

## D4.3 Case Studies

Deliverable: D4.3 Case Studies  
Author(s): WP4  
Date: 14/12/2018  
Grant Agreement N°: 730928  
Starting Date: 01/01/2017  
Duration: 24 months  
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Brussels, 14.12.2018

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## List of abbreviations

AC	Associated Countries
EC	European Commission
EJP	European Joint Programmes
ERA	European Research Area
ERIC	European Research Infrastructure Consortium
ESFRI	European Strategic Forum for Research Infrastructures
ESIF	European Structural Investment Funds
EU	European Union
FTE	Full-time equivalent
GSF	Global Science Forum
JPI	Joint Programming Initiatives
KPI	Key performance indicator
MS	Member States
NRIRMP	National Research Infrastructures Roadmapping Procedures
OECD	Organisation for Economic Co-operation and Development
R&D&I	Research, development and innovation
R&I	Research and innovation
RI	Research Infrastructure
RIS3	Research and Innovation Smart Specialisation Strategies
VAT	Value Added Tax



## 1. Executive summary

The present Annex reports the development process and the general findings from the case studies on funding of Research Infrastructures (RIs) in Europe, which have been conducted within the scope of the activities of InRoad.

The information from the case studies described in this document was obtained through a series of interviews conducted between months 14 and 18 of the project, respectively between 28 February and 29 June 2018 – with representatives of 17 European RIs from different scientific areas and typologies. Following a structured methodology, the interviews were organised to gather insights on the use and combination of funding sources throughout different stages of their lifecycles. The pool took into account (to the extent possible) the heterogeneous European RI landscape, selecting facilities from different scientific domains, different typologies (distributed or single-sited), in different lifecycle stages and with different funding models. This process was also supported by the organisation of five Regional Technical Workshops (RTWs), where stakeholders could discuss issues related to RI funding.

Overall, this document lays out and analyses the information collected during the interviews. Where appropriate, inputs from the RTW were inserted. The cumulative process herewith described allowed the definition of four main recommendation areas, to be further developed in Deliverable 4.5 of the project: Lifecycle approach; Closer synergies among funding frameworks; Exchange of knowledge for funding solutions; Demonstration and communication of RI's scientific and strategic relevance and their broader societal impact.

## 2. Introduction

The European RI landscape is undergoing a process of continuous change whereby RIs evolve from the early stages of their construction to their operational and subsequent phases. The diversity of available funding instruments during early stages (e.g. concept development, design, preparation and implementation) stands in contrast with the lack of suitable funding instruments for the operational phase. This highlights a shortage of adequate, realistic, and predictable funding mechanisms and models, necessary to cover the entire lifecycle. This is especially important given that the transition from implementation to subsequent phases often entails a change of funding sources. Therefore, closer synergies among different funding instruments and across different levels are needed to provide more stability throughout all stages of the RI development.



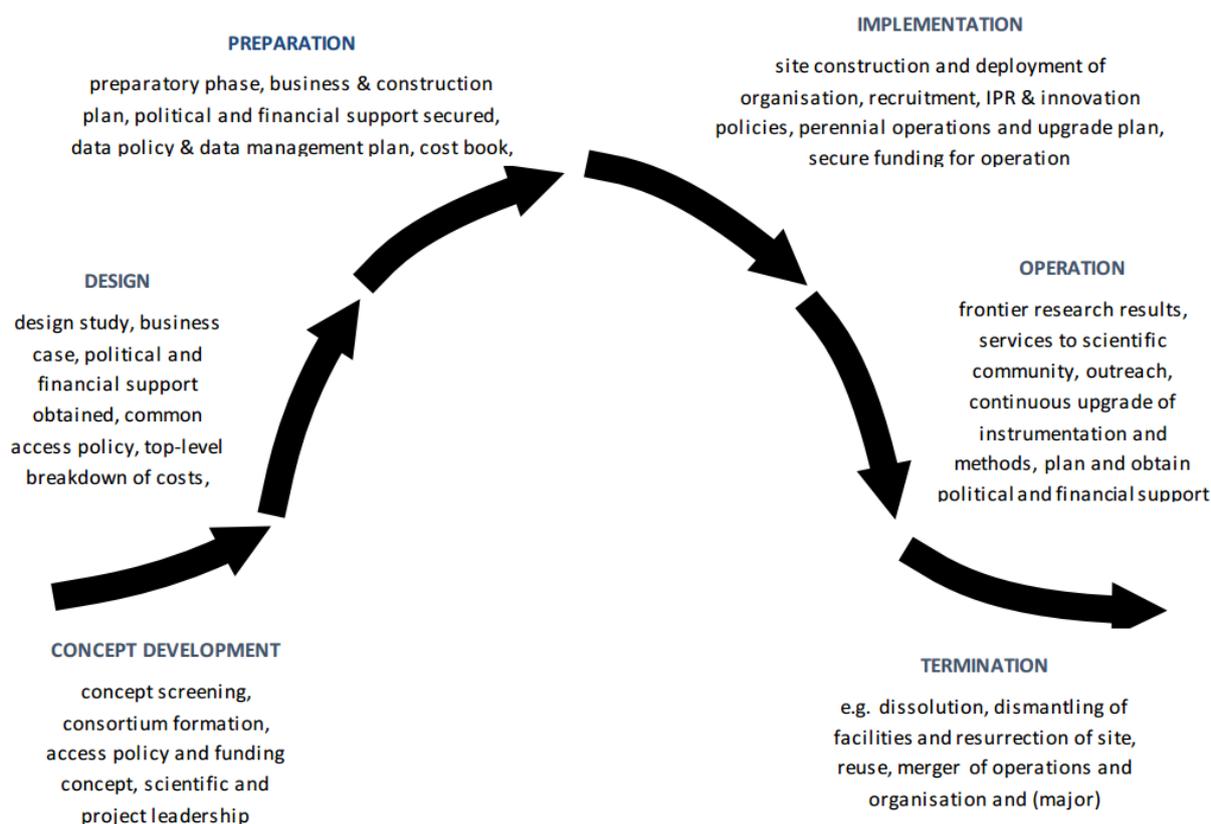


Figure 1 RI lifecycle ([ESFRI Public Roadmap 2018 Guide](#))

### 3. Methodology and data collection

Building upon the results of previous tasks of the project (for more information, please see the [Consultation Report](#)), the InRoad case studies were designed to gather new information and refining already identified insights. In addition to the information collected through previous tasks, the preparation of the interviews involved the use of secondary sources such as documents that were particularly relevant to acquire a deeper understanding of the general context, existing bottlenecks in RI funding, key stakeholders, among other topics. RI managers from different facilities were contacted, as their experience on using and combining different funding schemes throughout the RI lifecycle stages is relevant for the development of insights and recommendations. The selection took into account (to the extent possible) the heterogeneous European RI landscape, selecting facilities operating in different scientific domains and different types of RIs (distributed or single-sited), in different lifecycle stages and with different funding models.

A common interview guide was designed to create a standard framework for all interviews, and to facilitate, at a later stage, the analysis of the data gathered from the interview process. In addition, specific adjustments to the interview questionnaire were made when needed or justified by the specific nature and context of the RI (e.g. inclusion of questions regarding the linkage of funding decisions to national roadmapping processes depended on the existence of such roadmap for RIs at the national level).

Overall, for the approach and design of the individual interview questions, the following topics served as the basis for the interviews:

1. Which funding schemes exist in different European countries and what phases of an RI's lifecycle do they cover?



2. How are funding decisions in different countries interlinked with RI roadmapping processes (or other ways of defining strategic priorities for RIs)?
3. How can the existing funding schemes be adapted to provide better framework conditions to cover each phase of a RI's lifecycle?

Consent forms were sent to each of the interviewees to make them aware of the purpose and terms of the study, and the implications thereof. Following the interviews with RI representatives, all answers were transcribed and shared with the interviewees, for their verification and approval. Once validated by the interviewees, the data for each individual case study was then inserted into a multi-level matrix, which had been designed to aggregate all relevant findings, quotes from interviewees, reflections from InRoad partners and also to allow a cross-case analysis. This instrument provided a simple overview of all related quotes (taken from the interview transcripts), inputs (from other project's activities in regards to a specific RI) and reflections (elaborated by the team that performed each interview). Through the matrix, good practices and bottlenecks were identified, which then helped develop InRoad's initial recommendations.

The data collection process also largely benefited from the regional technical workshops (RTW) that were organized sequentially between November 2017 and May 2018. The InRoad Regional Workshops, held in [Prague](#), [Rome](#), [Hamburg](#), [Aveiro](#) and [Wroclaw](#) between 2017 and 2018, provided a space for stakeholders to discuss and deliver a set of recommendations, that were organised and presented in the [Report from the Regional Technical Workshops](#) around the following topics: the main bottlenecks encountered during the different RI phases, the importance of the national roadmap process, timing and funding, the experiences with regard to the long-term funding of RIs, and recommendations for a better coordination of the different levels of RI funding (regional, national and European).

## OVERVIEW OF LITERATURE ANALYSED

The [Regional Technical Workshops reports](#), the [Consultation report](#) and the literature sources listed below were used for the analysis.

- [Bulgarian Presidency Flagship Conference](#): Research Infrastructures beyond 2020 – Sustainable and effective ecosystem for science and society, Conference Conclusions. Sofia, 22-23 March 2018.
- [ESFRI Scripta Volume II](#): Long-Term Sustainability of Research Infrastructures. European Strategy Forum on Research Infrastructures, Long-Term Sustainability Working Group, Published by Dipartimento di Fisica – Università degli Studi di Milano, October 2017.
- [OECD – Strengthening the effectiveness and sustainability of international research infrastructures](#), OECD Science, Technology and Industry Policy Papers, No. 48, OECD Publishing, Paris, 2017.
- [Sustainable European Research Infrastructures – A call for action](#); COMMISSION STAFF WORKING DOCUMENT – Long-term sustainability of Research Infrastructures, 2017.

Once the case studies were defined, relevant information on the specific funding models and experiences of each RI was gathered. Prior to the drafting of the 17 case studies, research work was conducted as a preparatory task for the inclusion of specific adjustments to the questionnaire. Besides policy documents from different *fora* (e.g. ESFRI, the OECD, Science Europe, the Royal Society and the European Commission, etc.), special attention was devoted to reports and other documents published by RIs (annual reports, business plans, statutes, deliverables, etc.).



## OVERVIEW OF INSTITUTIONS AND PEOPLE INTERVIEWED

From their design, the InRoad case studies aimed to cover a broad spectrum of experiences and capturing the main differences in Europe with respect to different research and innovation systems. For that purpose, the selection methodology took into account different criteria. With the goal of assuring a broad representation of realities, the case studies **aimed to cover all scientific domains of RIs**, according to the categorisation of the 2018 Roadmap with ESFRI Projects and ESFRI Landmarks (i.e. Energy, Environment, Health & Food, Physical Sciences & Engineering, Social & Cultural Innovation and Data, Computing and Digital RI).

Recognizing that there are specific implications with regard to the type of RI, i.e. single-sited or distributed, the case studies sought to strike a **balance between the two typologies**. With 53% of the case studies being distributed RIs, for which national nodes or the central hub were interviewed, the remaining 47% were single-sited RIs.

Regarding the lifecycle approach, the selection of RIs took into account the **coverage of all stages** applied by [ESFRI](#) (vide infra), which is coherent and consistent with RI funding under the (i.e. concept development, design, preparation, implementation, operation and termination). By definition, operational RIs have experience in the previous stages of the lifecycle, and are therefore more capable of providing in-depth insights. Hence, a major part of the case studies focused on the operational phase of RIs. Moreover, in previous tasks of the project, it had become evident that RIs face more funding-related bottlenecks during the operational phase. Thus, around 70% of the covered RIs **are currently in their operational stage**, with the remaining percentage either undergoing the preparatory (about 12%), implementation phase (also 12%), or in transition from preparation to implementation (representing less than 6%).

Taking into consideration the different criteria, the following table provides an overview of the 17 selected RIs organised according to their specific scientific domain, typology, lifecycle stage and interview date.

<b>RI</b>	<b>Scientific domain</b>	<b>Typology</b>	<b>Lifecycle stage</b>	<b>Interview date</b>
<b>RI 1</b>	Environment	Distributed	Preparation	28.02.2018
<b>RI 2</b>	Physical Sciences and Engineering	Single-sited	Operation	01.03.2018
<b>RI 3</b>	Physical Sciences and Engineering	Distributed	Operation	21.03.2018
<b>RI 4</b>	Environment	Distributed	Operation	29.03.2018
<b>RI 5</b>	Data, Computing and Digital Research Infrastructures	Single-sited	Operation	03.04.2018
<b>RI 6</b>	Environment	Distributed	Operation	03.04.2018
<b>RI 7</b>	Health & Food	Distributed	Operation	12.04.2018
<b>RI 8</b>	Data, Computing and Digital Research Infrastructures	Distributed	Operation	12.04.2018
<b>RI 9</b>	Physical Sciences and Engineering	Single-sited	Interim/Transition	12.04.2018
<b>RI 10</b>	Physical Sciences and Engineering	Single-sited	Operation	25.04.2018
<b>RI 11</b>	Health & Food	Distributed	Implementation	30.04.2018
<b>RI 12</b>	Physical Sciences and Engineering	Single-sited	Implementation	24.05.2018
<b>RI 13</b>	Physical Sciences and Engineering	Single-sited	Operation	24.05.2018
<b>RI 14</b>	Health & Food	Single-sited	Operation	25.05.2018



<b>RI 15</b>	Social & Cultural Innovation	Distributed	Operation	25.05.2018
<b>RI 16</b>	Health & Food	Distributed	Operation	29.05.2018
<b>RI 17</b>	Energy	Single-sited	Preparation	29.06.2018

Table 1: Overview of RI profiles selected for InRoad's case studies on RI funding.

In addition to the aforementioned selection criteria, the existence of contact persons from RIs was also an important factor in the selection process, as it guaranteed an entry point for interactions and gathering of information by InRoad.

The following section presents the analyses of the information collected during the interviews and RTWs according to the following structure: (i) NRIRMP and funding, (ii) Funding instruments used by RIs, (iii) Lifecycle approaches and decommissioning, (iv) Users and access policy, (v) Training, and (vi) Other mentioned topics and bottlenecks.

## 4. Findings on RI funding

The InRoad [consultation](#) showed that 93% of responding countries linked their RI funding decisions with the definition of strategic priorities, suggesting that this is perceived as an important aspect by the majority of consulted countries. In spite of this, funding from different sources (regional, national, European) along the different RI lifecycle stages, particularly for operation and termination - is not guaranteed within existing funding frameworks. A higher degree of coordination is therefore needed through **a better understanding of existing RI funding instruments and regulations across all RI lifecycle stages**. This is specifically the case for long-term oriented RIs, where multi-source funding models, as well as transparent and simple application processes are necessary to ensure stability throughout all lifecycle stages.

Overall, the lifecycle model for RIs is a reference to realistically understand the needs and targets of RI at a given time and on various levels. Funding dynamics, therefore, should be adapted accordingly to meet the requirements of RIs, safeguarding the long-term sustainability while securing at the same time effective and efficient spending. The richness of RI typology, the specific requirements based on the different RI lifecycles and organizational structure, and not least the relatively large financial resources required, result typically in complex RI funding models.

While the **concept development, design and preparatory phases** are typically funded through individual grants (from institutional, national funding, or EC schemes), the **implementation phase** of RIs tends to be funded through the combination of several funding channels. In the case of single-sited RIs, a large investment for the construction period (which may last several years) is made. For this, financial resources from several sources are used from national funding agencies (typically), EU structural and investment funds (ESIF), research grants, donations from charities, loans, and from the involvement of other stakeholders including private companies. This multisource financing, with the restrictions from different underlying rules and regulations, represents an additional challenge in terms of financial management and planning. In the case of distributed RIs, the aspects abovementioned may also apply to the setting up of a Central Hub or the construction or upgrade of the national nodes. The **operational phase** of a RI is connected with operation, maintenance and upgrade costs, which are typically in the order of 10-20% (per year) of the initial capital investment. However, these costs can often not be covered from the same sources as the RI implementation costs, due to eligibility rules of the funding instruments. **It is of utmost importance that adequate funding sources are identified and prepared already during the planning of the RI implementation.** Similarly, it would be beneficial to include the costs of regular periodic updates in the financial planning



of the RI operational phase and to prepare contingency measures in case of unforeseen developments. The operation costs are intrinsically connected with the RI governance model, and it is crucial for the smooth RI operation that the chosen legal structure is suitable for the corresponding funding streams. Not much experience has been gathered yet with regard to the **termination phase** of the RI, though it is obvious that it entails considerable costs – especially in the case of large-scale facilities.

All bottlenecks mentioned above are amplified for international and highly distributed RIs. The role of timely planning, coordination and alignment of rules and procedures is therefore pivotal.

Moreover, it is also worth stating that more than 58% of the RIs chosen for the case studies were included in the [2018 ESFRI Roadmap](#), as part of the 'ESFRI projects & ESFRI landmarks', more than 23% of the selected RIs have been awarded the ERIC legal status and only one of the case studies confirmed the existence of a formal funding plan for the termination phase.

Overall, the case studies focused on some specific discussion topics with implications on the funding of RIs. More concretely, the collected insights focused on: the relationship between National RI Roadmapping Procedures (NRIRMP) and funding; the funding instruments used by RIs; insights on lifecycle approaches and decommissioning; feedback from RIs on users and access policy; training and a final overview of the main bottlenecks and recommendations. Hence, the following observations result from the collection of views expressed by the case studies' interviewees. In addition to some general insights, the segments of blue text highlight specific findings.

## NRIRMP AND FUNDING

RIs are often the result of a coordinated effort to gain greater scale in a specific scientific area through the aggregation of already existing infrastructures and focal teams, with the goal of scaling-up capabilities and leading to a smart specialisation. As previously mentioned, the funding of these RIs over the course of different lifecycle stages often entails the combination of different funding sources. However, assuring this multisource funding with very lean coordination between bodies is a challenge for the sustainability of RIs. Furthermore, considering the availability of the different funding sources and the funding needs of RIs, the need for prioritisation is well perceived across all RI representatives. In this context, roadmapping processes tend to play a pivotal role (both at national and European level) and their importance was recognised by the interviewees. Nevertheless, the different case studies revealed a significant variety of experiences regarding the inclusion of each RI in the national and ESFRI roadmaps and the implications of such on assuring the funding sustainability of the RI.

- **Key finding 1.** *Although roadmaps are perceived to be a valuable tool, some RI representatives stressed the importance of the specific context of each country that designs and implements it. The success of priority setting exercises seems to highly depend on the ability to set in motion long-term perspectives and commitments. Moreover, from the RI management's perspective, it seems to be important that the roadmapping process is accompanied by a perspective of funding.*

With regard to the implications of the roadmapping processes to secure national funding for RIs, the insights collected also highlighted a wide range of experiences. In some cases, the decision of including a new RI into the national roadmap is simultaneous to the decision of allocating basic public funding (e.g. Ministry of Education, Youth and Sports of the Czech Republic). In those cases, the inclusion on the roadmap implies some national funding



commitment. In other cases, although it is a formal condition to apply for funding, the inclusion in the national roadmap does not guarantee access to funding (e.g. France).

Furthermore, other perspectives were identified regarding the importance of roadmapping processes. Whether it is due to the scientific domain, existing relationships with industry, or the national context, for some RIs, being part of a national roadmap is sometimes not perceived as essential or even appropriate.

Nevertheless, in the majority of the case studies, national roadmapping processes were deemed as essential to secure national funding, as well as for international networking. Moreover, during one case study, an interviewee suggested strategically aligning pan-European RIs to EU and global initiatives (e.g. Climate Initiative) as a potential way to further promote coherence among strategies.

During the case studies, some RIs also stressed the influence that ESFRI has on the development of national roadmaps. In cases of absence of a national roadmap, the ESFRI one is sometimes considered to be an important tool to reaffirm the RI's relevance at the national level.

- **Key finding 2.** *The inclusion of a RI in the ESFRI roadmap does not always assure the governmental support for the inclusion in their national RI roadmaps. Being part of a national roadmap often implies that a considerable amount of funding will be provided to the nodes and this implies national commitment. Even though the logic should be that ESFRI includes the RIs put forward by national governments, some distributed RIs see the absence of national nodes in the national roadmaps as a symptom of lack of governmental support.*
- *In some cases, letters of support from the Central Hub to the respective national authorities of the RI's nodes can be helpful to describe progression, thereby informing the funding authorities of the importance of the RI.*

Retrospectively, it seems that the ESFRI roadmap has played a crucial role stimulating MS and some AC to develop their own national roadmaps. Yet, the alignment of timelines for national and ESFRI roadmapping processes remains challenging. In regards to this, the RTWs demonstrated that the criteria, timing and processes in national RI roadmaps vary from country to country, creating a domestic regulatory framework that presents weaknesses for European Union-level cooperation and growth. Furthermore, participants commented that updated lists, maps or documents of already existing RIs in EU MS and AC are not always available for online consultation. In this context, as suggested in point 3.5 of the [Report on the RTW](#), "to the extent possible, the development and update of a list/database of existing national facilities for consultation purposes – including those involved in ESFRI projects or preparatory phases – would help to attain a better idea of the RI landscape in each country".

## FUNDING INSTRUMENTS USED BY RIs

Funding models for RIs across Europe often imply the combination of different funding sources and financial instruments. Consequently, complying with various funding regulatory frameworks and their respective cycles poses a challenge to the financial stability of RIs. This occurs because the different funding schemes often come with different rules and assume different accounting principles, which represents a problem for the RI management. Hence, careful planning is essential to assure a smooth transition from one phase to the other. Overall, the case studies' interviewees referred the financial instability herewith described as one of the main bottlenecks to their strategic development.



- **Key finding 3.** *Funding fluctuations over the different lifecycle stages are a bottleneck, namely at the level of recruitment and retention of human resources. High performance scientific facilities are in need of constant technological upgrades and of specialised personnel to operate them. It is often the case that these RIs need a major revision of the budget from construction to operation. The prediction of future costs is challenging and the resulting financial uncertainty is something that RIs often have to deal with, which is ultimately a limiting factor in the retention of highly specialised personnel and consequently in productivity.*

Although the case studies revealed a broad range of funding models, the gathering and treatment of information allowed the grouping of well-defined funding sources: regional, national, EU FP, Cohesion Policy instruments and industrial funding.

Regarding the EU FP, overall the interviewed RI representatives acknowledged its role in organizing the scientific communities around strategic societal challenges that go beyond the capabilities of EU MS. On its importance for RI funding, the case studies declared that this is an important source (and probably will maintain its relevance for the following FP periods). Although the absolute volume of funding is low, it appears to be crucial for certain activities and project logistics. More concretely, the interviewees stressed the importance of the EU FP for the development of the financial and legal model for the RI during the preparatory phase, for the implementation of the RI (including training courses and for the coordination of platforms), as well as for the provision of services and tools. Nevertheless, there were also some cases in which RI representatives have stated that the EU FP had not yet been used as a source of funding.

Regarding Cohesion Policy funding, despite differences for instance in the use of ESIF, it was clear that this source of income represents one of the main funding streams for the construction and implementation phases in some countries. Nevertheless, there were also cases where ESIF was not deemed relevant for the RI's funding model, e.g. when a facility is located in an ineligible region or when the corresponding economic or research area is not contemplated in the defined national priorities.

On the topic of national and regional funding, the findings from the case studies reveal that the overall perception is that basic funding of operational phase should be secured straight from the beginning in order to allow preparation of the competitive funding later. As for the RTWs, some participants had stressed that ensuring a transitional period from one phase to another through investments is important for the financial sustainability of RI. As recognised during the different events, securing the costs associated to the operational phase of RI through the reconfiguration of existing and/or new tailor-made financial mechanisms would be a measure well received by RI managers. Further consideration from national governments should be given to the creation of a dedicated (national, not institutional) funding line to cover operational costs. In this regard, the European Commission should look into its role as facilitator of this process.

Overall, from the RTWs and case studies, it was suggested that the operational budget should still benefit from significant national contributions in later phases, in order to prevent the instability caused by budget fluctuations. In addition to annual budgeting, financial planning for upgrades was also highlighted as important during some interviews.

- **Key finding 4.** *The establishment of national funding mechanisms to cover the operational phase is just one prerequisites for sustainable funding. It is also important to find a coordination model and strategically align the different sources of national and eventually institutional funding.*



*National funding agencies play a pivotal role by supporting construction and operation of RIs, as they guarantee the functioning and excellence of scientific and research services they provide.*

Regarding industrial funding, the answers provided by the RI representatives once again portrayed a broad spectrum of situations. While discussing the relevance of private funding as a source for the operational phase, the different feedback demonstrated that, in general, this source of funding is expected to account for only a small portion of the budget. For the majority of the case studies, cooperation with industry will occur within the frame of the general institutional policy. As a result, private funding will remain a marginal source also in the future. However, in some cases, such linkage to industry is expected to rise. Nevertheless, while having close links to industry and SMEs, these RIs tend to stress that they would rather continue to work under restricted economic models, serving mainly the extension of the knowledge base.

Besides the abovementioned sources, it is also worth noting that some case studies discussed the potential of other funding schemes, such as [INTERREG](#), which promote the cooperation between local, regional and national actors from different EU MS and European Investment Bank (EIB) loans. However, the interviewees who mentioned these also reflected on some of their limitations (e.g. budget availability and suitability for RI funding). Moreover, the Wellcome Trust, the Wallenberg Foundations, the Bill & Melinda Gates Foundation and the Chan Zuckerberg Foundation were also mentioned, as funding sources that have been used or are being considered by some RIs.

One specific subject tackled during some of the RTWs was related to in-kind contributions. As they can help capacitate and the operation of RI through the provision of technical equipment and the secondment of staff, some aspects were mentioned as existing bottlenecks. Besides ownership transfer, tax and legal matters, the determination of the value of certain goods and services was argued to sometimes involve challenging, lengthy processes for the stakeholders involved. A lack of understanding of the specific know-how of a consortium partner can thus have an impact on the provision of suitable resources to an RI. In this context, understanding the capabilities and know-how of the different partners can help to effectively manage and allocate in-kind contributions in international large-scale facilities. Moreover, agreeing on a standard cost equivalent for a good or service provided by a contributor to a RI (irrespective of the real cost of origin or of execution) not only offers a solution to arduous negotiations/calculations on in-kind contributions among international partners, but also helps achieve further convergence among countries.

## LIFECYCLE APPROACHES AND DECOMMISSIONING

As it was previously mentioned, the adoption of a lifecycle approach allows to better understand the different needs and targets of RIs throughout their different stages of development. Creating long-term sustainability therefore depends on the implementation of this approach to each RI funding model. More concretely, it entails the understanding of the full continuous RI development process, from concept development until termination and – when relevant – decommissioning of facilities. Concerning long-term sustainability, the importance of considering and calculating all costs from an early stage, including those associated to dismantling the RI (if relevant), had already been highlighted by some workshops participants.

Moreover, as stressed by some interviewees, decommissioning can be much more than the mere planned shut-down or removal of a building, equipment or plant from operation or usage. It can also entail the upgrade of new facilities, with materials that can be re-used for



other research purposes. Overall, decommissioning costs vary broadly, depending on the scientific domain and the specific characteristics of the RI.

- **Key finding 5.** *Although some RIs are aware and anticipate the need of predicting the costs of their future decommissioning, it is rarely the case that they have a clear funding plan for it.*

Hence, besides being rarely foreseen by RIs, the existence of a decommissioning plan seems to be highly dependent on the domain in which the RI operates (e.g. RIs in the field of energy are by default more aware of the need for long-term planning). In order to prepare for this phase, some interviewees have stated that the provision for their decommissioning is being anticipated through a saving plan throughout their operational phase in order to smooth the process.

## USERS AND ACCESS POLICY

The role that RIs play in the provision of services to a broader network of users, access policy and funding were topics often mentioned by the interviewees. Overall, recognising the usage of their facilities as an indicator of their relevance was an area of concern for many. According to one RI representative, the number of external (meaning international) users could be considered as a key indicator to measure the quality and strategic relevance of the RI.

Regarding access funding, the feedback obtained indicated that access to a RI can depend heavily on the scale of the research projects and level of costs associated.

- **Key finding 6.** *Some RI representatives recognised that open access and its costs should be a part of the RI mission discussion from very early stages on, on the basis of a systemic approach that entails the comprehension of the role that each RI plays in their related scientific, innovation and education systems.*

Nevertheless, some of the interviewees revealed that they do not yet have a concrete policy for user access in place. Moreover, the lack of available funding for operation also seems to cause difficulties in the implementation of a clear, structured and transparent open access policy. Moreover, as already put forward during the RTWs, *“the involvement of users from early conceptual stages of the RI can be beneficial for the design of access schemes, as well as for the validation of the fit-for-use and fit-for-purpose of research facilities. Besides this, specific actions aimed at young post docs could help raise awareness of the products and services offered by RIs”*.

From the case studies, while still far away from implementing concrete policies for user access, RIs seem to exclude the possibility of having users from public research institutions paying for access to their facilities. For other external entities, the fact that their country is a partner or not of the ERIC is considered as a criteria when assessing their access to the RI.

Overall, the existence of a high demand of RI services by users was deemed crucial to the survival and the long-term sustainability of the RI. As suggested by several RTWs' participants, improving awareness of RIs and their portfolio of services and products is essential to increase user involvement inside and outside the scientific community. Moreover, some of the RI representatives stressed high expectations for the growing relevance of virtual and remote access. In their view, it is crucial that the forthcoming funding mechanisms also contemplate the support of virtual and remote access to RIs.

Furthermore, on the relationship between RIs and the scientific and education systems, some additional and specific remarks were made by some interviewees.



- **Key finding 7.** *National instruments designed to fund universities are an efficient way to bind universities to the capabilities of large-scale facilities. A recommendation was made for the institutionalisation of a support scheme for transnational access to RIs, in order to bridge the gap between academia and more applied research.*

## TRAINING

Some of the previously mentioned bottlenecks and concerns expressed by the RI representatives here described have already highlighted the need to promote training, dialogue and other forms of knowledge exchanges between stakeholders, with regard to the coordination of funding sources. Overall, RI representatives tended to agree that very bureaucratic conditions require at least one Full-Time Equivalent (FTE) administrator, even for mid-size projects, in order to fulfil all requirements. Such an administrator needs appropriate training and this, as recognised by the interviewees, represents a cost to be taken into account in the budget.

To handle extensive information on different funding schemes available, some RI representatives consider that external help and training on how to write applications and apply for funding instruments such as those for interregional cooperation is necessary. In some cases, training courses are offered to users through the RI's training platforms. Also related to this is the shortage of qualified personnel in highly skilled areas such as big data, data mining and modelling that are relevant for RI operation and upgrading, as suggested during one of the RTWs. Moreover, during the case studies, some RIs discussed the potential of knowledge-exchanges through the mobilisation of staff. In one specific interview, it was suggested that one of the things that would be welcomed in Horizon Europe would be to expand the staff exchange scheme so that industry can be included. Adding to that, one particular suggestion that came from one of the RTW regarded the creation of an ERASMUS-type of scheme for short secondments of public civil servants, working in RI policy and funding. This could contribute to a better understanding of RI and the factors that determine the use and non-use of funding instruments as potential sources for RI funding in different countries. In consequence, it would enable more informed funding decisions, as well as a stronger funding coordination among countries through the mobility of these civil servants.

Furthermore, some RI representatives also stressed that they are aware of the present expectations to demonstrate short-term economic returns as a result of recent and significant investments made. For this, besides the aforementioned training needs on how to use the different available funding schemes, it has also been suggested that there is a need for external expertise on business planning and business plan drafting.

## OTHER MENTIONED TOPICS AND BOTTLENECKS

Throughout the conduction of all 17 in-depth case studies, besides the insights already tackled in this section, different approaches and new topics that are relevant for the subject of RI funding were put forward by the interviewees. Some of them are developed below.

- In order to build up capabilities (comparable to those of China or the United States, for example), multi-national cooperation should be fostered. For this reason, the promotion of mechanisms that combine and allow for different funding sources to be mobilised from different countries would enhance the potential of developing-national projects.



- Funding commitments are not always clear at the start of RI projects. For the operation phase, in particular, the funding of big international facilities should ideally be agreed upon when the project is being defined and not during its course. Complementarily, RIs recognise the importance of being aware of their role in their scientific, social and economic systems and anticipating external changes that require individual adjustment (e.g. foresee pressures for regulatory changes, extra-European competition, etc.).
- Regarding the ERIC status, although considered to be a commitment at the EU MS level, the case studies demonstrated that in terms of funding it is sometimes perceived as a rather weak form, with different interpretations and implications across different countries. Furthermore, feedback from the RTW demonstrated that although there is ample information out there on ERICs, the general perception is that the information is scattered and not always accessible in a concise form to everyone. Moreover, during one of the interviews, it was suggested that some economic activities are deemed to be incompatible or difficult to combine with European treaties (namely, the Euratom) and that it represents a bottleneck. Also, it was stated that it would be welcome to have all countries, adopting a common approach towards the VAT /excise duty.
- Due to insufficient national resources for RI operational costs, some interviewees demonstrated that there is an apparent tendency to substitute the national commitments by European sources, namely ESIF, even in pan-European RIs. However, the applicable financial regulations of ESIF can then become an obstacle for some phases and the planning of future expenditures (e.g. running costs).
- Clear and well-defined set of KPIs are important for transparency in decision processes and allow to set internal principles, which are then easier to be understood and followed. These KPIs could be used both for internal managerial decisions as well as for reporting to the funders. However, some interviewees stressed the importance of telling a narrative, in order to avoid misinterpretations of results. Talking about the stories, alongside the presentation of data, can be a more appropriate way to show the impact of the RI to the funders.



## 5. Conclusions

Following previous steps of data collection and interaction with relevant stakeholders, InRoad carried out the case studies with RI representatives, offering a micro-perspective on the present and past experience of RI on combining different funding schemes throughout their lifecycle stages. In this document, besides the methodology behind the selection of case studies and conduction of interviews, some of the preliminary findings and insights of InRoad regarding the funding of RI were presented.

Through the analysis of the information collected from the 17 in-depth interviews, it is possible to propose some main topics in which InRoad's recommendations on RI funding will focus:

- **Lifecycle approach:** In order to promote the long-term sustainability of RI, a lifecycle approach is needed allowing the improvement of financial predictability and stability across all stages. For this to happen, long term funding commitments, a better integration of RIs in their related scientific, innovation and educational systems as well as a focus on the promotion of access to these facilities are essential;
- **Closer synergies among funding frameworks:** Considering the multi-source funding models of RI and the existing bottlenecks that are inherent to the combination of different funding sources, closer synergies among funding frameworks are needed. For this to happen, both the alignment of priority setting processes and regulatory frameworks are needed;
- **Exchange of knowledge for funding solutions:** Given the diversity within the 'tool box' available for the funding of RIs and the complexity of their regulatory frameworks, there is the need to foster mutual learning and cooperation through the sharing of practices and the common development of funding solutions for RI. Specific budget allocations are needed, in order to allow for the development of activities that promote such goals;
- **Demonstration and communication of RI's scientific and strategic relevance and their broader societal impact:** As there are pressing expectations for RIs to demonstrate their relevance and impact, as well as a need to enhance their role, it is important to create mechanisms to foster the communication between RIs and all the stakeholders (e.g. policy makers, funders, users, society in general). In order to promote this, there is a need to develop appropriate impact measurement standards, not only through KPIs but also through qualitative information.



## Annex 1 – Interview guide for the case studies

### *Introductory questions:*

#### **How are funding decisions on RI taken in your country?**

1. Who is responsible for funding decisions in your country?
2. What kind of funding instruments are available? Institutional, project- based, ESIF, national/regional funds.
3. From a funding perspective, how important has it been for your project to be on the national roadmap?
4. Have the funding decisions of your RI (in the different phases, through the different instruments) been dependent on the NRIRMP?
5. To what extent are national RI road-mapping procedures interlinked with funding of the different life-cycle stages?
6. If the interviewee has used ESIF to fund the RI, the following questions below could be asked to further explore the use of structural funds:
  - How do ESIF operate in your country?
  - What were the conditions/requirements involved?
  - What are the implications of using these funds?
7. Is training necessary to use any of the available funding schemes?

### *Follow-up Questions:*

#### **Long-term sustainability, full life cycle cost of RI and funding instruments.**

1. Which funding instruments/sources are being or have been used by your Research Infrastructure? (E.g. national budgets, H2020, ESIF, private businesses, charities)
2. What stages of the RI life cycle are being or have been funded with these instruments?
3. What is the frequency of these funding sources? (E.g. annual, quinquennial, others?)
4. How critical are they in providing stability and excellence of services?
5. How important are industrial users to sustain your long-term funding? Please provide some examples. (E.g. annual number of users)
6. Do you often serve multiple disciplines by providing access to cross-disciplinary techniques, equipment or collections?
7. What is your access policy for non-national users? (What percentage do these represent?)
8. How did the combination of different funding schemes change over time and what are the perspectives for the future?
9. Is there a funding plan for the termination phase of the RI?



**Difficulties in short, medium and long-term funding/ Recommendations for funding of RI**

10. Do you face problems in the funding rules (where)? Any ideas on how to overcome this?
11. How do you plan to sustain the operational costs in the next ten years?
12. Are there limitations to industrial investments/user access? What are the implications?
13. Concerning the coordination of ESIF with H2020 where are the bottlenecks (limits and restrictions)?
14. To what extent can the next generation of ESIF and FP9 be aligned to suit RI processes? What parameters would have to be taken into consideration? Time? Eligibility? National and European regulatory frameworks?
15. Timing for funding and road-mapping: Any recommendations on that?



## Annex 2 – Working matrix for the analysis of case studies

	Research Infrastructure 1			(...)	Research Infrastructure 17		
	Scientific domain; Type (Distributed / Single Sited); Info: Date, location, interview team and interviewee			(...)	Scientific domain; Type (Distributed / Single Sited); Info: Date, location, interview team and interviewee		
	InRoad Reflection	Quote from interview	Other sources of information	(...)	InRoad Reflection	Quote from interview	Other sources of information
NRIRMP and context				(...)			
Existence of roadmap at the national level				(...)			
Inclusion of the RI on the NRIRMP				(...)			
Bodies involved in the funding of the RI				(...)			
Linkage of funding decisions and the NRIRMP				(...)			
Funding instruments used by the RI				(...)			
- Framework Programme				(...)			
- Cohesion Policy Funding				(...)			
- National and Regional Funding				(...)			
- Industrial Funding				(...)			
- Other Sources				(...)			
Other topics				(...)			
Policies and funding of user access				(...)			
Training				(...)			
Decommissioning				(...)			
Bottlenecks and recommendations				(...)			
Funding rules				(...)			
Good Practices of the RI				(...)			
Inputs on the combination of different funding sources				(...)			
Overall recommendations by the RI				(...)			

