Summary report: ESFRI Workshop on the Future of Research Infrastructures in the European Research Area

6-8 November 2019, Los Cancajos, La Palma, Canary Islands

With the next [Roadmap of European Research Infrastructures](#), foreseen for publication in 2021, ESFRI will end the second cycle of its Roadmaps, comprising the editions of 2006, 2008, 2010, 2016 and 2018. The last two editions have demonstrated clearly how the landscape of research infrastructures in Europe has evolved and matured.

As demonstrated through the work on long-term sustainability of research infrastructures over the last three years, the facilities that have now become operational face very different challenges to the ones early in their lifecycle.

Recognising the nature of these challenges and responding to the invitation of the Competitiveness Council to strengthen its strategic role, ESFRI started a comprehensive reflection process on the role of research infrastructures and ESFRI itself in the evolving European Research Area.

In contribution to the reflection process, the ESFRI Workshop on the Future of Research Infrastructures in the European Research Area, organised by StR-ESFRI2 as an Exchange of Experience workshop, was hosted on 6th-9th November in La Palma, Spain.

Over 100 stakeholders participated from across research infrastructures, thematic clusters, the European Commission, national ministries, ESFRI representatives and other ERA stakeholders and policy makers.

The workshop was structured around a range of highly relevant focus areas, with a balanced mix of plenary session and round table discussions included in each to provide full opportunity for discussion. The following summary reports reflect the collated outputs from the discussion topics, representing the views of the participants involved.

A survey conducted upon registration illustrated the three leading reasons delegates chose to attend the workshop, and the feedback questionnaire indicated that participants agreed that the event fulfilled their expectations, with a high score of 4.4/5.

- Participate in exploring the ways ESFRI can have more impact in the redesigned ERA
- Exchange experience and ideas on how ESFRI can help RIs expand their offering to scientists and communities
- Get a better idea of how the RI Monitoring process will be designed and implemented

Session 1. The role of Research Infrastructures and ESFRI in EOSC

Session Chair: Mirjam van Daalen

Session Objectives

(As formulated in the program)

This session will take stock of the current state of implementation of the EOSC and the links of Research Infrastructures with this process. Ongoing activities will be discussed, and the remaining challenges explored. The discussion will in particular focus on how ESFRI follows up the EOSC development and how it can contribute to its ongoing or future activities. ESFRI EOSC Task Force as an important advisory tool will have a central role in the discussion, and in the preparation of a future oriented ESFRI position related to EOSC. The importance of ESFRI RI clusters, their approaches and their achievements related to EOSC implementation will flow into the debate. An important issue will be communication to the different EOSC bodies, and the question how to effectively spread ESFRI inputs to the EOSC activities to create biggest impact on its implementation. The event will also offer an opportunity to consider new topics for a potential dedicated ESFRI Exchange of Experience workshop on related matters.

Session Presentations

- Introduction – 15', Mirjam van Daalen, Chair of ESFRI Task Force on EOSC *(download the presentation)*
- Interplay of horizontal e-Infrastructures and thematic RIs – 15', Ludek Matyska, Director, Institute of Computer Science, Masaryk University *(download the presentation)*
- The e-IRG National Nodes Paper – 15' , Sverker Holmgren, Uppsala University, Swedish Delegate to e-IRG *(download the presentation)*
- Getting ready for EOSC: a research infrastructure perspective – 15', Nicholas Pade, Executive Director, EMBRC ERIC *(download the presentation)*

Round-tables introduction

The EOSC is a complex subject and the questions posed in the session, despite appearing straightforward at first sight, are inter-connected in many ways. Participants were actively engaged in discussions and gave full consideration to the issues as a whole, and consequently the table responses reflect the complexity and inter-connectivity of the topic. In analysing the responses, an attempt has been made to focus the summary in order to address both the relevant question and the objectives as a whole, however, we must also take care to avoid over-simplification of this challenging and multi-faceted subject.

Round-table discussion focus

There were around 100 participants across Europe, who were grouped in tables of around 10 persons in each table. Participants were asked to engage in round table discussions focussed on the following 5 questions. Note not all questions were discussed by all tables.

1. **What is the EOSC according to you as a user and/or provider?**

Discussion of this question demonstrated that a shared understanding of what the EOSC is (or will be) is still evolving in the RI community. Some clear points surrounding the definition of the EOSC by this audience could be drawn, including its aims (open and reproducible science, FAIR data and services), collaborative elements (horizontal and thematic) and the understanding that there would be user access point(s) with an underlying interoperable infrastructure. Priority areas for further consideration emerged, including the approach (implementation and beyond), data, and accessibility (both tools and services).

2. **Which benefits should the EOSC bring to the users?**

Within this community, there are a number of clear, shared expectations regarding the benefits that the EOSC and its methodological/regulatory framework can deliver. These included primary scientific advantages, such as enhanced data and service connections, ability to address societal challenges, and improved tools for RIs, but

also political, social and cultural advantages, for example improved political decision making capabilities, increased societal awareness and leading a change in culture towards open science. Participants also identified a number of qualifying factors, such as the need for transparency, high data quality, research acknowledgement/credit, and training.

3. Which kind of EOSC users would you define?

Participants identified a range of potential users of the EOSC, noting that successful engagement and user access is contingent on the effective implementation of supporting services. Different roles of user and provider were also identified. User-groups included RIs, broad scientific community, computation scientists, industry and machine/service users, policy-makers, and additionally citizens as end users. Participants also noted user limitations/conditions which may vary depending on, for example, user group (public sector vs industry), sensitive data restrictions, and embargo periods.

4. For EOSC there needs to be a change of culture to open research data according to the FAIR data principles: how can we tackle this?

This question provoked some of the most extensive and detailed dialogue amongst participants, illustrating the challenges in balancing some of the key issues in this complex area. The main directions identified however to achieve this cultural change are education and training, incentives and reward mechanisms, and understanding and funding of associated costs of open science. There must also be further consideration given to the ease of sharing and sharing cultures across disciplines or infrastructures, the type of data, the type of data producer and data user. Participants clearly recognised advantages of the EOSC, including the many benefits of open science, and the 'added value' for RIs. There was significant discussion of open vs FAIR concepts, business models, access limitations, restricted/sensitive data, the importance of data quality, original researcher credit, and training. The RI community was identified as a key player in leading the change of culture and driving data quality and access.

5. Other topics for workshops

Participants made many valuable suggestions for future discussion and workshop needs, noting significant overlap between many of them. Participants also identified that there is likely to be an issue of relevance and timeliness of sessions aligning with the EOSC implementation timeline. Broad themes included 'The interactions and dynamics between the different EOSC stakeholders and RIs', 'Fostering interdisciplinary and multidisciplinary collaborations', 'Data', 'Exchange of experience', and 'Funding'.

A full summary and evaluation of responses is provided below.

Draft Recommendations

Informed by the outcomes of the detailed discussions of the workshop (summarised and evaluated below), it is possible to identify a number of high level actions for further consideration by the ESFRI Task Force on EOSC and the discussion with EOSC key stakeholders. To a large extent, the activities highlighted below represent a continuance of ESFRI's current and ongoing engagement with the EOSC, though they are presented here having been reinforced by the outcomes of the La Palma session.

1. Identify and define key stakeholders and their roles in both understanding and informing the ESFRI/ESFRI RIs position on EOSC,
2. Develop opportunities and mechanisms which facilitate exchange of experience and the building of a common understanding among ESFRI, RIs and EOSC stakeholders,
3. Work with RIs and other relevant stakeholders to develop a position which reflects the unique perspective of this important sector of the research community (i.e. the RIs), using in particular the EOSC cluster projects
4. Engage with EOSC governance bodies through appropriate mechanisms such as the ESFRI Task Force on EOSC and the EOSC clusters to inform and influence the shape of the EOSC,
5. Develop a communication and feedback loop with RIs to provide confidence and reassurance in the sector that their contributions are being taken into account,

6. Recognise that the development of the EOSC is operating according to demanding timeframes and engage effectively at appropriate points in the implementation timeline
7. Develop a long-term view of ESFRI's role in engaging with the EOSC post-implementation.

Discussion summary and evaluation

Q1: What is the EOSC according to you as a user and/or provider?

This fundamental question resulted in a range of EOSC key elements from participants, still not giving a clear answer. It also raised a number of unanswered (and unanswerable at this time) questions, such as the top-down (policy/funders-driven) vs. bottom-up (user-driven) direction on the future of EOSC and the interplay/balance between national and thematic approaches. This response suggests that there is not yet a shared understanding of what the EOSC is amongst the RI community. Yet, there are some points that can be drawn:

● **Definition – RI point of view**

- Although still abstract, EOSC can be understood as a framework and an evolving process, aiming at open and reproducible science, leading to FAIR (Findable, Accessible, Interoperable, Reusable) data and services, including a set of rules and policies.

- Collaboration between horizontal (generic) and thematic (domain-specific) is an inherent part of EOSC and its future success. Cross-thematic activities are also welcome. EOSC cluster projects have a key role in both of these points while they are running.

- EOSC may have both 'visible' access point(s) for the end user (e.g. portal(s), marketplace(s)), and 'invisible' (transparent to the users) underlying interoperable infrastructures (including machine-to-machine interfaces)

In addition, there were, some key features of discussions which begin to emerge as broad priority areas for this group.

● **Approach – implementation and beyond**

- Implementation should be user/community-driven. RIs should be actively engaged in shaping the future EOSC. IT experts should be also included in this.

- Although a full requirements capture leading to the EOSC design is lengthy and difficult at this stage, RI requirements for EOSC must be documented and appropriately applied over the course of its implementation

- Business models for research and commercial services use need to be defined

- There is a need for strong coordination across EU (thematic) and country-based levels.

- A better understanding of commonalities across disciplines will be essential. We need to have connections across domains. The role of mediators who interpret the data across domains is key for such interdisciplinary approaches.

- New EOSC tools/technologies will need to be well-federated to/integrated with the existing ones. This must be done with a high regard for data preservation

● **Data**
- The data to be available within the EOSC has yet to be defined. The offer should be broad and data should be useful and accessible, but limits/restrictions need to be agreed. Data in different fields will have a different lifetime.
- Raw RI data is unlikely to be useful outside of the RI.
- RIs are both users (of EOSC) and data providers (for EOSC) at the same time (i.e. prosumers).

● **Accessibility (tools and services)**

- Agreement to the principle that data should be useful and accessible in a fair way to users outside the specific RI. Suggestions on how to achieve this included provisioning of processes,

methodologies and tools (as data), and availability of supporting services (e.g. mediators who support data interpretation for different communities or users).

- Delivery of EOSC services/tools in advanced RIs (with a set of existing tools) should be carefully considered to be able to federate and use both new and existing services.

- Note that delivering high levels of accessibility to EOSC data and services (including RI ones) in a sustainable way are likely to require significant resources (e.g. trained experts/mediators to facilitate use of data from different fields, computation scientists to adapt/improve services/ algorithms)

Q2: Which benefits should EOSC bring for the users?

Amongst this group of participants, table responses demonstrate that there are a number of clear, shared expectations regarding the benefits the EOSC and its methodological/regulatory framework deliver.

At this stage, expectations remain relatively high level but also focussed on primary scientific advantages, including:

- **Enhanced data and services interconnections**, leading to;
    - improved interdisciplinary capabilities
    - amplification of researchers outputs' impact
    - more effective use of resources - original funding investments leveraged across multiple domains, reduced duplication of funding
    - reuse of old/existing data for new results
    - improved collaboration opportunities and research outputs including interdisciplinary research (e.g. by combining the air pollution with biological/health data)

- **Improved tools for RIs**
    - faster and easier findability and access to data and services
    - providing services that single infrastructures cannot
    - common metadata schema for all data/services with a minimum quality
    - cloud storage supporting FAIR data
    - longer term preservation of data (also public asset)
    - utilising EOSC workflows to combine data
    - supporting definition of new experiments more efficiently

Some discussions however went into a higher level and identified further broader benefits (e.g. cultural and socioeconomic), including:
- **Change of researchers' culture towards openness and sharing** through the use of EOSC
- **Improved decision making capabilities**; recognising the need for considering digestion of data to the political sphere
- **Increased societal awareness/perception of research/science and researchers/scientists**
- **Increased level of European competitiveness**

Additionally, a number of other considerations qualifying the above benefits were identified:
- transparency is vital to ensure trust in the EOSC; essential development of 'trust tools' to guarantee data quality, trust and benefits across users and providers in a transparent way (potential use of *blockchain* technology to support this)
- Improve traceability and research credit/acknowledgement/reward to each contributor of data/services/ funding (e.g. researcher, provider, funder)
- training needs must be taken into account
- added value to RIs must be ensured

Participants identified a range of potential users of the EOSC, noting that successful engagement and user access is contingent on the effective implementation of supporting services:

- RIs (noting that RIs are both users and providers of the EOSC)
- Broad scientific community, including individual researchers (end users)
- Computation scientists/developers (who use data to develop improved models, algorithms, tools)
- Private sector/industry/commerce
- Not only 'human' users – machine/services also users

Participants also noted potential limitations/conditions for example;
- different business models for different user categories:
  - academic/RI users vs industry access
  - access by international users based outside EU/nationally funded organisations
- no anonymous access (especially for sensitive/personal/health data)
- qualification of users (model of driving licence)
- embargo periods to enable first use of data by researchers generating it
- sensitive data restrictions

Two tables noted that policy makers and citizens can ultimately become also beneficiaries/end users.

Q4: For EOSC there needs to be a change of culture to open research data according to the FAIR data principles: how can we tackle this?

This question provoked some of the most extensive and detailed dialogue amongst participants, illustrating the challenges in balancing some of the key issues in this complex area. The main directions however to achieve this cultural change are the following:

● Education and training on open science and data sharing at early stages i.e. universities, especially before PhD level. Already early career researchers are more open towards sharing.

● Incentives and reward mechanisms for opening data and data sharing (are key for the change of culture), along with policies from funding agencies (carrot and stick approach), mainly for public funding. For private funding this may be different, i.e. the way research is funded may influence the way data is managed/shared (public funding vs private/industry funding).

● There is a cost of making data open and FAIR (including data/metadata quality and reliability, and FAIR maturity level), which needs to be understood and included in funding proposals.

● There may be differences on the ease of sharing and sharing cultures across disciplines or infrastructures, depending on the type of data (e.g. raw vs. processed, and sensitive vs. non-sensitive), but also the type of data producers (e.g. individual researchers vs. research infrastructures-institutions). For some of the latter the culture of openness may be more easily-broadly accepted. Research Infrastructures can take a leading role in this. Still, in some of the above cases, the change of culture should be gradual/progressive.

There is clear recognition of the advantages that the EOSC will bring:

● Support for concept of 'open science', enabling access and data sharing across multidisciplinary domains, positioning the EU research community to address systemic and complex societal challenges
● 'Added value' for RIs, recognising that many have yet to develop multidisciplinary coordination, complementarity of data, standardisation, visibility, safety, traceability of data

The fundamental principle which underpins the EOSC – open research data to facilitate open science – does represent a deep cultural shift from existing practices for both user and provider communities. A number of

groups identified that this would particularly be the case in academia, the public sector and at the individual researcher level.

Discussions identified that a successful implementation of the EOSC will feature a high regard for the respect, confidence and satisfaction of an engaged community. This will need to take account of:

● the understanding that data generated through use of public funds should be included in the EOSC, but should appreciate limitations on open data concept
  - clear definition of the open science concept
  - open data vs FAIR
  - timeliness of access – embargo periods should be normal accepted practice
  - usability of raw vs processed data (e.g. from RIs)
  - industry and international access, noting potential for misuse of data
  - restricted access to sensitive/personal/health data and implications of GDPR

● the importance of promoting the advantages and new opportunities that the EOSC will offer plus incentivising 'FAIR' and incentivising RIs for collaboration

● the need to recognise/credit original research, noting impact on careers/progression opportunities
  - Code of practice in sharing/using data to support excellent science
  - Use of mandates and incentives (noting that responsibility and resources for this need to be defined)

● How to ensure data quality and reliability
  - Standards for data reliability; procedures and resources to support 'FAIR data maturity labels'
  - Quality control (minimum data quality thresholds, analytical tools, quality controls in each RI)
  - Reproducibility
  - Sustainability and data preservation
  - Funding – these measures are all costly. Who pays?
● Training
  - Early stage research training re. metadata importance and cultural change training (noting also that there may already be a different generational approach towards open data)

One table also identified a role for RIs, whereby specific RIs who have specific competencies in their fields need to work as drivers for the quality of data and access management

Q5: Other topics for workshops

Participants made many valuable suggestions for future discussion and workshop needs. An attempt has been made to group these into broad thematic areas for consideration, though noting significant overlap between many of them. Note also that there is likely to be an issue of relevance and timeliness of sessions aligning with the EOSC implementation timeline.

The most important topic across the majority of tables was the following:
● **The interactions and dynamics between the different EOSC stakeholders and RIs, namely:**
  - Horizontal (generic) e-Infrastructures vs. thematic (domain-specific) RIs, considering that RIs also have e-Infrastructure/data infrastructure built into them. Where is the meeting point and interfaces between the EOSC minimum viable product and the thematic services? How will EOSC gain better understanding of RIs needs?
  - National vs. EU/thematic approaches (including national components of RIs and related funding) and aligning national initiatives with EOSC
  - Related governance aspects, valid from the initial steps to the longer term

Other important areas included:

- **Fostering interdisciplinary and multidisciplinary collaborations**
  - How to foster communication and collaborations across disciplines
  - How to foster interoperability of data/services/tools across disciplines
  - Discussion of different fields for interdisciplinary connections, including;
    - Understanding interdisciplinary potential in the achievement of political goals; how can RIs contribute to EU missions?
    - (meta)data requirements to facilitate use in other disciplines (overlap with data)

- **Data (note different data discussion needs along EOSC implementation timeline)**
  - Data requirements to facilitate interdisciplinary use (overlap with above)
  - Definition of key requirements for data flows to be ready for EOSC
  - How do RIs get data into the EOSC
  - Data access and quality control
  - Who owns data and who is responsible for quality?
  - Data interpretation - understanding technical specialist requirements; new IT professions to support data interpretation, sustainability and career competitiveness
  - Sustainability of data, data preservation
  - What is needed for full openness of data? How to ensure funding for this and how can EOSC facilitate?
  - How fair is FAIR?
  - Sensitive and restricted data
  - Access for different user groups (research vs industry)
  - AI for interdisciplinary research through big data

- **Exchange of experience**
  - "Concept of EOSC" for policy makers and RI managers
  - How will EOSC gain better understanding of RIs
  - Examples from projects on first exchange with EOSC
  - Exchange of experience between RIs and researchers
  -
- **Funding**
  - Coordination and funding at national level
  - Ensuring data quality, incentivising access will be costly. Who will pay?

Session 2. Consolidation of the Research Infrastructure landscape – how to make the most impact

Session Chair: Gelsomina Pappalardo

Session Objectives

(As formulated in the program)

The landscape of Research Infrastructures is more and more mature, developed and interconnected, equipping European scientists with state-of-the-art facilities to conduct world-class research and foster innovation. This session will discuss how to foster a more integrated, ecosystem approach in order to enable the RIs to help effectively address the common challenges that Europe is facing, and which increasingly require a multidimensional approach.

Session Presentations

- *Introduction – 4', Gelsomina Pappalardo, ESFRI Executive Board Member (download the presentation)*

- *Landscape of the European Research Infrastructures– 7', Jose Luis Martinez, Chair of ESFRI Strategy Working Group on Physical Sciences and Engineering (download the presentation)*

- *Joint activities across RIs: opportunities and challenges – 7', Rory Fitzgerald, Director, European Social Survey ERIC*

- *Consolidation initiatives among European RIs - 7', Fransesco Florindi, Strategy & Partnership Manager, BBMRI ERIC (download the presentation)*

Round-tables introduction

The Research Infrastructure Landscape is a complex subject and the questions posed in the session. Participants were actively engaged in discussions and gave full consideration to the issues as a whole, and consequently the table responses reflect the complexity and inter-connectivity of the topic. In analyzing the responses, an attempt has been made to focus the summary in order to address the relevant question and the objectives as a whole, however, we must also take care to avoid over-simplification of this challenging and multi-faceted subject.

Round-table discussion focus

There were around 100 participants across Europe, who were grouped in tables of around 10 persons in each table. Participants were asked to engage in round table discussions focused on the following 3 questions. Note not all questions were discussed by all tables.

1. **ESFRI role as incubator across the RI lifecycle – how can it be improved?**

The term "incubator" suggests permanent care. It would be better to use the words "facilitator" or "strategic development" than "incubator". If term incubator cannot be changed, it's essential to come up with a very clear definition. Incubation and evaluation should be strongly linked and made regularly. ESFRI should have the role of mentoring, sharing implementation experience; shift from an incubating role to a rather guiding, advising and monitoring role jointly towards Member States, Associated Countries and European Commission.

ESFRI has a role in monitoring the full lifecycle. ESFRI should continue to monitor projects and landmarks. It should be an early warning system to ensure quality. Early intervention should occur when required, and ESFRI should not be concerned about removing projects and landmarks at any time when standards fall below a limit. The ESFRI quality mark must not be watered down. ESFRI role as incubator should focus also in the first stages of the RIs. There are problems in the pre-ESFRI phase. A mismatch between the scientific community and how to get it to the policy level. Good contact with the national authorities is desired from the very beginning. There are also problems in the ESFRI timeline regarding the implementation phase, because not every country will

indeed become a member and will not contribute as calculated during the preparatory phase. Early operation costs are often absorbed by the construction phase. It is crucial to set up a cost book with the risks. In the RI implementation the ESFRI Project label is very important, ESFRI needs to make sure it continues to ensure the quality and recognition of this label. There is a need to follow-up the ESFRI Landmarks and ESFRI should also play a role in the termination phase.

The main ESFRI role should be fostering, promotion, interconnecting and monitoring, but not more beyond that. ESFRI should not be an administrative supervisor. ESFRI provides stamp for cross boarder value and it enables discussion among RIs. Having an ESFRI label is extremely important. ESFRI must define clearly its services and in what stages of RI life cycle it should be involved; it is recommended to accompany RIs closer to identify where are problems and how they could overcome. Exchange of experience workshop, throughout the lifecycle (not just new projects on the ESFRI Roadmap) are strongly recommended. ESFRI should increase awareness on RIs to be seen by every scientist and inform broadly. ESFRI need to provide the means (funding and networking possibilities) to facilitate "RI thinking" for all thematic disciplines. ESFRI could help to strengthen link between ESFRI RIs and national RIs. An ESFRI stakeholder forum should be established.

2. **How to foster interconnections among the RIs, within a single scientific domain and across different scientific domains, for supporting interdisciplinary and multidisciplinary research for new research frontiers?**

ESFRI should foster a more integrated, ecosystem approach in order to enable the RIs to help effectively address the common challenges that Europe is facing, and which increasingly require a multidimensional approach. Open Data will help stimulate inter-disciplinarily. Inter-disciplinarily should be science driven but of course incentives are necessary. It is necessary a combination of top down and bottom up approach.

There could be greater use of a challenge driven approach, linked to funding calls. For example, using the Missions of Horizon Europe, by specifically including RIs in a call this could foster greater cross-disciplinary working. There could be cluster projects using this approach for a specific mission. There could also be a greater use of workshops organized by ESFRI. These could be on multiple levels. One would be to involve researchers from two or more areas to come together to generate ideas for a bottom up approach.

ESFRI should have a role to support the similar RIs to work together and also promote cluster projects across scientific domains, in order to address future joint challenges. ESFRI should foster the RIs reuse/adopt services rather than build their own. Each ESFRI infrastructure should make the list of their services publicly available (online). Building common services to different RIs within the cluster; signing collaboration agreements to reference services of the different RIs should be promoted. ESFRI should contribute to create a discussion space, reinforce exchange of experience.

3. **What relationship should ESFRI have with sectorial initiatives, international networks, other RIs not included in the ESFRI Roadmap as well as with national and regional RIs?**

ESFRI should explore the possibility of setting up a stakeholder forum to include new initiatives and existing non-ESFRI projects. ESFRI should facilitate a coherent ecosystem, incl. link with sectorial initiatives and regional links. ESFRI should know about all initiatives and decline a strategy more than trying to drive. There could be greater emphasis on working with global organizations. For example, with the GSO who are doing work on internationalizing top national infrastructures and with international organization as those existing for the environment and health and food domains. ESFRI Forum should be more proactive and monitor initiatives (national). Landscape analysis should consider also not ESFRI RIs and relevant international, national and regional initiatives.

Discussion summary and evaluation

Q1: ESFRI role as incubator across the RI lifecycle – how can it be improved?

There has not been clearly defined the role of ESFRI as the incubator. Furthermore, it should be specified ESFRI involvement in projects and landmarks monitoring. The visibility of ESFRI label should be supported to be recognized as a sign of quality. There are some points to be considered:

Incubator role
- The use of the term *incubator* considered or clearly defined.
- Incubation and evaluation should be strongly linked and regular.
- ESFRI should considered guiding, advising and monitoring role.
- ESFRI role as incubator should focus also on the first stages of the RIs.

Monitoring
- ESFRI has a role in monitoring the full lifecycle.
- ESFRI should continue to monitor projects and landmarks but not be involved in removing projects and landmarks not meeting limits.
- It should be introduced and early warning system.

Project implementation
- The implementation deals with
    1) a mismatch during pre-ESFRI phase between the scientific community and related policy level.
    2) meeting the ESFRI timeline related to the implementation phase
- ESFRI should play a role in the termination phase (landmarks)
- Clear definition of services provided by ESFRI and its involvement in stages of RI life cycle
- ESFRI should increase awareness on RIs among the scientist community.
- ESFRI Project label is very important as a sign of quality.
- ESFRI provides stamp for cross boarder value and it enables discussion among RIs.
- ESFRI could help to strengthen link between ESFRI RIs and national RIs.
- Exchange of experience workshop are strongly supported across thematic disciplines.
- ESFRI stakeholder forum should be established.

Q2: How to foster interconnections among the RIs, within a single scientific domain and across different scientific domains, for supporting interdisciplinary and multidisciplinary research for new research frontiers?

Table responses demonstrate that integrated ecosystem approach is a key issue regarding interconnection among the RIs covering different scientific domains. The aspects to be considered are:
- Integrated ecosystem approach is a tool to enable the RIs to effectively address the common challenges in Europe required a multidimensional approach.
- Open Data will help stimulate inter-disciplinarily which should be science driven
- It is necessary a combination of top down and bottom up approach.
- ESFRI should support clustering of RIs and projects across scientific domains.
- ESFRI should foster the RIs reuse/adopt services.
- ESFRI should contribute to create a discussion space and reinforce exchange of experience.

Q3: What relationship should ESFRI have with sectorial initiatives, international networks, other RIs not included in the ESFRI Roadmap as well as with national and regional RIs?

- ESFRI should explore the possibility of setting up a stakeholder forum.
- ESFRI should facilitate a coherent ecosystem incl. sectorial initiatives and regional links.
- ESFRI should have an overview about all initiatives.
- A greater emphasis on work with global organizations.
- ESFRI Forum should be more proactive and monitor (national) initiatives.
- Landscape analysis should consider relevant international, national and regional initiatives.

Session 3. Fostering Effective Open Access to Research Infrastructures

Session Chair: Yannis Ioannidis

Session Objectives

(As formulated in the program)

One of the key elements in fostering scientific excellence in Europe is ensuring that researchers, wherever they are, have the possibility to access facilities, resources and services of the first-class European Research Infrastructures, suitable to their needs. This session discussed the current access practices, funding models, challenges and bottlenecks across the different scientific domains and explored effective ways to make further progress in this area. Reflecting on the European Charter for Access to Research Infrastructures and possible improvements to this document were part of the discussion.

Session Presentations Program

- Introduction, Yannis Ioannidis, ESFRI Vice Chair, Chair of ESFRI Task Force on TNA
  (download the presentation)

- Access to Research Infrastructures: Finances, Jose Luis Martinez, Chair of ESFRI SWG on Physical Sciences and Engineering *(download the presentation)*

- Access to Research Infrastructures: Services, Martin Van Breukelen, Executive Manager, European Magnetic Field Laboratory *(download the presentation)*

- Access to Research Infrastructures: Operations, Christine Kubiak, Operations Director, ECRIN ERIC *(cancelled)*

Round-tables introduction

A long-time objective of Europe has been to increase and open up trans-national access (TNA) to national research infrastructures (of European interest) and to European research infrastructures, such as those prioritised by ESFRI. Nevertheless, this has not been as successful as originally envisioned. Some of the possible reasons may be related to lack of availability, e.g., when competing with national users, or finances, e.g., when no specific funding of [additional] costs by home or host organizations are available. In addition, issues related to personal data, security or intellectual property often become more sensitive in a trans-national context and close up access. Of course, the bottlenecks may actually be very different depending on the scientific domain, the modality of access for a class of infrastructures, or the nature of costs and funding model.

A key motivation for this session was to look into the reasons why access to research infrastructures has not been as open as one would like, especially trans-national access, and suggest solutions and/or corrective actions. During the session, the workshop participants actively engaged in very intense discussions on all the main aspects of the issues concerned, offering deep insights and novel ideas on how to move forward productively.

Round-table discussion focus

As with all sessions, the participants were grouped in ten tables of eight to ten persons per table. During the session, six questions were raised and discussed, with each table focusing on two of these questions (with one or two additional questions, in case of time availability). The questions were partitioned in three pairs: The first pair dealt with transnational access models/policies for members of ESFRI RIs, one question for RIs in general and one for distributed RIs. The second pair was symmetric to the first but dealt with funding models of transnational access. Finally, the third pair dealt with transnational access of non-members of ESFRI RIs; the first question inquired about the landscape of related models and policies, while the second pondered the development of a special European-level program for (non-member) transnational access to ESFRI RIs. The overall structure of the six questions is given schematically below.

	Access Models	Funding Models
RIs in general	Q1	Q3
Distributed RIs	Q2	Q4

Members

Q5   Q6

Non-Members

The key messages from the tables for each question are given below, while a more detailed account of the discussions is given in the last section of this document (Appendix).

4. **What are the current (transnational) access models/policies used for members of ESFRI RIs? What are their key weaknesses with respect to ensuring effective access? Are there any differences across RIs in different scientific domains?**

   Several issues around access models appear to be universal across all types of research infrastructures. The most critical one is that all access models to publicly funded RIs should be offering predominantly excellence-driven & free access to the facilities. Beyond that, there are several variations in RI access models depending on whether they are for a physical RI (where access should be based on merit) or for a data and software RI (where access should be open and free to everyone). In several access models, especially for physical RIs, members are being privileged and have more services at their disposal than non-members. Examples of the full spectrum of services that may be included as part of accessing an RI, beyond the time on the RI instruments, include technological and other support to prepare experiments, RI-specific datasets for best validation of results, and of course providing accommodation next to the RI. Still, the key challenge for all types of RIs is not access but funding.

5. **Are there any specific transnational member access models/policies for distributed ESFRI RIs or any specific challenges they face in offering such access?**

   It is quite difficult to clearly separate centralized from distributed RIs when it comes to several aspects of access models. In fact, there appears to be a spectrum of RIs between the two ends with a variety of approaches to access models. Still, access models for centralized and distributed RIs are not very different, except for the heterogeneity in national access policies and corresponding legal frameworks, which must be resolved from the very beginning of establishing an RI. The key difference in access models is that between physical access and data access.

6. **What are the main funding models used for ESFRI RI member access and what are their key weaknesses? Are there any differences across RIs in different scientific domains?**

   Current funding models for RIs fail to cover all possibilities and this creates several gaps in the community's understanding of them. There is a great variety of funding models in individual RIs, according to several dimensions that characterize them, in particular, their nature (e.g., physical or data, centralized or distributed), their access criteria (e.g., excellence-driven or market-driven), their users status (e.g., full member, associate member, academic non-member, or industry), and their governance schemes (e.g., ERIC or EIROForum). There is extensive experience with which should serve as the starting point for unifying and rationalizing the overall space of funding models. Furthermore, the benefits of particular funding models should be articulated and disseminated broadly, to help increase the overall understanding of the models that exist in the stakeholders, for them to be making informed decisions. For example, it is not always clear to everyone that membership in an RI has the member-exclusive benefit of receiving funds from EC projects, which often exceed the membership fee.

7. **Are there any specific funding models for member access to distributed ESFRI RIs and what are their key weaknesses?**

As with access models, there does not seem to exist any major funding model particularities that are due to a research infrastructure comprising several distributed research facilities. The key difference is between funding models for physical infrastructures and funding models for data infrastructures.

8. **What are the current (transnational) access models/policies and corresponding funding models used for non-members of ESFRI RIs, in general, and of distributed RIs, in particular? What are their key weaknesses with respect to ensuring effective access? Are there any differences across RIs in different scientific domains?**

It is often the case that access and funding models for non-members of an RI are not articulated separately but are embedded into more general models that offer cohesive schemes for all types of users. Such comprehensive models are able to handle cases of member/non-member collaborations, which are quite common in research. What is very noteworthy, however, is that there is disagreement in the community (or at least among the participants of this workshop) on the need to distinguish between members and non-members in access and funding privileges, with one opinion advocating for always maintaining a clear distinction between the two user categories, for fairness, with another advocating that access should be excellence-based for all, with no difference between members and non-members.

9. **Each ESFRI RI has a different country geometry, inevitably, scientists from several countries do not have member access privileges. Should a pan-European RI access "market" be developed (in the context of a renewed ERA), with access policies and funding models complementary to those of individual ESFRI RIs?**

Establishing a scheme of pan-European nature for funding transnational access is a pivotal issue. There seems to be a universal sentiment that TNA is suffering and that some funding instruments at the EC level is necessary for truly boosting such activities, which are fundamental to European researchers and the health of the ERA. There is also general agreement on the inappropriateness of the "market" concept and term to describe any reciprocity-based RI service offerings across national borders, with more fitting alternatives being suggested in the spirit of "exchanges.

Draft Recommendations

Based on the key messages that came out of the extensive discussions and the critical details that have come on the various issues, one may draw some initial, broad recommendations on what may be the way forward with respect to access and funding models for research infrastructures. These are given below and should serve as input to further elaborations and discussion and more comprehensive studies before arriving at any major conclusions to be acted upon.

1. Access to physical RIs should continue to be excellence-based, with the quality of the work being determined following a process of peer review of proposals submitted by the community.

2. Access to data RIs should be open and free at the point of use.

3. A concerted communication and impact assessment effort should be launched by the RI community to inform all researchers about the value of RI access and all other RI services. This should include training through material production, conferences, and other means.

4. An attempt should be made to harmonize national policies and legal frameworks on RI access and funding models, as this will have a tremendous beneficial impact on reducing the overhead of establishing and operating (especially distributed) RIs as well as on transnational access afterwards.

5. The cost of (transnational) access should stop being funded mostly through projects but should become part of the RI operation budget. For this to be realized, cost models for the entire operation of RIs should be available so that the full cost of RI access may be calculated.

6. Covering RI access costs should become eligible for an expanded set of funding sources, including national funds, European structural and investment funds, and appropriate EC framework funds (e.g., all Pillar 1 and Pillar 2 instruments in Horizon Europe).

7. National rules may pose limitations to funding access of infrastructures abroad. Horizon Europe and other EC-level programs should provide funding for transnational access.

Detailed discussion points

Despite the rather firm structure of the set of questions and the concrete logic of assignment of questions with a particular theme to each table, discussions naturally drifted away and spilled over to some of the questions beyond each table's specific assignment or even touched upon issues much broader. As much as possible, the account below ignores the table where each point came from and the question in the context of which the point was made but groups the main points of the discussions according to their relevance to the particular questions.

Before proceeding to the individual questions, one general observation from across all discussions is that there is still some confusion between the concept of open access and the concept of free access. Especially for accessing data infrastructures, the important concept of FAIR data does imply open access but not necessarily free access. In general, open access guarantees that access is free at the point of use (with the underlying costs of offering such access being covered by sources other than the users), and it is with this interpretation that the two terms are used interchangeably below.

Q1: What are the current (transnational) access models/policies used for members of ESFRI RIs? What are their key weaknesses with respect to ensuring effective access? Are there any differences across RIs in different scientific domains?

Access to RIs is mostly associated with user time on the RI instruments (for physical RIs), but this is a rather inaccurate and limiting point of view. A broader and more accurate conception of access includes many more services, such as offering the necessary technological and other support to prepare experiments, providing relevant accommodation, or releasing RI-specific datasets for best validation of results.

The table discussions on access models for ESFRI RI members brought up several issues that appeared to be universal and in the minds of everyone. In addition, there were also specific aspects on which insightful comments were made individually. Below are the main messages drawn from all the discussions, followed by more detailed issues raised for each of the three parts of Q1.

- **Key messages**

    - The foundation/starting point of all access models to publicly funded RIs should be offering predominantly excellence-driven & free access to the facilities, with RI members being privileged and having more services at their disposal.

    - RI access models vary depending on whether they are for a physical RI (where access should be based on merit) or for a data and software RI (where access should be open and free to everyone).

    - The key challenge is funding, which is directly linked to monitoring and impact assessment of RIs and is equally challenging for both centralized and distributed RIs.

- **Detailed issues and suggestions**

    What are the current (transnational) access models/policies used for members of ESFRI RIs?

    - As a universal principle on access policies, physical access has always been and should continue to be based on peer review, with the main criterion being the quality of the work proposed in response to calls that are open either only to members or to the entire community.

    - Due to their limited resources, it is typical for physical RIs to adopt models that partition access time into three components: standard access to members according to their proportion on some key parameter, e.g., financial contribution; competitive access to members based on excellence; and possibly a (usually small) fraction of competitive access open to non-members and/or fee-based access to the market. There is a natural competition/tension between the three components, members vs non-members, scientific excellence vs quotas/geographical return, so identifying the right proportion according to the priorities of an RI is a significant challenge.

    - An interesting observation that may be affecting policies is that there is a trend to move from physical access to remote access even for RIs that are physical facilities.

    What are their key weaknesses with respect to ensuring effective access?

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- There was a widespread conviction that the key obstacle in effective use of RIs is not related to issues with access or access policies per se; it is funding (addressed in Q3 and Q4). Still, some additional issues come into play and have a negative effect as outlined below

- A key weakness is related to the value that RIs bring to the scientific endeavor and is two-fold.

    • There is lack of awareness among many researchers and funders of the role RIs can play in enhancing and strengthening a research project, or in some cases making it even possible. This is rather widespread and cuts across researchers in most scientific fields as well many national and international funding agencies, including the EU (beyond the units focusing on RIs proper). A common related side-effect is a typical lack of appreciation for Open Access and the valuable benefits it brings.

    • There is lack of appropriate accurate models to assess the real value that RIs bring and the impact their use may have to research breakthroughs. Moreover, even if such models exist, they all require to keep track of the steps that have led to a particular research outcome, including the possible use of particular RIs, a process that is rather cumbersome and not embedded well into the current research processes.

    For both aspects, concerted communication and impact assessment efforts by the RI community itself is in order. It is important to communicate the value of RI access as well as all other services offered, including scientific expertise and training. There should be training for the research community at large through material production, conferences, and other means.

- For data and software infrastructures, user monitoring is particularly challenging and potentially requires a different approach for each individual RI. For instance, in ELIXIR or CLARIN, monitoring and measuring usage is inaccurate, as sometimes users find information through a commercial search engine and not the RI portal, without the RI being able to detect it is being used. For another instance, most Social Science and Humanities RIs, e.g., SHARE, must identify the affiliation of potential users before giving access, to protect the privacy of personal data they store, which should not become available to commercial entities or even policy makers (e.g., OECD, UN). In general, the more open the access model of an RI is, the more complex monitoring of its users becomes.

- There is a tradeoff between access opportunities and access model complexity. Collaboration among RIs having similar facilities, including facilities with different access models, and partnering with international facilities are both very desirable as they broaden access possibilities. Nevertheless, they also complicate and/or blur access strategies/models, as they need to become more intricate and heterogeneous, embed adaptive optimization of their calendar of operations, and take into account differences in, among other things, platform constraints, national requirements, and scientific methodologies. The right balance point in this tradeoff is often elusive, resulting in poorer levels of use, whether because of limited opportunities or because of access model complications that act as a deterrent.

- Free and open access is an advantage to non-members. However, being a member of an RI brings additional benefits on top of access itself, such as internationalization, increased participation in EC projects on RIs, and obtaining support from the main RI office to improve national facilities.

- An additional issue that hampers access to RIs that rely on facilities already existing for a long time is that, although a very important component of their services, access to their legacy data is hard due to the costly data cleaning, integration, and curation required beforehand.

Are there any differences across RIs in different scientific domains?

- The key differences in access models are not between scientific domains but between physical RIs and data and software RIs.

- There is some correlation between scientific domains and the nature of RIs, e.g., PSE has more physical centralized RIs, whereas H&F, ENV, and SCI RIs have more distributed and data RIs. Still, the key differences in access models do not come from the domains themselves but from the above aspects of the RI nature.

- Industry relations for RIs are domain specific with respect to both its nature and its level of maturity. As an example, health RIs are already advanced in offering appropriate services to companies. As a counterexample, environmental RIs, e.g., eLTER, have limited related history, are less experienced, and would need some help in defining how a collaboration with industry should be put in place.

- Besides differences between RIs that are due to differences in their domains, each individual RI may employ an access model that differs from others in some details. Below are examples provided for some RIs:

  - CLARIN (data): open access for all researchers from all countries that are members; people with a commercial purpose have some limitations.

  - SSH/SHARE (mostly data): open access, free of charge, with approval (username/password); no commercial access for privacy reasons, due to the presence of personal data.

  - ELIXIR (data): open access without approval (besides sensitive data).

  - EU OpenScreen (physical / data): open access, paid for physical (lower rate for locals), free for data; excellence-based for physical access.

  - eLTER (physical / data): limited access as RI is still in its starting prep phase; it has 200 hundred sites for physical access.

  - CERIC-ERIC (physical – "federation" of centralized RIs): open access based on merit after proposal evaluation; proprietary access to industry for a fee; global access, with promotion to potential users from countries with low usage (currently underrepresented communities); 10% of each instrument in a country guaranteed for scientists from other member countries.

  - MIRRI (physical): open access for members (10 members, 40 sites) with selection of projects based on excellence.

  - INSTRUCT (physical): restricted transnational access; excellence-based access via proposal evaluation by expert committee; members get preferential treatment compared to non-members.

Q2: Are there any specific transnational member access models/policies for distributed ESFRI RIs or any specific challenges they face in offering such access?

Several insightful thoughts on access models for members of distributed ESFRI RIs were expressed during the table discussions. Interestingly, many particularities of distributed RIs came up in the context of discussions of other questions, primarily Q1, demonstrating the difficulty in clearly separating centralized from distributed RIs when it comes to several aspects of access models, and pointing more towards a spectrum between the two ends. Below are the main messages drawn from all the discussions, which corroborate very well with those of Q1, followed by more detailed issues raised for Q2.

- **Key messages**

  - Access models for centralized and distributed RIs are not very different. The key difference that dwarfs all others is that between physical and virtual access.

  - Different national policies and legal impediments must be taken into account in the preparatory phase of distributed ESFRI RIs.

- **Detailed issues and suggestions**

  Are there any specific transnational member access models/policies for distributed ESFRI RIs?

  - Access models for distributed RIs are even more diverse than those of centralized RIs, as there are several additional dimensions they have to take into account:

    - Identifying the fraction given to members across the different sites vs. that left up to the individual sites for their normal local use by home researchers and other users.

- • Harmonizing different national access policies, already from the preparatory phase, and if needed, updating national policies to match the needs of transnational access.

- • Incorporating the need of certain fields, e.g., environmental / ecosystem RIs, of offering access to multiple sites of a distributed RI at the same time.

- For a distributed RI that is essentially an integrator of national RIs, it should have a central model for excellence-based access by researchers, but it is better to leave the management of market-driven access at the national level.

Are there any specific challenges that distributed ESFRI RIs face in offering such access?

- Policies on open access to data and software without approval or with approval for sensitive data are much more complicated and intense in distributed RIs due to national regulation differences, e.g., with respect to restrictions on sharing patient data.

- Physical access to different sites of distributed RIs by researchers may be hindered by immigration/visa limitations, residence permits, and other national regulations; dealing with such obstacles may be increasing significantly the preparation time for a visit. ESFRI should collaborate with policy makers in MSs/ACs to come up with an appropriate legal and policy system for TNA.

Q3: What are the main funding models used for ESFRI RI member access and what are their key weaknesses? Are there any differences across RIs in different scientific domains?

Table responses for Q3 demonstrate that the space of funding models for RIs is not well defined and the need to have a better understanding of the possibilities and address the gaps that current models leave is very current. There is extensive experience from the RIs themselves that has led to many ideas on how this space may be extended and rationalized in the near future. Below are the key take-aways from the discussions and some further details that were addressed.

- • **Key messages**

  - Funding models vary quite significantly along several dimensions that characterize RIs, in particular, their nature (e.g., physical or data, centralized or distributed), their access criteria (e.g., excellence-driven or market-driven), their users status (e.g., full member, associate member, academic non-member, or industry), their governance schemes (e.g., ERIC or EIROForum), and (less so) their scientific fields.

  - National rules may pose limitations to funding access of infrastructures abroad. Horizon Europe and other EC-level programs should provide funding for transnational access.

  - Funding through membership fees may be a hard sell to member states, especially in conjunction with open access. Nevertheless, an important membership incentive is the opportunity to receive funds from EC projects, as participation in them is reserved exclusively for members. For example, ELIXIR has a high success rate in projects, thereby financial returns to its member countries usually exceeding investments.

- • **Detailed issues and suggestions**

  What are the main funding models used for ESFRI RI member access?

  - Access is typically free of charge, whether it is excellence-based physical access for members or open data access for everyone. Especially for data RIs, this is also common for most services other than access as well, e.g., for several of the value-added services of ELIXIR, such as managing, linking, and understanding data. Covering the costs of such free access is a very big challenge, especially for data RIs.

  - The possibility of paid access does exist in several RIs but is limited to certain types of users, e.g., for industry, and for physical RIs, its offering depends on the remaining capacity of the RI. More generally, where available, paid access is associated with increasing amounts from symbolically covering some marginal cost to covering the full cost, depending on the user status.

- For EIROForum RIs, the intergovernmental organizations have their own funding agreements, sometimes limiting access for non-members. ERICs are more flexible and open to outsiders, but they are not always able to fully cover their cost, as they receive no support from the EU for that.

- Physical transnational access is funded through projects (often travel grants).

What are the key weaknesses of the main funding models used for ESFRI RI member access?

- There is one major weakness with respect to current funding models of Transnational Access: they are all based on projects, whose processes and timing are independent of the RI operation itself and may be ad hoc. This puts access costs on the shoulders of researcher, thereby hampering access to RIs, and offers no long-term sustainability. Below are several thoughts on how to rectify the problem but also to improve upon other aspects, which may not be as critical as the one above.

- It is often the case that current funding models do not account for any long-term accumulation of funds to be used for large updates to the RIs at the appropriate time.

What are possible points of improvement of current funding models?

- The cost of (transnational) access should stop being funded mostly through projects but should become part of the RI operation budget. There should be a specific budget line for RI access in each country. Alternatively, each RI should have a central budget line for accessing it. This transition is a major challenge but is key for accountability.

- For the above to be realized, cost models for the entire operation of RIs should be available so that the full cost of RI access may be calculated.

- Covering RI access costs should become eligible for an expanded set of funding sources to stimulate access to RIs.

  • ESFRI RIs have insisted on the importance of the EC supporting TNA, e.g., in the form of including such costs in the budget of R&D projects (in analogy to similar national level processes, for example, in Germany).

  • By its nature, transnational access to RIs has several secondary beneficial effects, such as personnel mobility and training, technology gap filling, capacity building, and bridging gaps among members states. Therefore, travel to physical infrastructures and other TNA costs should become fundable in all relevant schemes and from any combination of national funds, European structural and investment funds, and EC framework funds.

  • The cost of RI access is already eligible for many EC instruments, e.g., MSCA, ERC, and other mobility schemes, and hopefully forthcoming programs, e.g., Pillar 2 missions of Horizon Europe, but the research community is making little use of these opportunities. They should be given more visibility so that the level of RI use increases.

  • For specific use cases, mostly as supplementary to some core resources, one may consider alternative funding models as well, such as those mandated by private foundations, e.g., Bill Gates Foundation or Wellcome Trust, or followed by Wikipedia. The overhead, however, is significant.

- RI budget management should have more flexibility, so that funding models may become most amenable to adaptation to the needs of the RI user communities and allow budget resolution to be done mostly in an a posteriori than an a priori fashion.

Are there any differences in funding models across RIs in different scientific domains?

- No significant funding model differences appear to exist that stem from the particular scientific domain of RIs.

Q4: Are there any specific funding models for member access to distributed ESFRI RIs and what are their key weaknesses?

Table discussions for Q4 were very lively and animated but revolved mostly on much more general issues of access and funding models than the particular focus of the question. The participants raised very few points that are specific to funding models for distributed research infrastructures, indicating the lack of any major funding particularities that are due to research facility distribution. These few issues are all outlined below.

- Key messages
    - As with access models, so is with funding models, that centralized and distributed RIs are not very different. The key difference again is between physical and data infrastructure funding.

- Detailed issues and suggestions

    Are there any specific funding models for member access to distributed ESFRI RIs?
    - In distributed RIs in general, a large proportion of the cost generated by each individual facility is covered by the facility itself and is not embedded into that of the corresponding European RI. Funding of the over-arching RI operations is covered in several ways, e.g., CERIC-ERIC operations are fully funded by one of the member states (Italy).
    - For distributed data RIs, the core data facilities and services are usually open to everyone and mostly free. In certain cases, e.g., in ICOS, additional services, such as data analysis, are offered for a fee that covers their full costs.
    - For distributed physical RIs, funding models include combinations of in-kind contributions and real cost remuneration, depending on the type of access as outlined above, e.g., TNA vs home use, commercial vs academia. Below are some examples:
        - EUOpenScreen: ERIC members pay the salaries of the facilities' personnel. Projects fund the machine time through grants, where every participating country pays based on the full cost model and according to its level of membership: Members pay 50% of the full economic cost, observers pay an intermediate amount, while non-members (other research and commercial users) pay full costs.
        - SHARE: A sizeable part of the cost is taken up by the leading country and the rest is covered by the remaining ERIC countries.
        - EMPHASIS (a distributed physical RI under construction to be offering access to data and models similarly to ELIXIR): Two funding model scenarios are being considered for covering the envisaged operational costs: in-kind based fees by the member institutions or access-based fees (not preferred).

    What are the key weaknesses of current funding models for distributed ESFRI RIs?
    - For distributed RIs, calculations for RI operation costs and user access costs are usually different, leading to funding model difficulties.
    - The broader the distribution of a research infrastructure, the greater the challenges in funding it, as a greater variety of national policies and legal frameworks must be taken into account, harmonized and synchronized, and a greater number of national contributions must be agreed upon and paid.
    - Tensions may arise due to cost and/or usage imbalance between countries.
        - When researchers choose a site in a distributed RI, the scientific environment quality is their only important metric. Nevertheless, fee differences may cause problems. As one of many potential examples, EUOpenScreen national nodes differ in FTE costs. When a solution is available from multiple nodes and the best solution is at the most expensive node, convincing the user to pay and use the best solution can be a challenge.
        - "Give and take" models between national nodes may be very hard to establish, as the level of use and the cost of use between them may be very skewed.

Q5: What are the current (transnational) access models/policies and corresponding funding models used for non-members of ESFRI RIs, in general, and of distributed RIs, in particular? What are their key weaknesses with respect to ensuring effective access? Are there any differences across RIs in different scientific domains?

The discussions about access and funding models for non-members brought out several issues, most of which, however, were more general, as the approach to non-member interactions with RIs are embedded into the general schemes offered by the RIs. Therefore, many of the key elements brought out during the discussions have been incorporated into the comments of the previous questions. Still, there were a few that were specific to non-members and these are outlined below, including the most important issue where there was disagreement among the participants.

- Key messages

    - Collaboration between members and non-members is encouraged, but there is no uniformity in opinion about the need for distinguishing between members and non-members in access and funding privileges:

        - Opinion #1: A clear distinction should always be maintained in access and funding models, for fairness.

        - Opinion #2: Access should be excellence-based for all, with no difference between members and non-members.

- Detailed issues and suggestions

    What are the current (transnational) access models/policies and corresponding funding models used for non-members of ESFRI RIs, in general, and of distributed RIs, in particular?

    - The model of excellence for basic research could be applied easily to both members and non-members with no distinction between them (as in a large number of ESFRI RIs, e.g., ESO, EMSO, Eurobioimaging and Windscanner).

    - For research closer to industrial application (e.g., for medical data RI), such uniformity between members and non-members is more difficult.

    - Access to non-members should always be offered to foster international collaboration, thereby reinforcing the European position in the international scientific space. This should be adopoted even to the point of an RI reserving a certain (small) "access budget" for its facilities for the international community. Of course, open access is ideal as it supports international collaborations without additional considerations.

    What are the key weaknesses of current access and corresponding funding models with respect to ensuring effective access?

    - A common bottleneck is that, especially in non-member countries, the scientists who would like to use the infrastructures do not have adequate information about financing such use: ERC, H2020, national agency, etc. Although financing does exist at the national level in many cases, the relevant information is not as visible to the researchers as It should. The cluster projects are very useful in that regard, as their websites provide adequate financing information for several RIs.

    Are there any differences across RIs in different scientific domains?

    - No significant differences in access or funding models for non-members appear to exist that stem from the particular scientific domain of RIs.

Q6: Given that each ESFRI RI has a different country geometry, inevitably, scientists from several countries do not have member access privileges. Should a pan-European RI access "market" be developed (in the context of a renewed ERA), with access policies and funding models complementary to those of individual ESFRI RIs?

The question of establishing a scheme of pan-European nature for funding transnational access was pivotal in the overall design and delivery of the session, hence, the corresponding discussions for Q6 were equally vibrant. There was a universal sentiment that TNA is suffering and that some funding instruments at the EC level is necessary for truly boosting such activities, which are fundamental to European researchers and the health of the ERA. There was also general agreement on the inappropriateness of the "market" concept and term to describe any reciprocity-based RI service offerings across national borders, with more fitting alternatives being suggested that, nevertheless, maintained the original spirit of the approach. Beyond these overarching issues, several key ideas were brought out on the issues raised by the question, which are given below.

- **Key messages**

  - Despite policy drivers (ERA, open science, addressing global challenges, …) and economic constraints (pooling of resources, avoiding duplicates, efficient use of infrastructures, …), trans-national access without dedicated EU support is often limited.

  - So far, only a tiny, inadequate amount has been invested in TNA at the European level. A new dedicated TNA scheme with sizeable funds should be introduced within Horizon Europe.

  - The concept of a "market" for RI access is problematic and misleading and should not be adopted.

- **Detailed issues and suggestions**

  Should a pan-European RI access "market" be developed (in the context of a renewed ERA)?

  - There are several connotations with the term "market" that are not appropriate for the RI space, or in general, in the context of research. What may be appropriate and still carry some of the same fundamental elements is an "exchange of services". Alternatively, at a lighter level of engagement, one may think of an "exchange of (information about) best practices" and, eventually, of the development of common standards, all of which may be achieved simply by holding specialized workshops.

  - Given the heterogeneity in several dimensions that characterize RIs, e.g., their scientific domains, their nature (e.g., physical or data, centralized or distributed), or their access criteria (e.g., excellence-driven or market-driven), a common "access market" would probably be impossible, even if desirable.

  - If such an "access market" were to be established, supply and demand of services should be balanced, an effort that could possibly lead to lower access costs for non-members compared to members in some cases.

  - Such an "access market" would not be necessary if researchers were well informed about all the funding options in their respective field. More effort should be put towards advertising funding opportunities.

  - Approaches in the style of "access market" do exist already, but in order to be effective and accepted more broadly, they require "market" regulation.

  Should there be pan-European access and funding models complementary to those of individual ESFRI RIs?

  - Pan-European access and funding models should exist, but transnational access by non-members should be always an exception and should be funded at full cost of the RI services used.

  - In the context of Horizon Europe, as also emphasized when discussing question Q3, funds for transnational access should remain available in the entire Pillar 1 (not only in the research infrastructures budget, but also in Marie Skłodowska-Curie Actions and ERC), as well as Pillar 2 (thematic areas). This will have two beneficial impacts: RI access costs would be covered by research project budgets; RIs would become more visible to the scientific community.

Session 4. ESFRI Framework for monitoring of Research Infrastructure performance

Session Chair: Peter Wenzel-Constabel

Session Objectives

(As formulated in the program)

ESFRI Working Group has been established to propose a methodology to monitor the performance of RIs based on KPIs, taking into account the diversity of RIs and the aim that they will be adopted widely and effectively. This session will present the methodology for a final discussion and will explore the ways to foster its uptake by RIs, funding authorities and stakeholders.

Session Presentations

- **Introduction**, **Peter Wenzel-Constabel**, Chair ESFRI WG Monitoring *(download the presentation)*

"The session is dedicated to the feedback to the structure of the monitoring approach, not to the specifics of the KPIs."

- **The ESFRI RI monitoring framework**, **Jana Kolar**, Member of ESFRI WG on Monitoring *(download the presentation)*

"The KPIs were developed after intensive involvement of stakeholders along the RACER criteria and follow the nine most common objectives of the RIs. The KPIs are not carved in stone, but shall be adjusted in dialogue with the RIs and reviewed throughout the monitoring process. Possible timeline: implementation starting 2020, KPI collection in 2021."

- **RI perspective on performance monitoring**, **Werner Kutsch**, Director General, ICOS ERIC *(download the presentation)*

"Describes the ongoing process of ICOS Impact Assessment. Some of the indicators used by ICOS directly refer to KPIs proposed by the WG. Suggests that the timing of the future ESFRI assessment processes should be coordinated with the schedule of assessments of ICOS (5-year period)."

- **RI perspective on performance monitoring** , **Ute Gunsenheimer**, Head of External Relations and EU Projects, European Spallation Source ERIC (*(download the presentation)*

"Emphasizes the good cooperation between the ERIC Forum and the ESFRI WG Monitoring. Offers to continue this cooperation throughout the implementation process. Suggests to hold a joint workshop (ESFRI + ERIC-Forum) with stakeholders in June 2020."

Round-tables discussion

Participants were asked to engage in round table discussions focussed on the following 3 questions:

1) **What roles do you see for the ESFRI RIs, national funders and ESFRI (Strategic Working Groups, EB, Forum) in the dialogue process on the definition of specific objectives and indicators and in the further process of implementation and "monitoring the monitoring system"?**

2) **What do you regard as the main obstacles in implementing such an approach, are there major obstacles for the acceptance of such an approach by the RIs?**

3) Are there any recommendations missing that would increase usefulness and acceptance of such an approach; taking into account the diversity of RIs?

The stakeholders generally well received the monitoring approach.

Define (more) clearly:
- What is the purpose of the ESFRI monitoring?
- Who are the drivers and actors of the KPI development?
- Confidentiality of the monitoring procedures, results and of the data, but
- Transparency is the key to accepted and successful monitoring.

Emphasize:
- KPIs are not fit to benchmark RIs – no "misuse" for funding competition.
- Any monitoring must not be based solely on KPIs, KPIs must be set in a context.
- KPIs should stay stable over a given time, but it is essential that they are adapted in cooperation with the individual RI.
- KPIs must not lead or direct science, they should rather help the RIs in their development.

Procedural remarks:
- ESFRI should endeavour to clearly communicate the approach to the RIs.
- The SWGs / IG must be involved in the specific adaption of the KPIs and in the further development of the monitoring approach.
- ESFRI should coordinate monitoring with other evaluation activities, and minimize additional burden to the RIs.
- ESFRI should not intervene in established procedures.
- ESFRI should participate in regular evaluations of RIs and involve the RIs scientific advisory boards.
- Costs and resources for the monitoring?
- After the first rounds, the system should be evaluated and if necessary adapted.
- ESFRI should offer / promote workshops and other formats for exchange of experience, development of appropriate tools etc.

Next steps:
1. Revision of the WG report, taking into account the main messages above.
2. ESFRI should discuss the future steps for the implementation and the process of the monitoring.
3. ESFRI should define responsibilities.
4. During the implementation, ESFRI shall keep close contact with the stakeholders (e.g. another Workshop, in cooperation with ESFRI Forum?).
5. Some basic rules (e.g. how to store / how to handle the KPI data) need further definition.

For future consideration
- Consider the connection between performance monitoring and impact assessment – adjust for a smooth interface between the two (summer 2020: RI-PATHs framework to be finalized)
- Consider to make adaptions for assessing also projects on the roadmap at reasonable intervals.

Session 5: National RI Roadmaps and funding models – improving synergies with European priorities and programmes

Session Chair: Agnieszka Zalewska

Session objectives

(as formulated in the programme)

Greater synergies between national RI Roadmaps and funding decisions with the European priorities and funding programmes are needed to foster a more effective implementation of the RIs across their lifecycle and improve their long-term sustainability. This session will take a look at InRoad recommendations and debate the different funding practices for RIs identified on national roadmaps and will explore how to improve their synergies with the European programmes foreseen under the new MFF.

Session Presentations

- Introduction, Agnieszka Zalewska (ESFRI Executive Board member) *(download the presentation)*

- National RI Roadmaps and funding models, Recommendations of InRoad project, Gerd Rücker (Senior Scientific Officer, DLR-Project Management Agency) *(download the presentation)*

The InRoad project was aimed at contributing to a better harmonisation and synchronisation of priority-setting, funding and lifecycle management of Research Infrastructures through the exchange of best practices. The recommendations for a higher degree of coordination between national and European RI roadmapping processes are presented in the InRoad final report (https://www.inroad.eu/wp-content/uploads/2018/12/ InRoad_finalreport.pdf). They are based on surveys conducted in 27 countries (22 MS and 5 AC), four case studies of roadmap processes (Finland, Czech Republic, Netherlands, Sweden), five regional workshops and about 30 interviews with RIs.

- National RI Roadmap and funding model: Practical experiences from the Netherlands, Jeannette Ridder-Numan (Chair of ESFRI Implementation Group) *(download the presentation)*

The Netherlands participates in more than 35 ESFRI projects and project proposals. The first Roadmap was created in 2006. In 2015 the Permanent Committee on Large-scale Scientific Infrastructure was settled. The Committee performs the Landscape analysis of existing RIs and the Roadmap prioritisation of large-scale RIs, takes care of calls for funding the projects on the Roadmap, advises the Ministry on e-Infrastructures, ICT and the ESFRI Roadmap updates. The developed strategic approach includes: requirement of cohesion between various facilities (clustering in case of overlap), alignment with national and European strategic agendas as well as with the ESFRI Roadmap and funding contributions to the ESFRI RIs for the first five years. There are 16 individual facilities and 17 clusters on the Netherlands Roadmap 2016.

Round table discussions

The table discussions, related to four questions and ordered in a form of *findings* and *key messages*, are summarised below. Note that not all questions were addressed by all tables.

1. **Which practices in your national road-mapping and funding procedures would you recommend to other countries for improving synergies with European priorities and programmes? Are there examples when your national procedures have been adapted to better align with the ESFRI roadmap process?**

Findings:

Roadmap processes are mostly bottom-up. Some countries do not use national roadmaps, but pre-existing or ad-hoc processes that take into account the national research ecosystem.

In general, national roadmaps are important tools supplying methodology and principles that stimulate structuration in a more strategic way.

Some countries focus more on the concept and design of RIs while some others more on the implementation and operation phases.

Funding models vary between countries, but typically funding schemes only cover construction and implementation. Operation costs are usually the responsibility of the host institutions. In some countries, host institutions have to prove that they can fund their participation for 5-10 years, for sustainability reasons.

National committees for RIs have often been settled, initially for evaluation (with peer review experts) and later extended to strategy (with ministries and key organizations representatives).

Key messages:

It is important that: national roadmaps are developed applying a transparent process, there is a dedicated budget line for RIs and the ministries have a long-term vision for the RIs they approve.

Setting a Permanent Committee for RIs at ministry level appears to be a good practice. The same concerns the coordination of national nodes of ERICs and ESFRI Projects.

Aligning national roadmaps with the ESFRI roadmap and using the same definitions as used by ESFRI is advisable.

Use of structural funds for identified pan-European RIs (ESFRI and not) is helpful.

2. **What lessons did you learn for areas that didn't work so well in your national road-mapping and funding procedures for building synergies with European priorities and programmes and/or to align with the ESFRI roadmap process?**

Findings:

Areas, which often do not work very well: sustainability, continuity of political actions, insufficient and changing staff devoted to RIs in the Ministries.

Countries that use structural funds to fund the RIs in their roadmaps face problems with sustainability and with operation costs.

In many countries, being on the national roadmap means that one can apply for funding. However, there is no guarantee to get it. This creates difficulties if one wants to apply with other countries to be on the ESFRI roadmap.

Key messages:

For countries, which do not have yet a national roadmap, assistance from other MS may be helpful (even under regional collaboration).

Bottom-up approach to road-mapping could be risky in terms of fragmentation and in some cases top down decisions have been found advisable.

More attention to connections between the ESFRI fields, based on a comprehensive landscape approach, is recommended.

Alignment of various funds is required, though difficult, between regional funds (incl. S3 and structural funds), national funds and others European programmes. A better recognition of the ESFRI label at all these levels would be valuable. (On the other hand, automatic assignment to the national roadmap for RIs from the ESFRI roadmap, which is practiced in some countries, may negatively influence the excellence of national research groups, because such assignment is not based on competition.)

Cost of RIs is often unclear, and full cost approaches could be helpful for researchers, organizations and ministries. It is good to have a proper costing book in the proposal, to orient the decision makers what to expect when making their decision.

3. What improvements in the national road-mapping and funding procedures would be most welcome from the RIs point of view to improve their functioning and long-term sustainability?

Findings:

In many countries the timing of the national roadmaps is not aligned with the ESFRI roadmap. In some cases dependence on national and regional processes causes this misalignment. Lack of synchronisation provokes difficulties in the implementation of RIs. Sometimes the ESFRI roadmap is not taken into account at all, which is a problem. Some roadmaps entirely focus on national facilities.

A well-defined user community supporting the chosen RI is very important for decision processes in Member States.

The RIs are not always familiar with national road-mapping. Sometimes the national procedures are only available in national languages, what makes coordination on the European level difficult.

The number of RIs on some national roadmaps is too big for the community they support, leading to funding spread too thin or to gap years.

Diversity of national funding models creates issues for RIs. For example, some member countries have challenges obtaining funding competing against ERICs when some countries have an ERIC-specific funding pot that is considered easier to access.

Key messages:

The national RI prioritisation process should be transparent, disconnected from politics and properly communicated in each country. It is particularly important for distributed infrastructures, strongly depending on many national road-mapping and financial commitments. Hearings at national level are advisable.

Increasing alignment and synchronisation of national roadmaps with the ESFRI roadmap, concerning both their content and timing, is needed. The same applies to the alignment between national roadmaps and funding decisions at regional level where structural funds are distributed.

National roadmaps should explicitly include a part representing their participation in European RIs. If a national node has gone through an evaluation within the ESFRI RI, the result of this evaluation should be taken into account for the national evaluation.

Ensuring consistency between the provided political support to ESFRI Projects and the national roadmaps, or at least ensuring that there is enough political support to give a real green light enabling discussions about potential further engagement, is essential.

Road-mapping could help structuring scientific landscape by creating clusters.

Centralised information system, like a common portal, where the information on national processes (procedures and timelines) is updated regularly, is needed. May be the MOS+ tool could serve this purpose.

Securing timely funding for the preparatory phase after the roadmap decision is important. Dedicated budget lines in the state budgets for the long term commitments are needed, because project financing based on calls for projects is not adapted for the long-term sustainability of the infrastructures.

Countries' decisions on putting in place a new European infrastructure should be based on a thorough analysis and having in mind a long-term commitment. A possible way to proceed at the national level is the inter-ministerial decision based on a study, how the new infrastructure will be integrated in the national scientific ecosystem and how it will contribute to the national development.

4. What improvements in the ESFRI road-mapping procedures would be most welcome from the decision makers' and RIs' points of view?

Findings:

The ESFRI procedure is in general very good, robust and adequate.

Some ESFRI projects are waiting, even if they are on the roadmap, because of missing financial commitment.

At the ESFRI level the communication between decision makers is crucial. Before going to formal processes, it is important to exchange the information on emerging ideas to prepare common decisions.

A pending issue is how to secure alignment of updating the national with ESFRI roadmaps and whether this should be done without a real commitment on national level.

Key messages:

For the RIs more timely communication from ESFRI is needed.

The concept of multidisciplinary RIs should be better integrated because thematic positioning sometimes creates constrains on RIs and limits the support they can gather.

The landscape analysis should be a real strategic tool for the European decisions to identify what are the gaps and the opportunities, the needs and the possibilities.

ESFRI roadmap practices should be transferred to a larger extent to national road-mapping processes. To help that, ESFRI should find mechanisms to keep national funders and ministries informed in a consistent way.

Increasing intervals between ESFRI roadmaps is necessary to ensure better quality and higher maturity of new proposals. The roadmap periodicity should be 3-4 years as a minimum.

The timing of the ESFRI roadmap should be known well in advance. At least the next two roadmaps' timing should be known. For example, every time a Road Map process (call) is open, the date of the next Road Map should be announced.

The fact that national procedures start only after finalisation of ESFRI methodology and fixing call deadline results in very short deadlines at national level. Making ESFRI formal announcements more in advance is very important.

Communication between decision makers of the European countries on emerging research infrastructures is crucial in order to reach the common European objectives consistently with the national interests.

ESFRI should insist on stronger financial commitments from applicants, to ensure funding once the proposal is included in the roadmap. Definiteness of the countries decisions and long-term engagements before putting in place a European research infrastructure is crucial.

Session 6. Research Infrastructures in the evolving European Research Area: the role of ESFRI – Part 1

Chair: Inmaculada Figueroa

Session Objectives

(As formulated in the program)

Research Infrastructures play a crucial role for the excellence and competitiveness of the European Research Area. This session will take stock of the ongoing discussions on the future of ERA and will explore how to reinforce ESFRI and the European RIs to help make ERA stronger and more successful.

Session Presentations (Part 1)

- Future of the European Research Area – 15', Inmaculada Figueroa, ESFRI Vice-Chair *(download the presentation)*
- Improving implementation of Research Infrastructures – 15', Giorgio Rossi, Chair of European Commission High-level Expert Group on Research Infrastructures *(download the presentation)*

Round-tables introduction

The European Research Area was created about 20 years ago. Its purpose is to increase the competitiveness of European research institutions by bringing them together and encouraging a more inclusive way of work. ERA policies produced significant advances during the last two decades, but many ERA objectives fell short of the initially set goals. A new paradigm for the ERA is being prepared. ESFRI feels the need to contribute with a clear vision on ERA where research infrastructures stand as pillars of European cohesion.

Round-table discussion focus

Participants were asked to engage in round table discussions focussed on the following 3 questions:

10. How RIs can contribute to the strengthening of ERA? What is the role ESFRI must play in the new ERA narrative?

Discussion of this question demonstrated that outreach actions to give publicity to ERA and ERAC and its groups are needed. The new ERA narrative should contain clear objectives and indicators. ESFRI should keep a prominent role in the new ERA. Stronger interfaces between ESFRI and other ERAC related groups are crucial. Diverse contribution of ESFRI to ERA was discussed together with future actions involving promotion of ERIC legal structure, support to the RIs along different RI lifecycle, contribution to SDGs, better actions in communication to the citizens, education and training or more directed approach towards missions and partnerships in the Horizon Europe.

11. How could ESFRI and the EC work better together to facilitate the implementation of RIs?

The participant agreed that the real collaboration between EC and Countries should move towards the sustainability of the overall ecosystem with special attention to the distributed infrastructures. A co-funding model was discussed as a possible way how to strengthen the commitment of Member States. A smoother transition from EU-funded preparatory phase to Member States funded implementation phase shall be ensured. Future actions might think of EC collaboration with ESFRI in establishing a central office providing horizontal services. EC support to the horizontal activities of ESFRI across the lifecycle (e.g. implementing the monitoring framework) was discussed.

12. How to foster stronger collaboration of European RIs with those at national and regional level?

Within this discussion participants mostly agreed that better communication and visibility of existing RIs and national nodes is essential. There ESFRI could work as a mediator to structure the national community and help in dialogue to identify the relevant research institutes to be part of the national network.

A full summary and evaluation of responses is provided below.

Discussion summary

Q1: How RIs can contribute to the strengthening of ERA? What is the role ESFRI must play in the new ERA narrative?

Outreach actions to give publicity to ERA & ERAC and its groups are needed. A general lack of knowledge about them is reported in relation to their mandate, composition, governance, etc. New draft of the ERA narrative is considered very broad and generic, not innovative. There is a lack of clear objectives, and indicators to measure their development. The definition of "lighthouse" is not clear ESFRI has already a prominent role and must keep it and when possible improve it in the new ERA.

ESFRI should be pivotal with others ERAC WG. ESFRI is at crossroad of others ERAC related groups, to strengthen the interfaces between ESFRI and other ERAC related groups is crucial to define and boost a new ERA in aspects like:

- European partnerships
- Mobility
- International Cooperation
- Open Science
- Gender

ESFRI contributes to the ERA construction by means:

- The strong incubator role it plays. ESFRI is a mature well recognised Forum of MS, AC and EC, which based in solid procedures and trust ability contributes to the definition of the European RI ecosystem beyond national interests and borders and developing and putting in place RIs European policies as required by the Council.
- The important role of ESFRI roadmapping exercise, which becomes a solid methodology to identify gaps and to promote the construction and operation of pan-European RIs offering support along the different RI lifecycle stages.
- The promotion of ERIC regulation, how proves the broad use of the ERIC legal structure in the implementation of the pan-European Research Infrastructures.
- Accessibility is a key for new ERA, and RIs could act as hubs of research for "inclusive excellence" across Europe. Transnational Access has a clear value fort the ERA construction and need to be maintaned.

Possible future actions

a) Possible involvement of ESFRI in the setting-up of the recommendations of the HLEG, in particular in a possible implementation of the Readiness Level proposal.

b) While the ERIC regulation is considered a clear asset in the contribution of ESFRI and its RIs in the construction of the ERA, is probably time for a revision of the regulation to improve the inclusion and for offering new possibilities to the widening of the Membership. Special attention deserves the incorporation of third countries willing to be part of the construction and operation of the ERIC offering funding resources.

c) To improve the societal approach and in particular contribute to the SDGs, it is needed a better cross-domain collaboration among ESFRI RIs. In this regard, also deserves special attention RIs involvement in EOSC, and the need to strengthen the role of the Social, Cultural and innovation RIs. The Landscape analysis should be an important tool to achieve this purpose using the "cross-domain" view it offers.

d) ESFRI can help to stimulate better communication to the citizens and better outreach in preparation for the new ERA.

e) In relation with EOSC it is proposed that ESFRI plays a "match maker" role contributing not only to the top-down approach but also to the cultural change required through a bottom-up approach.

f) To promote the inclusiveness through more and better actions of the RIs in the education, training and innovation areas.

g) More directed approach towards missions and sectorial activities in connection with other ministries. ESFRI has to be capable to contribute to all the HE missions and partnerships by identifying how RIs can support the goal of the missions.

Q2: How could ESFRI and the EC work better together to facilitate the implementation of RIs?

- The real collaboration between EC and Countries should move towards the sustainability of the overall ecosystem. Spetial attention should be need for distributed infrastructures.
- Co-funding would strengthen the commitment of MS – in this model the MS would come earlier in the process while the EC would continue its support for a longer period, smoothing out the transition.
- Work together and with other services of the EC to facilitate the Use of structural funds – DG REGIO are less aware of RIs, and if possible propose to extend the use for access and operation, or at least pre-operation.
- Ensure a smoother transition from EU-funded PP to MS funded implementation phase. Stronger involvement in discussions with MS funders during the PP. Maybe, limiting the Preparatory Phase or changing the scope of this call.
- Analize if the Legal entity should be established soon and preferably at the beginning of the process. ESFRI could offer support through an Advisory panel for each legal entity.

Possible future actions

The EC could collaborate with ESFRI in establishing a central point/office with some horizontal services. Stronger EC support for the horizontal activities of ESFRI across the lifecycle, ex. implementing the monitoring framework.

Q3: How to foster stronger collaboration of European RIs with those at national and regional level?

- Information and communication of existing RIs and the services they offer to researchers and national RIs along Europe is needed.
- Spread over Europe the added value of the European RI and work in the possibilities to possible collaborations/agreements with national RIs.
- Improve visibility of the work of the national nodes, and strengthen them facilitating the inclusion of new national partners (national/regional infrastructures). Included the possibility to have standardised fiches to present them.
- ESFRI could work as a mediator to structure the national community and help in the dialogue to identify the relevant research institutes to be part of the national networks.
- Improve the visibility of the national nodes and the whole RI in a stardardised way, standardised fiches/forms might help to develop a common understanding and language for RI internal and external communication.
- Cooperation between them should be included in the funding regulations.
- Regular assessment of the nodes should be necessary at European and at national / regional level
- To foster communication regular annual meetings with all nodes could be desirable.
- Recover the Regional RI work done by ESFRI in 2013, but never approved nor pursued, … and look in detail if some concepts could be updated and applied.
- ESFRI could have a role to promote the use of Structural Funds for instance through exchange of experience events. And maybe establish a network of delegates which gather the info on their use ,

and could serve to guide other countries. Use the tools of Smart Specialization Strategy with a Strategical approach (and not only the financial approach).

Session 6. Research Infrastructures in the evolving European Research Area: the role of ESFRI – Part 2

Panel 1 – Strategic Orientations – 30'
1. RIs as knowledge hubs and pillars of competitiveness – Jana Kolar, Executive Director, CERIC-ERIC *(download the presentation)*
2. RIs responsiveness to the society & contribution to the Sustainable Development Goals – Juan Josè Dañobeitia Canales, Director General, EMSO ERIC *(download the presentation)*
3. Global dimension: Global Research Infrastructures, internationalization, membership widening to third countries – Andrew Williams, Institutional Relations Officer, European Southern Observatory *(download the presentation)*

Panel 2 – RI's as part of the EU Research &Innovation environment – 30'
1. RIs role in support of Horizon Europe Missions & Clusters – Christos Arvanitidis, Chief Executive Officer, LIFEWATCH ERIC *(download the presentation)*
2. RIs contributing to the EU big initiatives & policies: the case of Energy – Jose María Los Arcos, CIEMAT *(download the presentation)*
3. RIs and HR training, skills and links with higher education – Caterina Petrillo, ESFRI Delegate *(download the presentation)*