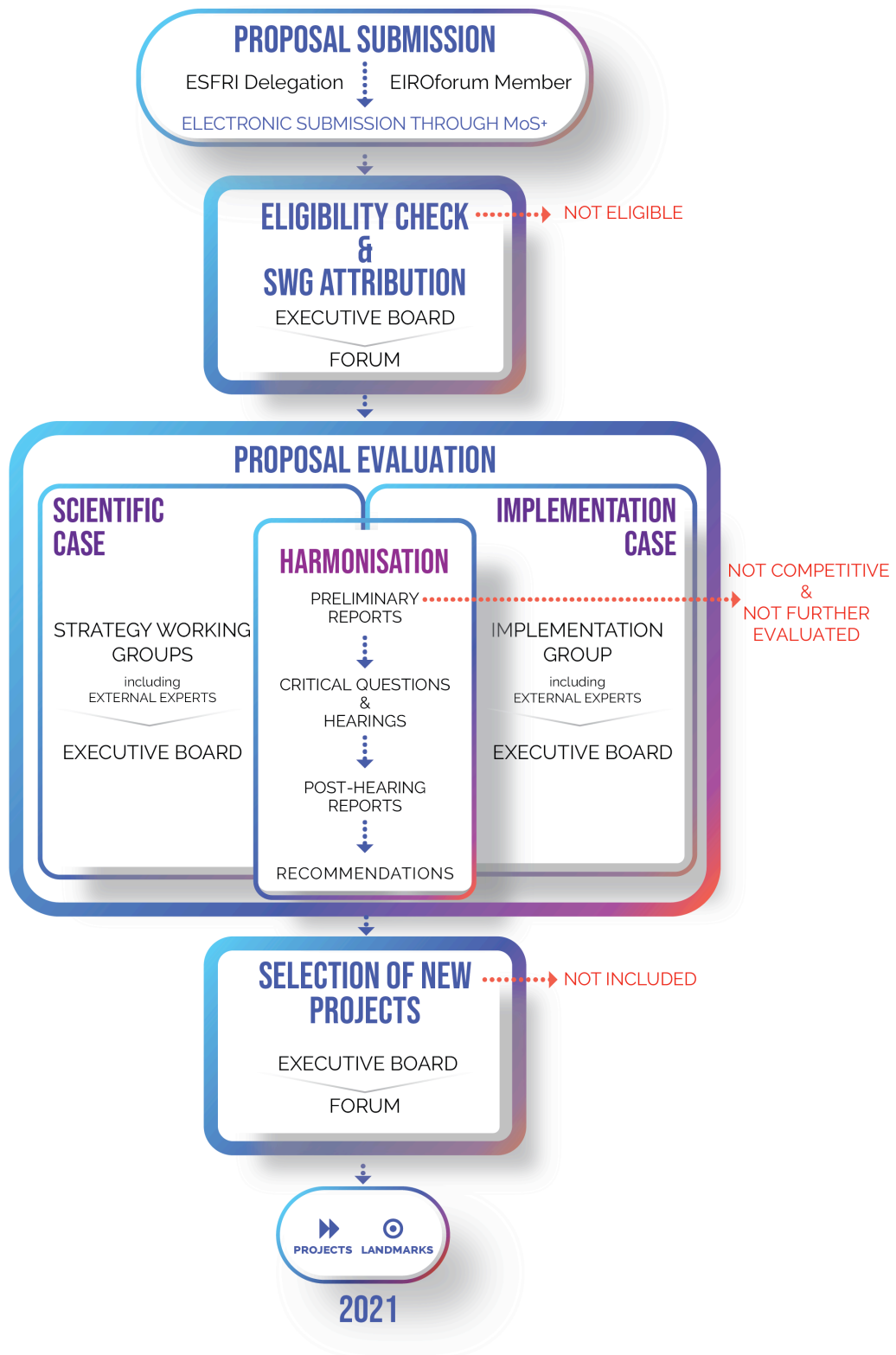


FIGURE 3: THE SUBMISSION & SELECTION OF NEW PROPOSALS

PLANNING

NEW PROPOSALS

STEPS	DATE (RANGE)
INFODAY	25 September 2019
OPEN CALL FOR PROPOSALS	25 September 2019
SUBMISSION OF PROPOSALS	5 May 2020
CRITICAL QUESTIONS & INVITATION TO HEARINGS	October 2020
HEARINGS	November-December 2020
ESFRI FORUM DECISION	June-September 2021
ESFRI ROADMAP LAUNCH	October-November 2021

MONITORING OF PROJECTS 2016

STEPS	DATE (RANGE)
INFODAY	25 September 2019
CUSTOMIZED QUESTIONNAIRE SENT TO THE PROJECTS	November 2019
SUBMISSION OF QUESTIONNAIRE	February 2020
ESFRI FORUM DECISION	June 2020
ESFRI ROADMAP LAUNCH	October-November 2021

MONITORING OF PROJECTS 2010

STEPS	DATE (RANGE)
INFODAY	25 September 2019
CUSTOMIZED QUESTIONNAIRE SENT TO THE PROJECTS	January 2020
SUBMISSION OF QUESTIONNAIRE	June 2020
CRITICAL QUESTIONS & INVITATION TO HEARINGS	January 2021
HEARINGS	February-March 2021
ESFRI FORUM DECISION	June 2021
ESFRI ROADMAP LAUNCH	October-November 2021

After the Forum decisions on the *New Proposals*, *Projects 2016* and *Projects 2010*, ESFRI will duly communicate its decisions to the concerned RI.

ANNEX I: LIST OF ABBREVIATIONS

ABBREVIATION	MEANING
AC	Associated Country to EU Framework Programme for Research and Innovation
CoI	Conflict of Interest
DMP	Data Management Plan
e-IRG	e-Infrastructure Reflection Group
EB	Executive Board
EC	European Commission
EoC	Expression of Commitment
EoS	Expression of (political) Support
EOSC	European Open Science Cloud
ERA	European Research Area
ESFRI	European Strategy Forum on Research Infrastructures
ESIF	European Structural and Investment Funds
EU	European Union
FP	EU Framework Programme for Research and Innovation
GRI	Global Research Infrastructure
GSO	Group of Senior Officials
IG	Implementation Group
KPI	Key Performance Indicator
LoI	Letter of Intent
MoU	Memorandum of Understanding
MS	Member State
RFO	Research Funding Organisation
RI	Research Infrastructure
RPO	Research Performing Organisation
SDG	Sustainable Development Goal
SWG	Strategy Working Group

ANNEX II: LIST OF MINIMAL KEY REQUIREMENTS FOR SCIENTIFIC CASE

The following table contains the **minimal key requirements** to a phase in the lifecycle of RI on the five dimensions of the **SCIENTIFIC CASE**:

	PHASE				
	DESIGN	PREPARATION*	IMPLEMENTATION**	OPERATION	TERMINATION
SCIENTIFIC EXCELLENCE	<ul style="list-style-type: none"> – long term science programme defined – scientific community well-established – scientific leadership described – cutting edge science and technology outlined 	<ul style="list-style-type: none"> – scientific vision and mission outlined – (multidisciplinary) scientific new frontier outlined – scientific leadership recruited – science concept tested and found feasible – services for the scientific community described – technical maturity and feasibility tested and achieved – cutting edge science and technology described – availability of scientific human resources proven 	<ul style="list-style-type: none"> – vision, mission and identity fully defined – multidisciplinary scientific new frontier established – scientific leadership consolidated – services delivered to scientific community – cutting edge science and technology fully defined 	<ul style="list-style-type: none"> – vision, mission and identity consolidated – leading RI landscape and multidisciplinary scientific new frontier achieved – scientific leadership and impact visible at global level – continuous upgrade planned and undertaken - if relevant – cutting edge science and technology consolidated 	
PAN-EUROPEAN RELEVANCE	<ul style="list-style-type: none"> – pan-European approach for scientific area outlined – targeted user community is pan-European – national/international facilities with complementary or synergistic potential 	<ul style="list-style-type: none"> – positioning in the RI landscape defined – case for European added value defined – research capacity and current/potential geographical distribution defined – links to relevant RI and other large pan-European programmes identified 	<ul style="list-style-type: none"> – positioning in the RI landscape fully described – case studies or other evidence of emerging European-added value achieved – research capacity and geographical distribution consolidated – joint strategies, common services with relevant RI and other large pan-European programmes being implemented 	<ul style="list-style-type: none"> – European added value consistently being delivered – research capacity and geographical distribution consolidated/expanding – common services with relevant RI and other large pan-EU programmes in place 	
SOCIO-ECONOMIC IMPACT	<ul style="list-style-type: none"> – relevance to societal challenges identified and potential economic impact 	<ul style="list-style-type: none"> – case for impact made, supporting innovation, other types of benefits such as services for society, cultural aspects and attraction of business, industry and public 	<ul style="list-style-type: none"> – socio-economic impact cases emerging – capacity building impact proven – contributing to tackling the societal challenges 	<ul style="list-style-type: none"> – impact demonstrated consistently – new communities involved – innovation oriented activities 	

	<ul style="list-style-type: none"> – predicted including innovation aspects 	<ul style="list-style-type: none"> – services, etc. 	<ul style="list-style-type: none"> – innovation oriented activities agreed – ability to develop an open innovation culture established 	<ul style="list-style-type: none"> – operational – private users involved – policies on key societal challenges, e.g. climate change, influenced 	
USER STRATEGY & ACCESS POLICY	<ul style="list-style-type: none"> – vision about user community – access modes described 	<ul style="list-style-type: none"> – identified user categories – survey executed demonstrating expected user community and description of it in terms of origin and size – identified services based on a clear identification of user demands and needs – single entry point for users outlined 	<ul style="list-style-type: none"> – user community in terms of origin and size consolidated – mechanism of exchange/engagement with users – accommodation of user needs/feedbacks – catalogue of initial services for users – user strategy consolidated (including training aspects) – common access policy – excellent driven access taken into account / transparent process, international research programmes, etc. – organisational structure and procedure for regulating access – including single entry point for users - decided and approved 	<ul style="list-style-type: none"> – common access management plan including: – solid mechanism of exchange with users – established catalogue of services for users – operational single entry point for access established – assistance to users for the entire process (from the proposal till after the access) – IPR policies fully established – dissemination programmes in place, including innovation actions 	<ul style="list-style-type: none"> – deployed IPR beyond decommissioning
E-NEEDS	<ul style="list-style-type: none"> – vision on e-infrastructure requirements, including access policy and security measures ready – interfacing with communication networks or distributed calculation or HPC/HTC 	<ul style="list-style-type: none"> – conceptual design of e-infrastructure ready – contributions of e-infrastructure resources at all levels (institutional, regional, national, international) described – access policy and Data Management Plan (DMP) outlined – compliance with FAIR principles 	<ul style="list-style-type: none"> – technical design of e-infrastructure ready and approved – draft operational planning for e-infrastructure service delivery – agreements with parties delivering core e-infrastructure services (Central Hub) drafted – access policy and DMP approved, including plan for sustainability of data – security policy defined and approved – implementing FAIR 	<ul style="list-style-type: none"> – operational plan ready and approved – agreements with service provisioning parties signed – DMP implemented and security policy deployed – operational application of FAIR 	<ul style="list-style-type: none"> – deployed sustainability of data beyond decommissioning

Texts in blue only apply to single-site RI.

Texts in green only apply to distributed RI.

* Proposals that meet the minimal key requirements for the Preparation Phase may be considered as Projects.

** Projects that meet the minimal key requirements for the Implementation Phase may be considered as Landmarks.

ANNEX III: LIST OF MINIMAL KEY REQUIREMENTS FOR THE IMPLEMENTATION CASE

The following table contains the **minimal key requirements** to a phase in the life cycle of RI on the five dimensions of the evaluation of the **IMPLEMENTATION CASE**:

	PHASE				
	DESIGN	PREPARATION*	IMPLEMENTATION	OPERATION	TERMINATION
STAKEHOLDER COMMITMENT	<ul style="list-style-type: none"> – institutional Letters of Intent (LoI) signed – formal agreement amongst partners for design study agreed upon (e.g. Consortium Agreement) 	<ul style="list-style-type: none"> – political support provided by a satisfactory number of prospective members – satisfactory inter-institutional and multi-lateral agreement, e.g. a Memorandum of Understanding (MoU) signed by all core partners - being research institutions - formally involved in the consortium – clear strategy about how to gather necessary commitments at institutional and governmental level 	<ul style="list-style-type: none"> – RI included in all relevant national RI roadmaps or similar political documents – commitment of a) MS and AC and b) core institutes and partners secured through signed legally binding document (e.g. statutes) – role and funding of Central office (Central Hub) agreed in legally binding document (e.g. statutes) 	<ul style="list-style-type: none"> – budget to financially support operation and use for at least five years by all countries involved agreed – break-down of budget of nodes and relative resources with respect to their (potential) double accounting as national RI and nodes of international RI 	<ul style="list-style-type: none"> – institutional, political and financial commitment on major upgrade/decommission/merger obtained
PREPARATORY WORK & PLANNING	<ul style="list-style-type: none"> – concept screening successfully completed and described in a conceptual design – overall project plan for design study with major milestones and deliverables approved 	<ul style="list-style-type: none"> - design/feasibility study successfully completed - clear business case developed - clear strategy about how to tackle technological and construction issues - detailed plan for preparation and implementation agreed, including relevant investment decisions - overall plan for operation and decommission defined 	<ul style="list-style-type: none"> – preparatory phase successfully completed – sound and reviewed business plan agreed – all investment decisions for implementation have been effectively taken and those for operation are clearly planned – communication programmes are in place – decision on site taken – building licence obtained – procurement strategy clearly identified and procurement task force in place – tenders and commitments to fund construction approved 	<ul style="list-style-type: none"> – achieving research results delivering relevant services to scientific community – utilisation of RI monitored and reported – construction effectively completed – medium term operations and upgrade plan approved and secured – procedure to winding up established 	<ul style="list-style-type: none"> – detailed and validated plan for decommission, major upgrade or merger approved

			<ul style="list-style-type: none"> – decision on hosting of central hub taken – services to users at national level and services from Central Hub to National Nodes delivered – detailed plan for scientific, technical and organisational implementation validated 		
GOVERNANCE, MANAGEMENT & HUMAN RESOURCES	<ul style="list-style-type: none"> – project organisation approved – scientific leadership, project manager and required staff identified 	<ul style="list-style-type: none"> – satisfactory project organisation and management for preparation and implementation with clearly defined skills and staffing plans, responsibilities and reporting lines approved – measurable and satisfactory Key Performance Indicators identified – governance for operation with clearly defined responsibilities and reporting lines outlined, including Supervisory and other Advisory Boards – human resources policy for implementation and operation to gather necessary competences, hiring, equal opportunities (including gender balance and diversity), secondments, education and training outlined 	<ul style="list-style-type: none"> – legal entity established – organisation for implementation in place – robust Key Performance Indicators for operation, management, administration and facilitation agreed – key managers and staff for implementation recruited and necessary skills trained – viable organisation for operation with adequate staffing and independent monitoring approved – human resources policy to gather necessary competences for operation, hiring, equal opportunities (including gender balance and diversity), secondments, education and training approved 	<ul style="list-style-type: none"> – planning and reporting mechanisms in place – staff for operation and management recruited and necessary skills trained – all human resources policies and instruments in place 	<ul style="list-style-type: none"> – organisation of decommission/merger/upgrade approved – organisation and social plan for decommission approved
FINANCES	<ul style="list-style-type: none"> – funding concept and potential partners (e.g. nature of partnership, in-kind versus cash) contributions outlined – budget for design study approved 	<ul style="list-style-type: none"> – financial commitment by lead country or EIROforum Member and possible other entities satisfactorily covering the preparation and implementation phases. – top-level breakdown of cost elements with overall order of magnitude estimates (including for Central Hub, National Nodes and main upgrades) – estimates and confidence levels available for each element – funding opportunities identified for the 	<ul style="list-style-type: none"> – formal commitment for funding of implementation obtained – cost book with costs based on supplier discussions or quotes and accounting principles approved – financial reporting set up – Work Packages and in-kind contributions fully detailed and centrally budgeted – validated projection on operation costs for at least five years and agreement on how to cover 	<ul style="list-style-type: none"> – funding for operation secured – auditing of accounting and budget systems in place 	<ul style="list-style-type: none"> – budget and liability for decommission/merger/major upgrade approved and covered

		whole lifecycle – in-kind contribution policy outlined	them – costs for decommission identified – funding for Central Hub and firm projection on operation costs for at least five years		
RISKS	– conceptual ideas about scientific, technological, political and financial risks	– clear identification of major risks involved and appropriate mitigation strategies described	– detailed risk inventory established and appropriate mitigation measures for implementation in place	– appropriate risk management and mitigation policies for operation in place	– risks involved in decommission/upgrade/merger described and mitigation strategies in place

Texts in blue only apply to single-site RI.

Texts in green only apply to distributed RI.

* Proposals that meet the minimal key requirements for the Preparation Phase may be considered as Projects.

** Projects that meet the minimal key requirements for the Implementation Phase may be considered as Landmarks.

