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Report on SEI ERIC
Framework
Work Package 4 - Deliverable 4.3

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Executive summary

Assessing the socio-economic impact (SEI) of European Research Infrastructure Consortia (ERICs) is being increasingly discussed as more ERICs are being established and the existing ones are developing. It is especially interesting for the funders and other stakeholders, but also for the general public who benefit from the work ERICs and other types of RIs do. However, assessing the SEI of ERICs is not so straightforward.

The aim of task 4.3 of the ERIC Forum Implementation Project, titled 'Report on SEI ERIC Framework' is to find out the current status of assessing SEI within the ERIC community, the challenges, and best practises encountered and established by the ERICs. The aim is also to collect information to inform the EC and stakeholders in developing ways to support the ERICs in assessing SEI, and to provide a overview of the process for those ERICs that have not yet assessed their SEI.

This Deliverable report presents results of a survey that was carried out by task 4.3 within the ERIC Forum Implementation Project. This task worked closely with Work Package 6 to create synergies within the project and within the ERIC Forum as a whole. The survey results provided data for work carried out in Work Package 6 and strengthened the community's ability to convey ERICs' views on SEI within the community and to convey them to stakeholders.

The whole ERIC community, 32 (ERICs and those in the preparatory phase to become ERICs) were invited to participate. 26 replies were received, from different scientific domains as classified in the ESFRI Roadmap: physical sciences and engineering, energy, environment, health and food, social sciences, and social and cultural innovation. The results can be said to be representative of the whole ERIC landscape.

The survey showed that there are differences in the approaches to assessing SEI within the ERICs. While some had already carried out the SEI assessment, the majority (17 out of 26) were in the process of planning the assessment. The community expressed having faced challenges related to a suitable methodology and indicators, as well as defining what 'SEI' means in the context of a specific ERIC. Often, performance and impact were difficult to differentiate, especially in different phases of the ERICs life cycle. This was seen especially in relation to the indicators used, as indicators for performance and impact were often used interchangeably.

The results conveyed a message to the EC and stakeholders that the ERICs would welcome a more structured approach to assessing SEI. More examples about methodologies and indicators would be useful, as well as a continuous dialogue between the ERICs and their stakeholders about how ERICs are expected, and able, to increase their SEI, and how this is seen to be linked to their funding.

In particular, defining the correct indicators is challenging, as many ERICs have adopted the use of Key Performance Indicators (KPIs) that may not necessarily be purposeful for assessing the longer term socio-economic impacts (SEI). Hence, it is important to differentiate between performance and impact indicators. Performance indicators can be seen as a way to demonstrate the ERIC's activities towards the expected impact. SEI indicators, then, are a set of indicators that demonstrate how the performance has produced further impact.

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List of abbreviations

SEI	Socio-economic impact
EC	European Commission
ERIC	European Research Infrastructure Consortium
RI	Research Infrastructure
ESFRI	European Strategy Forum for Research Infrastructures
FTE	Full time equivalent
MoU	Memorandum of understanding
KPI	Key performance indicator
KII	Key Impact Indicator
OECD	Organization for Economic Cooperation and Development

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Introduction

The socio-economic impact (SEI) of Research Infrastructures remains a challenging topic, both methodologically and conceptually. It is also a topic that requires a context-specific approach and assessment methods due to the scientifically and organisationally varied research infrastructure landscape in Europe.

The approaches to assessing SEI have been varied, and a number of methodologies have been developed in the last few years for example by the Organization for Economic Cooperation and Development (OECD) and a number of H2020 projects, such as ACCELERETE and RI-PATHS (for more information on these, please refer to D4.1 in WP4). Many ERICs have utilised the approaches developed in these, and have also used external companies to conduct the assessment. There is, however, no "one size fits all approach", and while this kind of an approach is neither a possible nor a purposeful aim, there is a need for a more common framework within which to start approaching the process of assessing SEI of ERICs. However, the challenge also lies in the fact that a generic approach, aimed at providing an element of harmonisation, also needs to be a flexible one, as all ERICs are likely to produce unique results within their assessments.

This report aims at exploring the current status and atmosphere related to assessing the socio-economic impact within the European Research Infrastructure Consortiums (ERICs) (both established and those in the preparatory phase; both types are referred to as ERICs from now on). The findings shed light on the level at which ERICs have engaged in assessing their socio-economic impact, the methodologies they have used, the challenges they have faced or are foreseeing, and the recommendations they would like to convey to the European Commission and other stakeholders.

Conceptualising Socio-Economic Impact of ERICs

One of the key issues about assessing the SEI within ERICs is the vagueness of the concept itself. What an ERIC's SEI is differs between the different scientific domains, and it can also differ from the preparatory phase to the operational phase, depending on the purpose of the infrastructure. It is also sometimes challenging to separate the ERIC's performance and the subsequent SEI. Hence, the idea of assessing the SEI of an ERIC needs to be reflected against the life cycle of the ERIC, and the aimed at SEI in each phase of the life cycle should be considered. Will the SEI the ERIC is expected to produce differ between the phases, or will it be a stable target that will just be approached differently according to the ERIC's capacity and operationality in each phase?

In general, the ERIC's performance can be defined as the result of its activities (such as collecting data) and the subsequent output (such as scientific publications). The SEI, then, would be the direct outcome and the longer-term effects of these – for example, the usage of the publications or data by policy-makers to support their decision that would then, eventually, result in for example improvements of changes in prevailing practices (an example of the structure is illustrated in figure 1).

In theory, this is quite straightforward. However, finding the links between the ERIC's activities and the actual SEI that results from them can be challenging. While some activities can produce SEI that

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is easier to track short-term, others' SEI may take a long time to materialise, making the trackability and creditability difficult. Impact is often a part of a holistic observation and chain of events.

Hence, defining what 'SEI' actually means in the context of a specific ERIC requires defining not only the impact itself but also the performance of the ERIC that potentially leads to the desired SEI. Hence, it is useful to look at the development of SEI as a process, an 'impact narrative' or 'impact landscape' that starts to take shape through the ERICs' performance.

Hence, the important starting point in attempting to define and assess an ERIC's SEI is the ERIC's strategy: what is the ERIC's overall mission, and what are its overall objectives? What is the ERIC expected to produce, perform or enable, and how can this performance be measured? And subsequently, what are the short- and longer-term effects and impacts that are expected to materialise from the ERIC's performance? The answers to these questions contribute to the understanding of an individual ERIC's SEI - Individual ERICs should have individual definitions for SEI. The level can vary, for example, from an instant solution to a phenomenon to a slowly-evolving change in policy-making practices. It is crucial, hence, to clarify what the 'SEI' for a particular ERIC means in relation to the purpose that the ERIC has been established for.
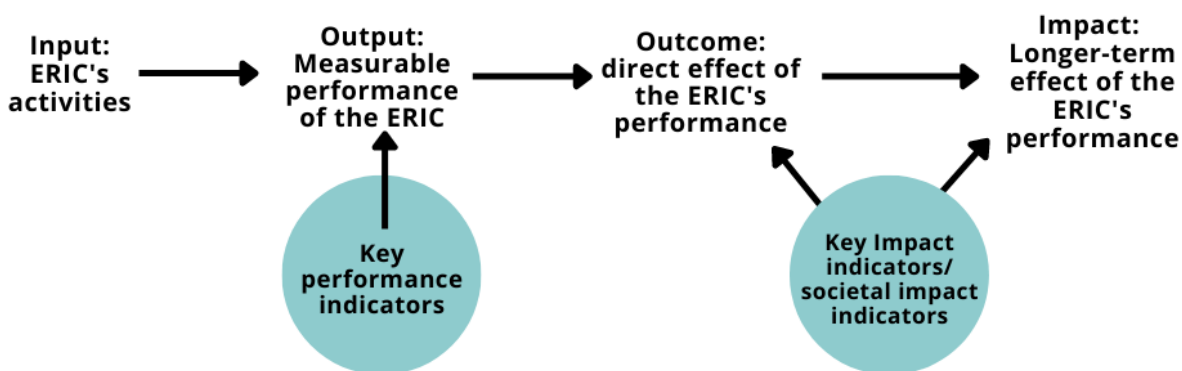

Figure 1. An approach to defining SEI

As pointed out, it is also important to think the definition of the SEI together in the lifecycle of the ERIC. In the different phases, it is not possible to measure performance and impact in the same way. It is more purposeful, perhaps, to build an understanding of what the currently performed activities are aiming at achieving within the specific phase in the ERIC life cycle: operationality (in the preparatory phase), output (in the early operational phase) or outcome and longer-term impact (in the mature operational phase). This will help in gradually building up the way towards demonstrating the longer-term SEI that the ERIC is expected to have. It is, however, natural that the phases and expectations overlap, and it is not so straightforward to define what an ERIC / RI should achieve in a very specific timeframe. It might, however, be helpful to break down the ERIC life cycle and the purpose of each phase when thinking about how the SEI will start to build up.

What is evident, then, is the fact that comparing the ERICs in terms of their SEI is not directly possible. Not only are the ERICs involved in different scientific fields, but they also have their individual missions – meaning that also the expectations in terms of their resulting impact differ. ERICs are also in different phases in their life cycles, meaning that SEI needs to be approached in

different ways. Defining the SEI can start from defining the expectations for SEI and the ways towards fulfilling them, and continue with the formulation and re-formulating of suitable indicators in different phases in the life cycle. Finally, when the ERIC has generated enough performance, it is possible to actually measure the effects and impacts that will have materialised. The timelines for this, as discussed, differ between the ERICs.

Measuring socio-economic impact

As performance and impact are often linked, the same or similar indicators are often used to monitor both, as noted in D4.1 in WP4. Many ERICs use Key Performance Indicators and Key Impact Indicators / Societal Impact Indicators interchangeably. This highlights the importance of a clear definition of the expected impact of an RI, and in what ways it should perform in order to generate the aimed-for impact.

Using the 'right' indicators can be challenging. As discussed, ERICs are in different phases in their life cycles. It is important to define the purpose indicators are used: KPIs are to measure performance to enable the assessing of SEI. It is difficult to focus on indicators that are supposed to measure SEI when the performance has not been measured for a long time, or if the expected SEI has not been defined yet, meaning that measuring performance with certain indicators might not provide the relevant data for assessing SEI later on.

Hence, it would be useful to think about two separate sets of indicators together. This might be helpful in the attempts to track the SEI from performance to impact. With carefully selected performance indicators, linked to the expected impacts, it becomes more straightforward to define the suitable impact indicators. Reflecting on questions like 'what can we measure with performance indicators that would feed into the aimed-at impact?' might be useful. It is also important to keep in mind the target audience to whom the SEI is narrated. Stakeholders have specific expectations, and this varies across scientific, geographical, cultural, and political fields. It is also useful to consider looking at impact inidicators and the different stakeholder – and user groups that the ERIC has.

Indicators are often only providing numerical data, while validating SEI often also requires narrative (qualitative) indicators, such as interview data, success stories, experience narratives, and so on. When combining both qualitative and quantitative indicators, it becomes easier to build up the 'impact narrative' or 'impact landscape' that is developing, meaning that even if there is no directly materialised societal impact present at a specific moment in time, it becomes possible to show how this impact is developing through performance and impact pathways.

The next section of this report will present the findings of the survey, and provide some concluding remarks.

Survey on SEI assessment practises

Profile of RIs participating in the survey

At the time of conducting the survey, there were 21 ERICs and 11 prep-ERICs in the European RI landscape. All 32 RIs were invited to participate in the survey. 26 replies were received, among them 5 ERICs in the preparatory phase. A vast majority, 23, were distributed infrastructures, and 3 were single-sited.

Five scientific domains were represented (Figure 1): 6 from the environmental domain, 9 from the health and food sector, 5 from physical sciences and engineering, 1 from energy, and 4 from social and cultural innovation. One respondent represented both health and social and cultural innovation.

The stakeholders of ERICs were defined as funding bodies (8 ERICs) and policy-makers (11 ERICs). The rest described their stakeholders as consisting of a combination of representatives of ministries, funding bodies and universities; member countries as the founders, national ministries, researchers, fellow ERICs/RIs, national research councils and facilities, data management professionals, and general public.

RESPONDENTS' DOMAINS

- Health and Food
- Environment
- Physical Sciences and Engineering
- Health & Food and Energy
- Social & cultural innovation
- Health and Social & cultural innovation
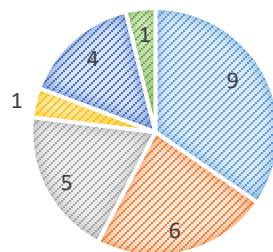
Figure 1. Respondents Domains

Survey structure

The survey consisted of 28 questions that were a combination of open-ended and multiple-choice questions. The survey was carried out using an online survey tool. It first collected respondents' background information such as the type, domain, size, and operational phase of their ERIC, and then addressed questions about the current situation about assessing the SEI, and future plans for carrying out the assessment. Furthermore, the survey asked about experienced and foreseen challenges in the assessment process and invited participants to convey suggestions and

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recommendations for the EC and stakeholders about providing support for ERICs in relation to the SEI assessment process.

Results

Status of assessing and approaching SEI within the ERIC community

The respondents were at different stages in planning or carrying out their SEI assessments. Seventeen of the 26 respondents had not yet carried out an SEI assessment, and four had already carried out an assessment several times (in the design, preparatory, and at different stages in the operational phase). Two ERICs had carried out the assessment in the operational phase, and one in its mature phase (having been operational for more than two 5-year periods). Figure 2 shows the distribution of assessment status:

STATUS OF CARRYING OUT AN SEI ASSESSMENT

- SEI has not yet been measured
- SEI has been measured more than once
- SEI measured in operational phase
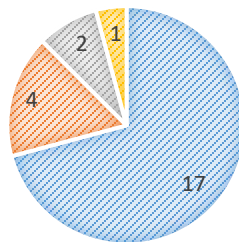- SEI measured in operational phase (after more than 2 5-year periods)

Figure 2. Status of carrying out an SEI assessment

Defining SEI in ERICs' documentation

Respondents indicated that the documentation where their SEI was defined varied within the ERIC community. Five ERICs had not yet defined their SEI, or it was under discussion as part of their statutes but was not yet included anywhere. Four ERICs indicated that their SEI was defined in connection to their strategy document or the objectives of the ERIC, and four ERICs indicated that their SEI had been defined through a specific impact pathway or impact area, such as 'economy', 'services', 'environment' or 'industry'. Six ERICs indicated that their SEI is defined in connection to the evaluation process, either to the required scientific evaluation that is carried out periodically by the ERIC itself, or in connection to the ESFRI evaluation process. One ERIC stated that their SEI was defined through success stories. In addition, respondents mentioned work plans, statutes, vision and mission statements, five-year plans, and policy documents.

Process of assessing SEI

The ERICs that had already carried out an SEI assessment described the process they had used. Three main ways to approach the assessment were indicated:

1. Impact assessment is connected to the Management Plan and/or evaluation process or is done through KPIs

2. Using the currently available tools on SEI (Accelerate, RI-Paths etc.) through internal resources

3. Using a mix of internal and external resources (available tools used as guidelines internally)

   - Some ERICs indicated having internal resources dedicated for SEI assessment. This was often linked to annual reports, where KPIs were reported.

4. Carried out in connection to an EU-funded project

Plans for assessing SEI (if not yet assessed)

Those respondents that had not yet assessed their SEI indicated varied approaches for carrying out the work. Firstly, some indicated that the assessment requires dedicated resources that had not yet been allocated, sometimes this was due to pending strategic decisions or finalisation of strategic documents or a strategy update. Secondly, some mentioned that the SEI would be carried out in connection to the development of KPIs or impact indicators, or to the development of management or sustainability plans. Thirdly, plans were underway for utilising an external service for carrying out the assessment. Some were also in the process of planning an internal process, or planning to link it to the scientific evaluation process. Furthermore, some explained that their SEI assessment would be done in a specific phase in the ERIC's life cycle in the near future.

Tools used for assessing SEI

Respondents indicated having used a variety of the existing tools to assess their SEI. Of those that had already carried out the SEI assessment, six out of ten had used an external service (figure 3). The reasons for this were explained as the assessment being linked to project funding or a pilot assessment that was funded by a grant or to support an internal assessment that had been previously carried out. Some also indicated that they had specifically planned to use an external service, and some mentioned that they had used an external service due to the lack of available tools at the time of carrying out the assessment. Figures 2 and 3 indicate which of the currently available tools were used. In the 'other' category, respondents mentioned using the input-output methodology, or a combination of the other tools.
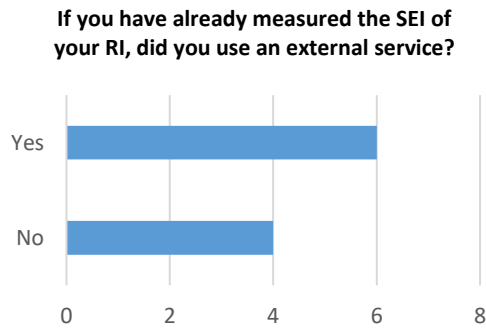
If you have already measured the SEI of your RI, did you use an external service?

Have you used the tools developed by the following:

Figure 3. Use of external service

Figure 4. Use of available tools

what components of the developed tools did you use?
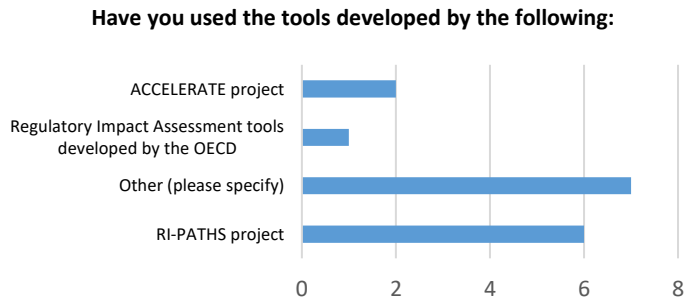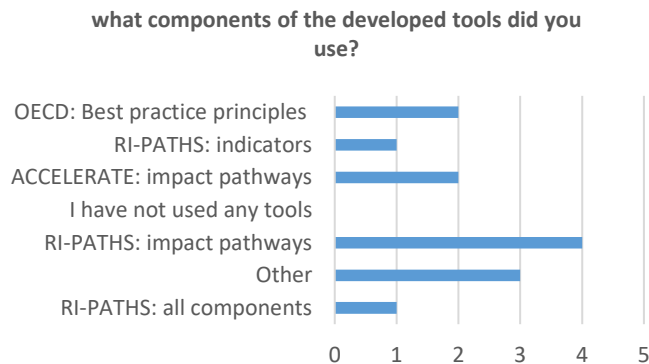
Figure 5. Components of available tools used

Respondents mentioned that the tools they had used had been, in general, compatible with the specificities of their ERICs. Some had used them as a framework and adapted them to suit their needs. Indicators developed within the tool kits were perceived to be complex to measure, or not so suitable for distributed RIs. It was also pointed out that the tools may not be so straightforward to use in the early stages of the RI's construction phase.

The tools had provided framework for defining suitable indicators and impact pathways, however. What was found to be useful as well, especially in relation to the tools developed in the ACCELERATE project, had been the emphasis on context, audience, basis information, and scales (national, European, global). The use of narratives and impact pathways had also been useful, as they focus on the underlying processes that generate impact, enabling the understanding of impact as an ongoing process.

Most challenging aspects in defining SEI

The vast majority of respondents perceived defining the SEI of their ERIC as challenging (figure 6.)

Defining the SEI of my RI is...

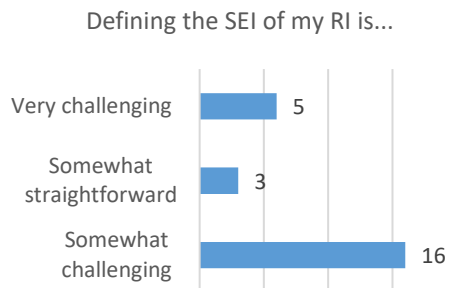|	
Very challenging	5
Somewhat straightforward	3
Somewhat challenging	16

Figure 6. Defining SEI was perceived as challenging by the majority of respondents

Those ERICs that had not yet assessed their SEI were asked to reflect on the foreseen challenges they linked to measuring it. Five main points were raised:

1. Geographical dimension (in the case of distributed RIs) and the subsequent multi-scalar SEI (local, regional, pan-European)
2. Traceability (how to link data generated in the RI and its later use, especially in a longer timeframe)
3. Difficulty defining indicators; as some impacts are intangible (such as community building); criteria is difficult to determine as not all components of the RI are part of the ERIC
4. Lack of a unified methodology or framework, as well as lack of dedicated funding
5. Defining what 'societal' and 'economic' impacts actually mean in the specific context of an RI

Those ERICs that had already assessed their SEI indicated having encountered similar challenges:

1. Geographical dimension (in the case of distributed RIs) and the subsequent multi-scalar SEI (local, regional, pan-European; multi-linguistic environments, country-specific regulations and decision-making schedule/differing funding structures)
2. Traceability (how to link data generated in the RI and its later use, especially in a longer timeframe; following the generation of indirect impacts)
3. Defining the correct methods that are not too resource-intense, finding right indicators that would measure relevant aspects, organising data collection within the RI, and differentiating between KPIs and impact indicators

Indicators used for assessing SEI

The respondents were asked to mention their 1-20 most relevant indicators that they have used, or are planning to use, for assessing their SEI. Annex 2 presents the common themes, together with some of the more specific indicators.

In general, the indicators could be grouped into 11 areas that came through in the data:
Data, visibility, engaging decision-makers, scientific and policy-related activities, services, quality of the network & amount of personnel, publications and other contributions to science, education and training, users, funding and cost-benefit ratio, and synergies with other RIs, bodies and industry. The more specific indicators under each themed area varied from very detailed to more broad, and were a combination of performance and impact indicators.

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Domain specific challenges in assessing SEI

Participants were also asked to indicate the specific features of their ERICs (domain, structure, etc.) that they saw as especially challenging when trying to assess their SEI. While all ERICs are, of course, different, a few common themes emerged from the data:

Firstly, the diversity of the communities was mentioned. This meant several different, smaller communities within the wider RIs, with different national structures, and a subsequent multi-level governance. Secondly, many again mentioned traceability – the long-term impacts generated from the use of the RI's data, multidisciplinary inputs from across the RI with several scientific fields, and the indirect impacts. Thirdly, they also mentioned the challenges in resourcing especially when some services are offered as in-kind, and because some services are resource-intensive to produce, and data is difficult to collect in cases where users need to be engaged in on a large scale. Furthermore, the areas where SEI is assessed can be complex, and the expectations from funders and stakeholders are not always clarified. Additionally, defining what 'societal impact' means in the domain-specific cases is not straightforward, and finding the right indicators is difficult when it comes to measuring with quantitative and qualitative indicators.

Environmental domain
- Much of the impact is not direct but comes from value chain
- The societal impact is easier to assess as the importance of the ERIC to answer some Societal Grand Challenges (SDG 13-14) related to climate change monitoring and ocean health
- Distributed RIs, impacts in many countries
- The need to point out long-term trends by having long time series
- Measuring the SEI is challenging because it has to be assessed through KPIs and qualitative indicators, on the long-term period, dealing with the social and the economic impact
- There is a wide range of applications where the information collected through the ERIC can be utilised. Quantification of the impact of the RI in question on society is challenging

Health & Food domain
- very heterogeneous community with many different impact pathways; potentially multi-level governance with plenty of actors involved
- Main challenge is the long-term aspects of the studies, therefore on the impact.
- Most impact is related to management methods, and also to sustainability / adaptation to climate change, which is difficult to measure / track
- Structural biology is at the fundamental end of the scientific pipeline which makes it a long way removed from the societal impact. Therefore, the further removed it is the harder it is to measure the SEI
- Trackability is an issue
- The changing landscape of the national partner priorities
- Time: It takes 10-20 years to develop novel drugs. It also takes several years to develop high-quality chemical probes
- Project/TNA budget: Drug discovery projects are demanding in terms of resources and money
- Related to the high access unit cost, the number of users per TNA budget is small

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- Trackability: Many collaborators from different scientific fields contribute to the drug discovery process, so tracking the contribution of the RI over years is challenging
- Tools easily developed; maintenance difficult (sustainability)
- Development on the ERIC-HQ level, but implementation on the national level
- Long term impact
- Indirect impact of the research infrastructure
- Lack of incentives for the users to answer a survey or even take an interview; as well as the turnover of staff which makes long-term impact measurement particularly challenging
- Monitor the extent one's open-source data has been used.
- Ensuring proper credit tracking

Health and Social & cultural innovation domain (combined)
- Although users are obligated to report any scientific publications resulting from their work with the RI's data, this is happening on a voluntary basis and does not count for any further projects/project results/policy actions following this research/publication
- Being a very large distributed infrastructure, tracking SEI is connected to extensive recherché and may never be 100% complete. Further, much of the impact becomes visible only in long-term since political decisions/processes often take time and are bound to further factors.

Physical Sciences and Engineering domain
- The combination of macro impact areas 1/ traditional scientific impact, 2/ innovation dimension through technology push and participation in mission-oriented research and 3/ a strong regional development expectation require different strategies and assessment tools.
- Being a single site RI there are difficulties on measuring SEI among partners not hosting components of the RI.
- To track impact over a long-time period plus the attribution of impact to the ERIC / RI.
- Many of the outcomes produced by fundamental research facilitated by the infrastructure are not directly produced by the RI itself but rather by its users
- A long time between a theory being presented, experiments performed and a discovery to be confirmed, a long time between a discovery and its application in society

Social & cultural innovation domain
- Challenging application of some indicators
- Humanities is a very diverse scientific field including many disciplines using very different methods
- Humanities study aspects of human society and culture, one could argue that any production in that field as a social impact, however very difficult to measure
- There are different paths to impact - direct and indirect
- Impact is often an indirect effect of a data service: researchers that use a dataset as a step in achieving insight or in creating a model are often not the ones that realise the non-academic impact outside academia
- Impact is typically a long-term effect of the enabling role of an RI

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Perceived importance of assessing SEI

Respondents conveyed several points of view on the importance of assessing the SEI of their ERICs, and what they saw as important prerequisites for the assessment. Firstly, it was seen as important that stakeholders would share expectations that they have from the ERIC in terms of the SEI it is expected to produce. Secondly, it would be important to ensure a relevant distribution of funds inside the RI so that SEI could be assessed on all relevant areas (for example not only on national level, but on the level of the whole RI). Thirdly, acknowledging that assessing the SEI is important and it should be planned for regular intervals is important. A continuous dialogue with stakeholders in this regard was seen as crucial. Respondents also pointed out that the ERICs themselves also need to invest in maintaining communication about their SEI with their stakeholders, to keep the discussion about their societal relevance ongoing.

Furthermore, explaining and narrating the SEI to funders and to the general public was seen as important, as well as promoting the usage of the data and services produced by the RI. It was also mentioned that data policies should be defined thoroughly to enable the usage more effectively. Finally, it was also highlighted that multinational cooperation is important to reduce duplication of resources, and to better understand the impact landscape of the RIs.

After assessing SEI

After carrying out the SEI assessment, some respondents indicated that they had been further developing their indicators and the evaluation process, as well as defining their impact areas. They also planned to continue using the results for increasing their impact or track the future developments through annual reporting. The information gained from the SEI assessments had also been used to define the cost-benefit structures of ERICs.

Suggestions for the EC and stakeholders for supporting ERICs in SEI assessments

The survey generated suggestions on how the EC and stakeholders could support the ERICs in carrying out their SEI assessments. In this respect, the ERICs would welcome:

1. Examples of how to improve their SEI and how impact is linked to funding

2. More guidance in relation to assessing SEI, defining the indicators and methodology. Case studies would be especially helpful

3. Recognition for the diversity of the ERIC community and the individual purpose of each ERIC. Comparing them to each other is not seen beneficial.

4. Freedom in developing their individual, most suitable indicators and impact pathways

5. When relevant, the recognition of the value of qualitative indicators alongside quantitative ones

6. Support in developing ways to ensure that they are properly credited for the data they generate

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Conclusions

Task 4.3 in WP4 in the ERIC Forum implementation project carried out a survey within the ERIC community to find out the current status of assessing the SEI of ERICs, how it had been approached, and what the challenges were. It also collected data about the hoped-for support structures that ERICs would welcome from the EC and other stakeholders about developing ways to assess SEI of ERICs.

The survey revealed that there is a relatively unified opinion feeling within the ERIC community about the SEI being a complex phenomenon to assess, mainly due to the challenges in defining SEI contextually, applying a suitable methodology, and finding the right indicators. It is often difficult to differentiate between performance and impact (see figure 1), and hence, indicators that are in use are a mixture of both performance and impact indicators. This further blur the ability to clearly point out what the longer-term socio-economic impacts of the ERICs' performance actually are, or are expected to be. ERICs would welcome a continuous dialogue with stakeholders to establish a consensus about what the SEI of individual ERICs are expected to be, how they should be assessed, and how performance and impact are linked to funding decisions. SEI would be a useful standing item in annual meetings with stakeholders. ERICs would also welcome more guidance about the practicalities of assessing SEI through examples, such as case studies. They also emphasise that:

- ERICs are a very heterogenous community that impacts science and societies in diverse ways. Direct comparisons do not produce a comprehensive idea about their capabilities, capacities and impact, especially when the direct impacts of the ERIC's performance can be validated only after a long time period, or is a result of a complex assemblage of scientific and societal processes.

- The ERIC community is keen to develop ways to ensure that it is possible to better track the data it generates in a way that would enable crediting the ERIC, since this is seen as a crucial aspect in being able to assess the SEI of ERICs.

- The ERIC community is keen to continue sharing best practises about SEI assessments and to include the EC and other stakeholders in the dialogue related to the process.

Annex 1: ERIC Forum survey on SEI assessment practises – survey questions

Socio-economic impact of ERICs

As part of the task 4.3 in WP4 of the ERIC Forum implementation project, we are gathering information about measuring and defining the socio-economic impact of ERICS - including the related challenges. The data collected in this survey will also help in preparing the policy brief of ERIC SEI that WP6 will be working on.

Background information
1. Name of your ERIC / Preparatory phase infrastructure *

2. My ERIC / preparatory infrastructure is... *
- ○ An established ERIC, in full operational phase
- ● An established ERIC, in implementation and construction phase
- ○ Not yet an ERIC, but in design and preparatory phase to become one

3. My ERIC / preparatory ERIC is a... *
- ● Distributed RI
- ○ Single sited R
- I ○ Other type, please specify below

4. What is / are the domain/s of your ERIC / Preparatory ERIC? *
- ○ Energy
- ● Environment
- ○ Health and Food
- ○ Physical Sciences and Engineering
- ○ Social & cultural innovation
- ○ Digital
- ○ Other, please specify

5. How would you describe the size of your ERIC / preparatory ERIC? E.g. annual budget, number of hubs / nodes, single or several member countries, number of FTEs, position in national RI landscape / scientific field...? *

Max. 1000 words

6. Who are the founders / stakeholders of your RI? *
- ● Policy makers

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○ Funding bodies

○ Advisory groups

○ Other, please specify below

Please specify who your founders / stakeholders are (if not found in the list above)

Socio-Economic Impact defining in your ERIC / preparatory ERIC

7. Is the Socio-Economic Impact that you RI is aiming to have defined in... *

◉ Your statutes

○ Your business / sustainability plan

○ ESFRI Evaluation

○ Other (please specify below)

○ It has not been defined anywhere

○ It is defined in multiple places - please specify

Please identify the place where the SEI your RI is aiming to have is defined, if not found in the list above

8. How is the aimed at socio-economic impact of your infrastructure defined? *

9. Have you already assessed / measured the SEI of your infrastructure? *

◉ Yes

○ No

Measuring / Assessing SEI in your ERIC / preparatory ERIC

10. Please describe the process you have related to measuring the SEI of your RI. Do you have dedicated resources for the process (interviews, meetings, workshops…) of assessing the SEI of your RI? Do you use internal or external resources, or a mix of both? *

11. If you have not started the SEI assessment process, do you have existing plans to start it? If so, when are you planning to start it? If no, is there a reason for that? *

12. If you have already measured the SEI of your RI, at what phase in your ERIC did you perform the assessment? *

| Preparatory (e.g. just established as an ERIC of close to being established) | ▼ |

If you have assessed your SEI multiple times already, please explain in what phases of your ERIC / preparatory ERIC you have done so

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13. If you have already measured the SEI of your RI, did you use an external service?

14. If you used an external service to assess your SEI, what was the reason for that? (E.g. was it a request from stakeholders / GA or a question about resources etc.?) OR, did you use a specific grant to perform the activity?

15. Have you used the tools developed by the following: *

○ ACCELERATE project

◉ RI-PATHS project

○ Regulatory Impact Assessment tools developed by the OECD

○ Other (please specify)

○ I have not used any tools

please specify the tools / external service you used if not found in the drop-down menu above

16. If you have used the tools mentioned above, what components oof the developed tools did you use?

○ RI-PATHS: all components

◉ RI-PATHS: impact pathways

○ RI-PATHS: impact areas

○ RI-PATHS: reporting

○ RI-PATHS: indicators

○ ACCELERATE: impact pathways

○ OECD: Best practice principles for regulatory impact analysis

○ Other, please specify below

○ I have not used any tools

17. If you used any of the existing tools mentioned above, did you solve some questions you had related to your SEI or did using these tools create more questions? (if you did not use the tools, just write n/a) *

18. If you used the tools mentioned above, how would you describe their compatibility with the specificity of your RI? (if you did not use the tools, just write n/a) *

19. If you have not used the tools mentioned above, are you planning to utilise them? If so, which ones? *

◉ Tools created by RI-PATHS

○ Tools created by ACCELERATE

○ Tools created by OECD

○ Other, please specify below

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○ Not planning to use these

20. If you have not yet assessed the SEI of your RI, what do you think would be the most challenging aspect of measuring SEI of ERICs? *

21. If you have already carried out a SEI assessment, what would you describe as the most challenging aspects in the process? *
Impact indicators

22. What key indicators have you defined for measuring SEI? Please only mention 1-20 most important ones *

23. If you have no defined impact indicators, what would be the process of defining KIIs for your RI? *

Challenges and suggestions in assessing the SEI of your ERIC / preparatory ERIC

24. How straightforward is it to define the SEI of your infrastructure? *					
	Very straightforward	Somewhat straightforward	Don't know	Somewhat challenging	Very challenging
Defining the SEI of my RI is...	○ 1	○ 2	● 3	○ 4	○ 5

25. Please describe any specificities of your domain / field that makes the defining / measuring of the SEI of your infrastructure challenging (examples; e.g. related to short – long-term impact, transparency, trackability) *

26. Please describe any specificities of your domain / field that makes the defining / measuring of the SEI of your infrastructure important to communicate externally (to stakeholders / general public / policy makers etc.) *

27. After assessing your SEI (if you have already measured), what did you do afterwards? Did you act on any of the results? *

28. Do you have any suggestions for the EC / stakeholders for providing support in addressing challenges / gaps in assessing the SEI of your ERIC / preparatory ERIC or ERICs in general? *

Annex 2. Selected indicators in use for assessing SEI of ERICs

Data	Visibility	Engaging decision-makers	Activities (scientific and policy-related)	Services	Quality of the network & amount of personnel	Publications and other contributions to science	Education and training	Users	Funding and cost-benefit ratio	Synergies with other RIs, bodies or industry
Amount, quality and popularity (as nr of downloads) of data produced	Visibility in scientific and social media	Decision-makers' Improved understanding	Participation in policy related WGs	Quality of services (as assessed by the users)	performance of the instruments	Number of publications produced by the RI	Number of students and researchers trained	Number of users	Growth of proposal submissions in percent	Co-development with other RIs
Ability to produce policy relevant data	Performance of twitter channel (followers, impressions)	Expert advice to support public policies	Participation in agricultural related project and WGs	support provided by the User Office	Instruments allocated and instruments rejected for a given year	Number of publications citing the RI	training programmes and participants	Number of industrial users	Proposals submitted and granted from target countries	Co-development with research & technol. organisations
Access/use of research data / databases / collections & informatics resources	Public awareness: visitors on website and followers on social media	Participation by RIs in policy related activities	Number of events attended	the logistic support provided by the ERIC Travel Office	Availability & access to dedicated technology platforms	Average impact factor (now replaced by the share of publications among the top 10% in their field)	Number of training events	Number of scientific users	total budget of the RI (incl. investments and salaries)	Involvement in standardisation bodies
Data provided by ERIC to other RIs from which a dataset has been created	European Coverage Public visibility (media appearances, social media, website visitors)		Activity of the events attended or working group joined	support provided by the Partner Facility in which measurements were performed	total number of FTE	Non-ERIC publications of the host institution	Total number of trainees	Number of new scientists using the RI	Most used type of funding	training programmes and participants
Standards and quality management	Media		Contribution to Policy (expert reports, conferences, articles, meetings, etc.)	support provided by the beamline or instrument scientists during the preparation of your proposal Assessment of the funders	Scientific domain of the applicants	Trends of publications in a given timeframe	Number of international trainees	Home countries of the users (international vs. EU users)	Value of ERIC for its country members	Number of R&D projects/Innovative projects based on RI outputs
Number of patents' applications			Capacity improvements in supporting decision makers	Number of service requests in a defined period (and comparison with previous ones)	Number of countries participating in the RI	Breakthrough researches made possible through services	Education resources for the larger community	Professional status of the users	Notable changes in funding decisions	Scientific collaborations with other RIs (joint projects)
Number of patents granted			Frequency in providing information to decision makers	Rate of accepted vs. not accepted requests, and reasons for rejecting requests	Community building, especially in countries that do not yet have the scientific expertise and technical capabilities in our field.	Breakthrough researches made possible through services	Public education	Academic vs. industrial users	Career / job creation	Connections with other RIs (collaboration agreements, MoU)
Number of scientific events organized on topics relating to ERIC				Most requested categories of services	Degree of awareness for ethical principles	Open Access publications	Number of graduates trained on issues utilizing ERIC outcomes	Gender balance of the users	Industry investments	The number of formalised collaborations with parties in the GLAM sector
				Satisfaction of scientific users		Publications of policy papers		User numbers	Direct investment	Collaboration with industry / intellectual property
				Compliance with EU charter of access		Scientific publications and other scientific outcomes (e.g. compounds, data) per		user workshops	Gross added value (Direct and indirect effect)	Production (Direct and indirect effect)

						number of users/projects				
				Total number of services		number of (SSCI ranked) publications		user countries	Jobs created (Direct and indirect effect)	Production (including consequential effects)
				successful user support		Number of articles related with research using ERIC RI published in proceedings of international conferences		Use of data by policy actors (users in public institutions/nonprofit organisations)	Gross added value (including consequential effects)	
				Number of relevant services		Number of books (chapters or extended sections) that are based on ERIC produced knowledge		Share of users associated with industry and publications with industry	Income from commercial activities and the number of entities paying for service	
				Degree of awareness of ERIC core services to adhere FAIR principles		Number of new methodologies, prototypes or designs developed		KPIs assessing the socio-economic effects of ERIC infrastructure at research activities of users	Number of R&D projects commissioned by European Commission or other international funding Agencies to the Research Groups involved in the RI & total volume of funding (in millions €)	
				Level of improvement of specific activities due to the utilization of ERIC products					Number of R&D projects commissioned by National Authorities to the Research Groups involved in ERIC / RI & Total volume of funding (in millions €)	
									Number of R&D projects commissioned by private sector to the Research Groups involved in ERIC / RI & Total volume of funding (in millions €)	
									Number of start-ups and/or spin-offs created utilizing products or expertise gained from the RI in question & Total turnover (in millions €) & Total earnings (in millions €)	
									Total investment undertaken for developing/maintaining and operating ERIC RI (in million €)	
									Jobs directly generated for setting up/maintaining and operating the physical infrastructure (in man-	

									years of full-time equivalent jobs)	
									Jobs directly generated to your Institutions or to start-ups/spin-offs associated with research activities utilizing ERIC RI (in man-years of full-time equivalent jobs)	
									Increase of the funds attracted due to utilization of ERIC products	