synchronising research infrastructure roadmapping in Europe

D4.5 Recommendations on the synchronisation and interoperability of RI funding instruments

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Table of contents

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1. Executive summary

The present document presents the recommendations on the synchronisation and interoperability of funding instruments for Research Infrastructures (RI), within the scope of the activities of InRoad. The three recommendations here presented, on how to promote a higher degree of coordination between regional national and European funding frameworks to support the long-term sustainability of RI, are based on the cumulative findings from the sequential tasks of the project described in the following section. In particular, the Consultation Report, the Case Studies conducted, the Regional Technical Workshops and the Validation Workshop represented pivotal moments within the overall process of gathering and treating information.
A draft version of the recommendations here presented was developed and presented as one of the four policy areas of the project's briefing note for the Validation Workshop, that took place on the 1st and 2nd of October, 2018, in Brussels. Feedback and interventions from said event were herewith considered.
In section 3 of this document, the recommendations, sub-recommendations and explanatory text are present accordingly to the InRoad Final Report, where they are present alongside the other identified policy areas.

2. Methodology

As already addressed in previous publications of the project (see InRoad Case Studies on RI funding), 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 gains even more importance 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 increased stability throughout all stages of the RI development. Thus, in order to provide recommendations on the synchronisation and interoperability of regional, national and European RI funding instruments, InRoad gathered information and insights, through a cumulative approach. In particular, building upon the results of previous tasks of the project (for more information, please see the Consultation Report), the formulation of the recommendations further presented largely benefited from the conduction of 17 case studies between February and June of 2018, as well as from the regional technical workshops (RTW) that were developed in parallel, in a series of events organized between November 2017 and May 2018.

The InRoad Regional Workshops, held in Prague, Rome, Hamburg, Aveiro and Wroclaw between 2017 and 2018, gathered participants from RI, regional and national funding organisations, as well as from the European Commission Directorate-General for Research and Innovation (DG RTD). With the goal of providing a space for stakeholders to discuss and deliver a set of recommendations, the focus was set on ways to help improve the coordination of scientific policies and funding regulatory frameworks at a regional, national and European level, as well as support the robust development of RI. Following a sequential process (already described in the Report from Regional Technical Workshops), the feedback gathered from participants in each regional workshop served as the basis for the design and content of subsequent ones. Despite some variations in content and format, all workshops entailed a discussion about the main bottlenecks encountered during the different RI phases, the

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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. Albeit some differences in structure, all five workshops included a round of presentations on specific RIs and science policy cases, followed by interactive sessions (either in the form of a Q&A or parallel sessions), where participants had a chance to actively discuss issues in more detail and propose a set of recommendations. The conclusions under the relevant workshop themes were summarised by workshop rapporteurs.

The information from the case studies described in this document was obtained through a series of interviews conducted between month 14 and month 18 of the project, respectively between 28 February and 29 June 2018 – with representatives of 17 European RIs from different scientific areas and typologies. 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. 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. Alongside the cumulative findings from the InRoad Consultation Report and the Regional Technical Workshops, the 17 in-depth case studies contributed to the development of recommendations on how to promote a higher degree of coordination between regional, national and European funding frameworks to support the long-term sustainability of RIs. Once the case studies were defined, relevant information on the specific funding models and experiences of each RI was gathered. Prior to 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.).

After such tasks, InRoad drafted a list recommendations that covered the following policy areas: (i) Coordination between national and European roadmapping processes; (ii) Embedding RI roadmap processes in national research and innovation systems; (iii) Higher degree of coordination between regional, national and European funding framework; and (iv) Towards best practices and common standards for RI business planning. Such proposals were then presented in the project's Briefing Note for the InRoad Validation Workshop that took place on the 1st and 2nd of October, 2018, in Brussels. The three objectives of the Workshop were to: interactively discuss, review and validate the project's findings, insights and good practices; identify missing elements and gaps in the current findings that will be addressed in the final report; discuss challenges linked to the implementation of the project's findings. In total, 73 participants from 21 different countries participated in the Workshop. During the second day, in particular, the discussions addressed the topic regarding the higher degree of coordination between regional, national and European funding frameworks, under analysis in this document. The discussions and feedback from the presentation of this topic were considered and allowed for the refinement of the recommendations then included in the Final Report.

Therefore, the following section presents the recommendations and further explanations that resulted from this cumulative process, as presented in the InRoad Final Report and the project's Final Public Conference.

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3. Recommendations on the synchronisation and interoperability of RI funding instruments

The recommendations, sub-recommendations and further explanatory information here presented are the result of a cumulative process of development of policy insights for RI funding, which relates to one of the three different policy areas[1] established by InRoad.

In total, 10 main policy insights have been developed by InRoad in its Final Report, which cover clear messages highlighting the main conclusions of InRoad findings. Regarding RI funding, three main recommendations were elaborated – deriving from the insights cumulatively collected through the case studies, Regional Technical Workshops, the InRoad Consultation Report and the Validation Workshop – as shown below. In some cases, good practices are included as a depiction of the issue tackled within each sub-recommendation.

HIGHER DEGREE OF COORDINATION BETWEEN REGIONAL, NATIONAL AND EUROPEAN FUNDING FRAMEWORKS

A InRoad recommends that EU Member States and Associated Countries improve financial predictability and stability across RIs' entire lifecycle and guarantee the ability to provide RI services to a broad user community.

B InRoad calls for closer synergies across regional, national and European levels, both through greater coherence among priority-setting exercises within research and innovation policies and an adjustment of the regulatory frameworks of the different instruments.

C InRoad calls for fostering communication, mutual learning and cooperation through the exchange of information between RIs and other stakeholders, to promote adequate and sustainable RI funding and enhance the societal value of RIs.

[1] InRoad's final report tackles three different policy areas: #1 Higher degree of coordination between national and European RI roadmapping processes; #2 Higher degree of coordination between regional, national and European funding frameworks; and #3 Best practices and common standards for business planning.

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HIGHER DEGREE OF COORDINATION BETWEEN REGIONAL, NATIONAL AND EUROPEAN FUNDING FRAMEWORKS

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. Funding dynamics, when appropriately adapted to meet the requirements of the RI throughout its lifecycle, contribute to safeguarding its long-term sustainability and securing effective and efficient spending.

The richness of the European RI landscape, the specific requirements based on the different RI lifecycles and organisational structures, and not least the considerable financial resources required, result typically in very complex RI funding models. Therefore, timely planning, coordination and alignment of rules and procedures are pivotal.

A InRoad recommends that EU Member States and Associated Countries improve financial predictability and stability across RIs' entire lifecycle and guarantee the ability to provide RI services to a broad user community.

FINANCIAL PREDICTABILITY AND STABILITY ACROSS THE ENTIRE LIFECYCLE OF RIs

Most RIs reach maturity after a few years of operation, but their operational costs cannot always be covered solely by the budget of host institutions. Therefore, additional sources of public funding are often needed. Consequently, **InRoad advises that the sustainable long-term financing of these RIs and additional operational and investment costs be considered already in the early planning stages** in order for new RIs to ensure their sustainable operation.

> ***Good practice 1: Long-term perspective for funding commitments and cost predictions.*** *For the roadmap proposal, the Netherlands Organisation for Scientific Research (NWO) asks for a 10-year budget for the full costs of a RI. Additionally, in the Netherlands 50% of the operational costs are funded during a period of 10 years under the condition that the facilities applying for funding commit to paying the other half of the operational costs. For the proposals, the hosting organisations are asked to submit a letter of intent in which they commit to financing half of the operational costs for 10 years. This way, the NWO ensures that the applicants deal with a business plan and financing strategy while applying for the roadmap.*

Overall, the diversity of available funding instruments during early stages (concept development, design, preparation and implementation) stands in contrast with the lack of suitable funding instruments for the operational phase. This leads to a shortage of accurate and predictable funding mechanisms and models, necessary to cover the entire lifecycle. In particular, for a smooth transition between phases, the high burden of costs related to the early stages of RIs' operational phase requires special attention.

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> ***Good practice 2: Funding commitments for initial stages of operation.*** *The Czech Republic has introduced two measures for RIs and Centres of Excellence, which were built through investments from the Operational Programme Research and Development for Innovation (2007-2014). Cross-funding (up to 20%) using ESIF was introduced and negotiated for large (above €50M) projects. This facilitated the initiation of research activities and the building of scientific competences already in the construction phase of the large infrastructures. These resources allowed for a smoother transition from the implementation to the operational phase. Similarly, a national sustainability programme funded from the state budget was designed to provide the infrastructures with sufficient resources to bridge the initial period (five years) before competitive funding became active.*

Budgetary fluctuations and unpredictability in political decision-making are identified not only as challenges for sustainable funding but also as risks in the operation of international large-scale facilities. Hence, they need to be addressed in order for Europe to stay at the forefront of science and technology. Political consensus at regional, national and European level is essential to ensure the technological and scientific RI capabilities needed to withstand increasing global competition. In light of this, it is particularly important to secure basic funding for the initial period of the operational phase (even in cases where competitive funding is assumed to be a major source of RI budget at later stages), and national contributions for continued operation. This would allow forward planning and timely preparation of RI strategies, and also facilitate the recruitment and retention of human resources needed to operate state-of-the-art facilities. At the national level, this requires strategic and budgetary commitments that can be sustained through several governmental mandates.

For RIs of international relevance, the securement of funding along their lifecycle implies the commitment of different national governments. Whereas for RIs based on intergovernmental agreements the securement of national budget allocations is assured throughout a robust governmental/parliamentary procedure, the European Research Infrastructure Consortium (ERIC) status is often perceived as implying weaker national commitments and the decision is usually taken at the level of a single ministry or funding agency. In this context, **InRoad suggests that, at national level, budgetary commitments for ERICs be planned in a similar way as for intergovernmental organisations**.

Furthermore, although some RIs are aware of the abovementioned challenges and anticipate the need for predicting the costs for upgrading and even decommissioning, the InRoad case studies demonstrate that they rarely have a clear funding plan for it. Ultimately, **a combination of long-term strategic vision, followed by stable funding and greater commitment from national governments, agencies and institutions would support the sustainability of these state-of-the-art facilities**.

BETTER INTEGRATION OF RIs IN THEIR RELATED SCIENTIFIC, INNOVATION AND EDUCATION SYSTEMS

RIs are intrinsically related to multi-level systems and take part in shaping different scientific, socio-economic and societal dynamics. The services and products provided by these RIs facilitate cooperation between facilities and sharing of equipment, techniques and expertise across scientific communities, industry and others. In addition to bringing communities closer and pooling resources, RIs play a key role scaling-up research, development and innovation capabilities to create value for various stakeholders. However, despite the increasing attention from policymakers and funders on the provision of RI services targeted at industry and broader society, RIs — similarly to public universities and research institutions – work under

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restricted economic models, serving the extension of the knowledge base. Moreover, scientific breakthroughs in certain disciplines may take decades to appear. In that context, **although the declared impetus for RIs to engage in industrial R&I activities is welcome, InRoad recommends avoiding pressing incentives to produce short-term results**.

In view of promoting a more effective integration of RIs in the abovementioned systems, a closer interaction with the broader user community (also as co-creators) can help increase the visibility of RIs and their services, as well as contribute to their sustainable development in the long-run. For this to happen, RIs are encouraged to continue communicating and engaging with relevant stakeholders (e.g. academia, small and medium enterprises (SMEs), industry and funders) regarding their scientific and technical capabilities, and also to gather their feedback on RI services and product development. At the same time, there is still potential for a deeper integration of RIs in educational and innovation systems, with an important role to be played by national governments and institutions in facilitating and promoting access. **At the European level, closer connections within thematic areas in the EU Framework Programme for Research and Technological Development (EU FP) could generate better integration of RIs in the mentioned systems, namely through closer links to the missions, partnerships, and pillars II and III of Horizon Europe**.

Furthermore, Citizen Science is also a topic worth exploring within the scope of public engagement and outreach in order to raise awareness and reduce the gap between society and both basic and applied research in certain fields (e.g. Structure of Matter, Personalised Medicine and Key Technologies).

STRENGTHENING NATIONAL AND INTERNATIONAL FUNDING MECHANISMS FOR ACCESS TO AND COORDINATION OF FACILITIES

State-of-the-art RIs play an important role in the provision of scientific and technical services to user communities by engaging with different stakeholder groups (i.e. scientific communities, public bodies, private companies and society at large). These resources and services enable key developments in a range of areas with societal relevance such as health, energy, and environment, where market failures exist, e.g. in the development of treatments for rare diseases or the development of cleaner and safer sources of energy such as fusion. Considering the contribution RIs make to scientific and technical progress, through their capabilities and by stimulating the growth of their surrounding innovation ecosystems, it is vital to design transparent access and user policies. **InRoad recommends designing policies on different access models adapted to each of the user categories.**

In this context, through the establishment of dedicated programmes for user access and the development of calls for expression of interest from industry and other research institutions, some RIs have demonstrated the ongoing efforts for setting up specific measures aiming at an effective integration and the provision of services to their broader user community.

> ***Good practice 3: Different access models adapted to different user categories.*** *CALIPSOPlus is a collaboration of accelerator-based light-sources in Europe and in the Middle East that provides transnational access to 14 synchrotrons and eight free electron lasers, as well as an access route tailor-made for SMEs. The project focuses mainly on newer EU MS, which are still un-derrepresented among users. Within the first 18 months, 16 visits to universities and research centres in these countries have been organised and more are planned to disseminate the knowledge on these facilities, provide free access and participate in a specially conceived twinning programme for users.*

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On the promotion of access and usability of data by scientists and society, it is also possible to identify some measures that are being designed and implemented towards the provision of services to the worldwide community (e.g. the Group of Senior Officials' list of RIs).

As the long-term sustainability of RIs is dependent on their capabilities to serve broad user communities, a clear definition and planning of costs for access is therefore crucial. In this context, **InRoad recommends that these costs be considered in the discussion of the mission of the RI from early stages on**, in relation with the business plan (recommendation 8). Furthermore, due to the current lack of funding for these activities, there is a need to develop the potential of promoting better coordination between European and national sources, as well as with sectoral initiatives (e.g. League of European Accelerator-based Photon Sources (LEAPS) initiative, Laserlab Europe).

Moreover, InRoad recommends that **new and existing access funding instruments take into account the diversity of user profiles and needs**. Because of the ongoing digitalisation of processes, – especially for knowledge produced in the form of consultable data – it is also crucial that the forthcoming funding mechanisms contemplate the support of virtual and remote access to RIs.

Considering the growing trend of providing open access to RIs, as well as the goal of creating an integrated ERA, the defragmentation and optimisation of resources through common standards and harmonised access rules are important. However, this requires **designing policies that ensure access to RIs through the principles of transparency, non-discrimination, information and competition (i.e. the European Charter of Access to RIs) and ensuring their effective implementation.** The considerable benefit of the EU transnational access (TNA) funding instrument in this context was highlighted by representatives of the scientific community and of RIs in most of InRoad's workshops.

Nevertheless, although the focus is herewith set at the level of transnational access, interactions and feedback from the Validation Workshop also highlighted existing bottlenecks in assuring funding for national access to RIs. As the TNA instrument is not designed for providing access to national RIs, there is also a potential for reinforcing the national support for such a purpose.

B **InRoad calls for closer synergies across regional, national and European levels, both through greater coherence among priority-setting exercises within research and innovation policies and an adjustment of the regulatory frameworks of the different instruments.**

GREATER COHERENCE AMONG PRIORITY-SETTING EXERCISES WITHIN RESEARCH AND INNOVATION POLICIES ACROSS REGIONAL, NATIONAL AND EUROPEAN LEVELS

Building pan-European RIs requires a combination of regional, national and European Union funds through different types of funding instruments, depending on the different stages of the RI lifecycle. In addition, there seems to be a lack of exchange and sharing of expertise on how to coordinate different sets of funding instruments at the level of RI management. Indeed, the suitability of those instruments varies depending on the type, scientific domain and lifecycle stage of the RI. Moreover, as the ESIF and EU FP have different objectives, coordination among these frameworks remains a challenge.

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In view of closer synergies between funding frameworks, building on existing and future competences is also important. National calls for proposals, ERA Networks, European Joint Programmes (EJP), Joint Programming Initiatives (JPI), Article 185 of the Treaty on the Functioning of the European Union (TFEU) and missions and partnerships in Horizon Europe, all offer good opportunities to maximise synergies by bringing scientific communities, industry (including SMEs) closer to the services and resources provided by RIs.

> ***Good practice 4: Synergetic approaches for research-based investments.*** *Since 2015, the National Institute of Health Carlos III (ISCIII) — the main funding organisation for biomedical research in Spain — includes ECRIN ERIC in its annual call text for proposals for clinical research, in order to foster the use of this RI's services by national biomedical research groups applying for funding, to align national strategic priorities with those of the RI, and to maximise Spain's return on investment for biomedical research. Spain is a member and financial contributor to ECRIN ERIC through the ISCIII.*

As stressed on several occasions during the RTWs, national RI roadmaps are often perceived among RI managers as a valuable tool for strategic activities. However, some processes for elaborating national research, development and innovation policies do not take them sufficiently into account. In this context, there is still potential for specialisation-based approaches through landscape analyses that explore the relevance of each RI for different national research and innovation policies. Moreover, the timing of roadmaps and updates is also a critical element in the stability of RI funding – notably, for new RIs.

The publication of the first ESFRI Roadmap in 2006 marked a milestone in the structuring of the ERA. Numerous examples highlight the important role that ESFRI Roadmaps have played in supporting a more coherent and strategy-led approach to policy-making on RIs in Europe, as well as their role in enabling multilateral initiatives that have contributed to a better use of research facilities at the EU and international level. One effect of this coherent and strategy-led approach is the increasing number of priority-setting exercises in Europe for strategic investments in R&I. For instance, among distributed RIs in particular, as the RTWs and case studies showed, there is a shared perception that the inclusion of a node in its corresponding national roadmap is not just a key step to secure funding but also an opportunity to be part of the long-term national vision and strategy for R&I.

Furthermore, the implementation of national research policies in certain European countries depends to a great extent on ESIF, within the framework of Cohesion Policy. The feedback obtained from the RTWs shows that the use and implementation of ESIF across regions is quite diverse. When it comes to distributed RIs, the setting of objectives and their practical implementation highlight some of the difficulties involved in the application of this instrument. Moreover, aligning regional policy with a pan-European mission can also be challenging; while the latter looks at Europe as an assembly of Member States, the former looks at Europe as distinct regions. In view of this, where new measures are proposed, **further consideration should be given to identifying the possible coordination between regional, national and European R&I policies** (namely, RIS3, national research strategies, national roadmapping processes, ERA Roadmap, ESFRI Roadmap).

> ***Good practice 5: Strategic coordination of priority-setting exercises.*** *In countries where structural funds play an important role in the funding of RIs, RIS3 gain particular relevance as they have become mandatory in the Cohesion Policy to streamline the investments in R&I funded by the ESIF in each region or country. In Portugal, the national RI roadmap evaluation included an assessment of its strategic relevance, measured through the facilities' strategic potential to the attainment of national R&I policy and RIS3*

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(both national and regional) objectives. Aligning both processes of priority setting (i.e. RI roadmapping with RIS3) could help create a favourable environment to maximise the potential of combining different funding sources (e.g. national funding, ESIF and EU FP).

Good practice 6: Coherent approaches for funding prioritised RIs through different mechanisms. *Italy has introduced one measure for RIs, under the National Operational Programme (NOP) Research and Innovation 2014-2020, aimed at strengthening the RIs identified by the Ministry of Education, Universities and Research (MIUR) as priorities in the National Programme for Research Infrastructures 2014-2020. RIs eligible for NOP are functional to the implementation of projects compliant with one or more ESFRI domains, have a significant impact on the specific development trajectories of the national RIS3, and will promote interventions in less developed or transition regions. This call, 'Enhancement of Research Infrastructures' (100% of eligible costs – €5-20M), acting outside 'State Aid' regulation, allows, mainly, for purchase of scientific instrumentation, upgrade (or extension) of scientific equipment, software licenses, etc. These investments and others related to RIs considered as a national priority are also supported with national funds, through the dedicated Ordinary Fund for Public Research bodies.*

In this context, it is also relevant to point to the ongoing work on the abovementioned topic of convergence between the EU FP and the Cohesion Policy, as it is the case of Stairway to Excellence[2].

ADJUSTMENT OF THE FUNDING REGULATORY FRAMEWORKS ACROSS REGIONAL, NATIONAL AND EUROPEAN LEVELS

The combination of different funding sources throughout the stages of the lifecycle of RIs requires compliance with and coordination of different frameworks and sets of regulations across regional, national and European levels. Given the differences between funding requirements of national budgets, ESIF and EU FP, a coordinated effort among EU MS, AC and the EC for the simplification of rules would contribute to reducing the overall level of bureaucracy and financial uncertainty, thus improving long-term organisational and strategic decision-making. In particular, **InRoad calls for the simplification and alignment of rules between ESIF (for R&I) and EU FP – or even the adoption of a common regulation**. This would be welcomed by the RI community. It is also worth exploring the possibility of complementarity with other funding sources for R&I, especially for forthcoming periods (e.g. InvestEU, European Investment Bank loans and others).

In cases where the provision of national resources is generally lacking, national commitments tend to be substituted with ESIF (even in pan-European RIs). As a consequence, the applicable financial regulations of ESIF can become an obstacle in certain phases and for the planning of future expenditures of the RI.

Ensuring a transitional period between implementation and operational phase that allows partial funding of operational costs through ESIF would contribute to bridging the existing gap. This holds particularly true in disciplines like data and High-Performance Computing (HPC), where systems rapidly become obsolete and host organisations are under continuous pressure to cover expenses related to software, support and maintenance. However, some conditions need to be considered. Besides planning for funding of following stages, after the period covered by ESIF, this transitional period would need to be clearly

[2] Pilot project by the European Parliament and executed by DG-JRC: https://ec.europa.eu/jrc/en/research-topic/stairway-excellence-s2e

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defined (for example not surpass three years), as well as coupled and dependent on a compromise for national funding. This way, RIs could have their impact and sustainability positively reinforced.

> ***Good practice 7: Funding of start-up research activities parallel to the construction phase for a smooth transition to the operational phase.*** *The ERDF-ESF cross-funding scheme in the period 2007-2013 (or the analogues 15% of flexibility under the present ESIF framework) has been applied by some RIs (when foreseen in the operational programmes) to bridge the implementation and operational phases of the RIs' lifecycle. Hereby, the RIs experienced twofold benefits from the early start of research activities: (a) the bridging funding allowed to settle the RI scientific support and prepare research projects already in the final stages of the construction, by which the transition to competitive funding was shortened (analogy of 'valley of death' for commercial start-ups), and (b) the presence of the research staff in the final construction phase allowed for the installation of scientific instruments to be adjusted to concrete user needs, therefore reducing the number of adaptations in later phases.*

Moreover, InRoad recommends the development of a common approach among the different countries and the EC on issues that deeply affect the multilevel articulation of the European RI ecosystem. The provision of in-kind contributions, for example, would benefit from common and clearly defined methodologies for collecting, reporting and accounting. This is particularly relevant for in-kind contributions of equipment and secondment of staff in international large-scale facilities.[3] Another example that illustrates this point as well is the Value Added Tax (VAT)/excise duty. Regarding abovementioned needs for a common approach and greater coordination, already existing fora (such as ESFRI) can play a pivotal role by promoting exchanges of experiences and information.

> ***Good practice 8: Promotion of greater coordination through common frameworks with implications for RI funding.*** *The ERIC framework was created as a legal personality for European RIs, which is recognised by all EU MS and that has certain advantages in comparison with others such as exemption from VAT and excise duty. Thus, many of newly implemented RIs have adopted it as it is seen as a rather flexible framework with many benefits. Nevertheless, there is room for improvement in the harmonisation of interpretations among EU MS.*

C **InRoad calls for fostering communication, mutual learning and cooperation through the exchange of information between RIs and other stakeholders, to promote adequate and sustainable RI funding and enhance the societal value of RIs.**

SHARING OF PRACTICES AND COMMON DEVELOPMENT OF FUNDING SOLUTIONS

Considering the diversity of RIs and of available funding instruments for their full lifecycle, it is commonly assumed that there is a need for a more efficient coordination of efforts in aligning existing resources with the needs of each individual facility. As a precondition, this requires a shared understanding among all stakeholders (including funders), supported by a

[3] CERIC ERIC Annual report 2017: https://www.ceric-eric.eu//wp-content/uploads/2018/06/CERIC-Report2017_spreadsDEF.pdf.

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common terminology (e.g. RI, national RI roadmap, lifecycle approach, long-term sustainability, access policy, business planning, and so on). It has also been stressed that a complex bureaucratic environment tends to require people with highly specialised knowledge, even for mid-size projects, in order to fulfil all requirements. Thus, while navigating the information on different funding schemes, some RI managers consider the possibility of having external help and training on how to apply for funding instruments, including for interregional cooperation.

> ***Good practice 9: Mutual learning through the exchange of practices.*** *For RI managers, aside from ESFRI, initiatives and training programmes such as RI Train and Executive Masters in Management of Research Infrastructures (EMMRI) can be beneficial to learn about funding and exchange on solutions. For some user communities, COST actions, Horizon 2020 clusters and TNA projects, could be used to network and foster mutual learning. Moreover, training workshops, among other discussion fora, information days, or even twinning schemes allowing managers and staff exchanges in different RIs are valuable mechanisms to promote the exchange of experiences and even to foster the common development of solutions.*

Overall, during the Validation Workshop, the issue of exchange of experiences at different levels was highly supported. Actions could be taken both at national and European levels, but also besides the managerial scope, down to operational level.

In addition to the abovementioned reasons that support the exchange of experiences among RIs, it is also important to highlight the potential for exchange and learning mechanisms between countries with similar characteristics, allowing for the comparison of information.

> ***Good practice 10: Exchange of knowledge through appropriate platforms.*** *There seems to be a potential for strengthening European platforms that assure the exchange of knowledge between national and European RIs, with the possible involvement of funding agencies, in order to promote the training of their national RI staff. ERF-AISBL, as the largest association of European level RIs and networks of RIs, has already demonstrated some efforts in this direction with potential for engaging more RIs in Europe.*

DEMONSTRATION, COMMUNICATION AND DISSEMINATION OF THE SCIENTIFIC AND STRATEGIC RELEVANCE OF RIs, AS WELL AS THEIR BROADER SOCIETAL IMPACT

As demonstrated through the case studies and RTWs, RI managers are aware of the present expectations to demonstrate the value of RIs following significant investments. In this context, current difficulties in **assessing the impact of RIs show the need for coordinated efforts to develop quantitative and qualitative models**. Indeed, specialized competencies are needed in view of effective communication between the RIs and their related ecosystems. This would assure that the scientific, socio-economic and societal value and the long-term return on investment of RIs – understood as their value to the scientific community and broader public compared to their total costs – are transparent and clearly perceived. Moreover, at the political level, there is potential to further raise awareness about the relevance and importance of RIs, with a role to be played by RIs themselves through proactive development of public representation and outreach outside their institutions.

Regarding quantitative assessments, despite the need to adapt each key performance indicator (KPI) to the mission of the RI, it would be beneficial to **commonly agree on a minimal set of indicators allowing for benchmarking and international comparisons**.

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Nevertheless, InRoad advises to account for variation according to the RI domain and to accompany KPIs with a narrative (e.g. complementary qualitative assessments). This would limit misinterpretations of results. With regard to the socio-economic impact assessment of RIs, ongoing efforts and projects specifically dedicated to the subject deserve close attention from RI managers, funders and policy makers, as it is a topic of high relevance for RIs and the forthcoming funding periods.

While the importance of developing KPIs and other monitoring tools for performance is broadly understood by RI managers, there is not yet a clear perception of the full potential of these processes. When engaging with the funding and other relevant public authorities in the development of KPIs, RIs are taking part in the creation of standards for measuring their impact[4] and therefore enhancing the value of the monitored results and data.

> ***Good practice 11: Proactive involvement of RIs in the design of impact measurement standards.*** *For RIs that produce large amounts of data, for example, the difficulty of tracing the usage represents a bottleneck that affects the impact assessment. The Earth science RI ICOS, being aware of this, has published its impact study report after the development of a specific methodology (through a H2020 project, with the help of a consulting company), which could be later used to develop models for other RIs as well.*

[4] The Global Science Forum (GSF) of OECD and H2020 projects such as RI-PATHS are conducting in-depth studies on the socio-economic impact of RIs. Their work is expected to contribute to a better understanding of the socio-economic impact of RIs as well as of appropriate ways to demonstrate it.

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4. Concluding remarks

As previously mentioned, the recommendations, sub-recommendations and explanatory text here presented are the result of a cumulative process of gathering information on RI funding. Throughout the tasks of such process, stakeholders were involved in the provision of information, as well as in the validation and reformulation of recommendations.

Over the course of the 17 case studies, a total of 20 people were interviewed. During the five regional workshops, the sum of total participants accounted for more than 200. In the Validation Workshop, 73 participants were engaged in discussing, reviewing and validating the project's findings and recommendations.

Considering the broader context of discussion on the topics tackled by InRoad, the publication of the European Commission report on the long-term sustainability of Research Infrastructures represented an important moment for the project's reflection about the work already done, as reflected in InRoad's response. Throughout the following events, - such as the regional and Validation workshops – European Commission representatives continued to participate and follow the discussions.

Hence, through the abovementioned tasks of cumulative refinement and validation of findings with the RI community, policy-makers, the European Commission, and all relevant stakeholders, InRoad developed its Final Report. Covering the project's main conclusions and recommendations, it has the goal of promoting discussions on the identified policy areas and ultimately contributing to support the long-term sustainability of RIs in Europe.

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