



WORKING GROUP REPORT
Monitoring of ESFRI Landmarks

**Proposal for the
Implementation of the
ESFRI Monitoring
Approach**

December 2021

Report of the ESFRI WORKING GROUP ON MONITORING OF ESFRI LANDMARKS

Proposal for the Implementation of the ESFRI Monitoring Approach

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Executive summary

Main conclusions of this report

- In order to maintain their status and “quality seal”, each Landmark will undergo a periodic monitoring by ESFRI, every five years.
- Landmark monitoring will become a permanent activity of ESFRI, requiring substantial effort and resources; therefore, it needs a dedicated organisational structure.
- The ESFRI Landmark monitoring approach will partly build on the use of Key Performance Indicators (KPIs), as presented in the ESFRI monitoring report¹. Main elements of monitoring will be the established methods, like questionnaires, hearings, the use of minimal key requirements, etc.
- The ESFRI monitoring approach should be implemented from the start as a self-learning system before a robust methodology is put in place.
- Promotion of the Landmark monitoring approach as a streamlined ESFRI methodology, will be a significant contribution of ESFRI to ERA

Recommendations of the informal Working Group

1. The ESFRI monitoring approach and the Landmark monitoring shall be implemented as a self-learning system and be reviewed at appropriate intervals.
2. Existence of Key Performance Indicators (KPI)-based data is a requirement for entering the Landmark monitoring process. While the RIs are invited to use the appropriate ESFRI KPIs, their uptake (instead of the Landmarks’ own KPIs) shall be voluntary. While the RIs are invited to use the ESFRI KPIs, an agreement between the RIs and the Monitoring Panel of selecting and adapting some of the KPIs to the specific needs, may also be made. KPI data shall be collected and stored by the Landmark RIs and be provided to the monitoring panel upon request.
3. In order to provide a complete monitoring following the ESFRI life-cycle approach, minimal key requirements, questionnaires, hearings and other proven instruments of monitoring shall be used in the process.
4. The Landmark monitoring shall be coordinated by a committee composed of WG-Chairs, one or two EB members and one representative of the European Commission
5. The monitoring shall be conducted by panels composed of the relevant SWGs and IG members, plus external experts
6. The first round of monitoring, covering a substantial number of operative Landmarks, shall be finished by the end of 2024, based on a schedule to be agreed with the RIs and to be coordinated with the planning of other relevant ESFRI activities.

¹ ESFRI WORKING GROUP REPORT, Monitoring of Research Infrastructures Performance, December 2019, https://www.esfri.eu/sites/default/files/ESFRI_WG_Monitoring_Report.pdf

1 Introduction

More than ever, science is reliant on advanced research facilities that build on state-of-the-art scientific and technological knowledge. Within large areas of research, access to these kinds of facilities is a pivotal necessity for moving the frontiers of science further ahead. Research Infrastructures – as one of the key facilities – play an essential role in enabling discovery, technological development and invention and, thus, advancing science, technology, and innovation.

To suitably address the challenge to provide the European research community with world class research infrastructures, the European Strategy Forum on Research Infrastructures (ESFRI) was established in 2002 with the purpose of developing a European approach to Research Infrastructure policy as a key element of the emerging European Research Area (ERA). Through the subsequent mandates that the Competitiveness Council gave to ESFRI, it is supporting the research infrastructures' system in optimizing its alignment with Europe's strategic agendas, across borders of sectoral domains. In adopting the ESFRI Roadmap, Member States and Associated Countries identify those research infrastructures that are strategically needed for European scientific competitiveness, and support the plan for implementing them. As the Research Infrastructure landscape has expanded over the years, ESFRI has developed a medium to long-term vision on the needs of the European scientific communities. This vision has been progressively developed by ESFRI since its set up in 2002: starting from the first roadmap in 2006 with the identified research infrastructures of pan-European relevance, through the increasing of their number in 2008 and focusing on particular scientific fields in 2010, prioritization in 2016 and consolidation of the European landscape of research infrastructures in 2018. In accordance with this dynamic, ESFRI developed in 2016 a life-cycle approach with respect to research infrastructures and adopted the concept of Projects (new pan-European RIs corresponding to the needs of research communities in the next 10 to 20 years) and Landmarks (implemented projects leading in their domains and structuring the European and global landscape). According to this life-cycle approach, a 10-year maximum term for status of Project on ESFRI roadmap was adopted. Also in line with the life-cycle principles, ESFRI roadmap defines a number of lifecycle stages in RIs' set up, starting with Concept Development and running through Design, Preparation, Implementation and Operation before reaching a final Termination Phase.

The mission of ESFRI is to support a coherent and strategy-led approach to policy-making on research infrastructures in Europe. In this, ESFRI endeavors to accompany the full policy cycle of research infrastructures establishment, starting from policy design and political decision on setting up of the research infrastructures, through the implementation of this research policy decision to the follow up of the development of research infrastructures.

Policy design aims at the development of the research infrastructures' ecosystem in Europe, with landscape analysis and identification of gaps and the roadmapping process as the main policy tools developed by ESFRI.

The implementation of the policy decisions on establishment of the research infrastructures is also supported by the ESFRI "incubation" activities and reviews at each stage of the infrastructure development lifecycle, described in ESFRI roadmap of 2016. Since 2014 ESFRI

established and refined a robust methodology for the evaluation of new candidates for the ESFRI roadmap, as well as for the monitoring of projects progress through their lifecycle towards implementation. Entry criteria were substantially enforced in the 2016 Roadmap update. The entry criteria were further refined for the Roadmap 2018 and 2021 updates. Evaluations, assessment, and periodic review mechanisms that include independent peer review, were established for the Projects on the ESFRI roadmap.

The Landmark status, confirming uniqueness and pan-European relevance of a research infrastructure, is attributed to the facilities which successfully reach the implementation phase, based on the results of a scrupulous evaluation conducted by ESFRI with the support of external experts. However, until now, ESFRI did not carry out any further assessment of the Landmarks and therefore had no instrument to ensure continuous relevance of the Landmarks. Also, it follows from ESFRI's life cycle approach that Research Infrastructures receive ESFRI feedback and support during their operation phase, until decommissioning. There is therefore a need to develop the monitoring of Landmarks which will help to periodically assess their performance and other activities.

In 2018, the Competitiveness Council (the Council conclusions of May 29, 2018) decided to address this aspect in its conclusions on Accelerating knowledge circulation in the EU, where it: "...; INVITES Member States and the Commission within the framework of ESFRI to develop a common approach for monitoring of their (RIs) performance and INVITES the Pan-European Research Infrastructures, on a voluntary basis, to include it in their governance and explore options to support this through the use of Key Performance Indicators".

In order to address the request of the Council, ESFRI set up a dedicated working group. This group developed a monitoring approach which included key performance indicators. The ESFRI monitoring report², adopted in December 2019, constitutes a comprehensive framework to support the analysis of individual RI performance and progress towards the individually set targets with the use of KPIs.

Taking into account the progress made by ESFRI towards developing a framework for monitoring of RI performance, the present document has the following objectives:

1. To suggest a methodology for the monitoring of Landmarks on the ESFRI Roadmap
2. To identify options for implementation of Landmark monitoring at ESFRI
3. To provide directions for further development of the ESFRI monitoring framework
4. To provide directions for the uptake of ESFRI monitoring approach beyond the Landmarks

2 ESFRI Landmark Monitoring Approach

2.1 The rationale for the Landmark monitoring by ESFRI

The ESFRI White Paper, agreed by the Forum in April 2020, states that ESFRI shall further discuss implementation of the monitoring approach and possibilities to promote its uptake by

² ESFRI WORKING GROUP REPORT, Monitoring of Research Infrastructures Performance, December 2019 https://www.esfri.eu/sites/default/files/ESFRI_WG_Monitoring_Report.pdf

the RIs. Moreover, results available from the approach could contribute to the regular assessments and reviews of Projects and Landmarks.

As described above, ESFRI has developed a robust assessment methodology in respect to the Projects of research infrastructures, but has not provided till now such close accompanying measures to Landmarks. ESFRI Landmarks are pillars in European Research Area landscape not only offering services to academic research, but also supporting development and innovation, and are specifically important for the regional scientific and economic development. Guaranteeing the excellence of Landmark label, ESFRI has a responsibility of the quality of the RIs listed in the ESFRI roadmap as Landmarks. Hence, ESFRI needs to develop a methodology to follow up and monitor Landmarks, capitalizing on the monitoring approach developed in 2019. It will contribute to a common framework of information on the RIs for their self-assessment as well as elements for external evaluations and assessments. Landmark monitoring by ESFRI is thought as a continuous assessment that aims at providing all stakeholders with detailed information on the progress or delay of the ongoing activities. It is an oversight of the Landmarks' activities with the purpose to determine if all the objectives planned by the RI have been reached, so that action can be taken to correct the deficiencies as quickly as possible. Thus, it will support the RIs into and during their operational phase, in line with ESFRI's life cycle approach. The KPI-based approach as a novel instrument is addressed in this report in some detail. However, this approach only complements the methodology. It must not and it cannot replace a thorough expert evaluation of both the scientific as well as the implementation aspects of a project.

Many of the ESFRI Landmarks are also monitored by their national and regional funders, and such reports will be a valuable input into the ESFRI monitoring process. Nevertheless, the existence of such processes cannot make the ESFRI monitoring redundant. ESFRI is indeed awarding the Landmark status to the RIs and is therefore responsible for assuring that the Landmarks continue to meet the necessary criteria.

2.2 Key Performance Indicators to support the Landmark monitoring within ESFRI

The ESFRI Landmark monitoring approach will partly build on the use of specific KPIs presented in the ESFRI monitoring report. These 21 indicators constitute a comprehensive framework ranging from input to outcome indicators, addressing the basic objectives of the research infrastructures.

However, the ESFRI KPI approach is not designed as a "one size fits all" scheme. The monitoring panel and the individual Landmarks shall engage in dialogue to adjust the KPIs to the specific objectives of the Landmark, according to their relevance to the Landmark and seek to keep the burden of collecting the KPI data as low as possible. However, the agreed list of KPIs shall be fit to answer relevant questions of the monitoring process (WG-Report recommendations 3 and 6). This methodology will allow RIs to select jointly with the monitoring panel the KPIs which will fit the specific objectives of each particular RI.

The ESFRI KPIs can be used to better understand the development of RIs and their use within scientific areas, but they are not designed for and do not support benchmarking of Research Infrastructures. They provide information on the performance of an RI against its own

objectives and targets and within its specific context. Importantly, KPIs will also provide a basis for keeping track of how a specific RI develops over time. Thus, the Landmark monitoring shall use the KPIs strictly selected for the respective Landmark. (WG-Report recommendation 2). The possibility of applying the monitoring approach to other RIs should be explored once ESFRI has gathered reliable Landmarks' experience including the use of these KPIs. However, it must be emphasized that the KPIs do not constitute the Landmark monitoring itself, but only feed information into this process. We also expect that the monitoring process will contribute to further development of the KPIs.

In order to provide a picture of the development of a RI, the infrastructure should collect the agreed KPIs at regular intervals over a sufficient period of time. This provides additional information on critical developments to the RIs themselves as well as to the monitoring panel. RIs and the monitoring panel shall agree on the frequency of collection of KPI data for each individual KPI. When the monitoring panel asks for the KPIs, the RIs shall provide the data covering the asked period of time, e.g. from the start of this data collection (WG-Report recommendation 6).

2.3 Proposal for implementation of the Landmark monitoring process within ESFRI

The Landmark label has become a recognised quality stamp for European research infrastructures. In order to maintain this status, each Landmark will undergo a periodic monitoring by ESFRI, every five years. With over 40 Landmarks on the ESFRI Roadmap, 8-10 Landmarks will need to be monitored each year. Landmark monitoring will be carried out in cooperation with the concerned RI, considering its operational and scientific objectives. The timing of the monitoring of each Landmark will be adjusted in accordance with its implementation timeline and its development strategy. In order to enable the follow up of the development of the RI performance, the agreed KPIs should be collected and stored by the research infrastructure every year. KPIs which are not tracked in time are indeed very difficult to interpret.

When entering the Landmark monitoring process, Landmarks shall provide the necessary information based on high-quality KPIs, adapted to their specific needs and objectives. During monitoring, the panel and the individual Landmarks shall engage in dialogue to discuss the suitability of the KPIs for monitoring of specific objectives of the Landmark. The Forum will decide how to address those Landmarks failing to provide appropriate KPIs.

Landmark monitoring methodology will be developed in detail by the end of 2021 by the ESFRI Executive Board in close collaboration with SWGs and IG. The implementation will start in 2022, with the report on a first set of Landmarks published by the end of 2022. This pilot phase will be used for testing and optimisation of the Landmark monitoring approach.

2.4 Organisation of the monitoring process within ESFRI

Landmark monitoring will become a permanent activity of ESFRI, requiring substantial effort and resources; therefore, it needs a dedicated organisational structure. The whole monitoring process will be conducted following the general evaluation procedures of ESFRI, under the responsibility of the SWGs and the IG, coordinated by the ESFRI EB and the Chairs of SWGs and IG through the committee established. The monitoring panels will use proven methods

like questionnaires, hearings, external expertise or site visits. The KPI information will provide information, complementing these tools. KPIs may provide additional proof for the findings, they may help to create a picture of the past performance development of a Landmark, and they may indicate specific problems or questions to be addressed in the review. The results of monitoring will be reported to the ESFRI Forum, which will pronounce the decisions concerning the outcomes of the monitoring process. This decision can comprise confirming the Landmark status, recommendation of measures to be taken to ensure the further performance of the Landmark or the termination of the Landmark status.

For each Landmark under monitoring, a panel of experts would be set up, covering the relevant scientific and operational expertise. Landmark monitoring will be supported by a dedicated IT tool (currently ESFRI MOS) in order to facilitate the gathering of the relevant information and serve as repository of reports for reference in future review processes. The Panels will also negotiate the appropriate KPIs and their definitions with the Landmarks concerned.

It is recommended that the monitoring process would be coordinated by a committee composed of SWG Chairs, 1-2 Executive Board Members and a representative from the European Commission, assuring internal consistency and that the entire process is coordinated at ESFRI level. The reviews of the specific Landmarks shall be conducted by ESFRI panels with external support. The reviewers would be from the relevant SWGs and IG and the panel would be complemented by independent external reviewers.

A fully internalised model, where the panels are composed by ESFRI SWGs and the IG only was also considered and was seen as not appropriate, since it would require very substantial additional commitment of time from members of ESFRI working groups.

A fully externalized model with a permanent Landmark monitoring expert group set up by ESFRI, composed of independent external experts covering the broad range of needed competences, and with monitoring panels composed of members of this group was found also inappropriate. This model would require substantial additional resources for external expertise from the ESFRI support structure.

2.5 Timeline and Landmark monitoring

Basic decisions on the implementation of the Landmark monitoring process and on the organisational model need to be taken by the end of September 2021. This is necessary in order to plan adequate resources for the Landmark monitoring process in the next ESFRI support project, to allow sufficient time for developing detailed methodology in autumn, to enable a discussion on the monitoring process with the Landmarks and to establish an operational structure to start the monitoring process in 2022.

For the first, pilot round of the Landmark monitoring in 2022, 5-10 Landmarks will be selected, representing a broad range of scientific fields and operational models. More Landmarks will follow in 2023 and 2024 with the aim to cover twenty Landmarks in total, thus allowing to monitor a substantial part of the operative Landmarks included in the 2016 Roadmap.

During 2022, a schedule for the monitoring of Landmarks for the period 2023-2024 will be developed, in dialogue with the RIs. At the end of the first exercise conducted within the first Landmarks, the methodology and the implementation model would be reviewed and adapted as necessary, including a possible update of the KPIs. While scheduling the monitoring activities, it is necessary to take into account the planning of the update of the next ESFRI roadmap (scheduled for 2025) and the planned of the Landscape Analysis (decoupled from the roadmap update schedule and planned in the middle of the term of the next roadmap update).

3 Further development of KPIs and Data collection

3.1 Testing and updating the KPIs list

All Landmarks entering the monitoring process will have to provide a set of KPIs. It is planned that the monitoring panel will discuss the KPIs used by the Landmarks during the Landmark monitoring process, and provide feedback to ESFRI. The information gathered during this exercise will enable review and further development of the ESFRI KPIs, the need for which was also established by the 2019 Report. It will also make possible to add further indicators to the list, in order to collect data on e.g. relevant to the implementation of EOOSC, energy and environmental management.

No additional working groups is proposed in this respect, and the topic should be addressed as a part of the Landmark monitoring exercise. The results should be further discussed by the Executive Board, which will present the proposal for the updated of the ESFRI KPIs for adoption to ESFRI. Periodic Exchange of Experience workshops involving RIs will be of added value to the process of further development of the ESFRI KPIs.

The ESFRI Monitoring approach should therefore be developed as a self-learning system and will require a close collaboration with the RIs, their owners and funders.

3.2 Data collection and data handling

When using the KPIs, RIs will create and collect a considerable amount of data, at different levels of confidentiality. This may also apply to further information provided by the RIs for monitoring purposes. In order to collect the data and to provide them to the monitoring panel, the RIs need to be confident how and for which purposes the data will be used.

The data shall be stored individually by each RI, in a format that allows flexible reporting according to the individual management needs of the RI, and the information needs of reviewers and other stakeholders.

The RIs will give the data to users (monitoring panels or other) upon request and for specific purposes only. These purposes shall be defined in the request. For ESFRI, these purposes normally include conducting a review process or conducting studies across RIs (e.g. if specific

problems affect specific groups of RIs more than others). ESFRI itself would only keep the listing of KPIs for the individual RIs as agreed in the dialogue process, not the KPI values.

The ownership of the data shall remain with the RIs. This means that they retain the control which data are distributed to whom, which rules apply to safeguarding and processing of the data and for which purposes the data will be used.

When collecting the data, RIs will need to comply with European and national legislations (e.g. the General Data Protection Regulation). National regulations sometimes deviate from each other, e.g. on the collection of personal information of staff members by the employers. Since ESFRI cannot impose rules that are not in alignment with the respective national regulations, **observing data protection regulations remains the responsibility of the individual RIs**. These limitations have to be considered in the dialogue process between RIs and panels when defining the relevant KPIs.

4 Promotion of the Landmark monitoring approach within and beyond ESFRI

4.1 Research infrastructures need high quality Key Performance Indicators (KPIs)

Monitoring of performance is a management tool which enables an institution to follow its progress towards objectives and forms a basis for informed decisions about future activities. The institutions are often mandated by their stakeholders or funders to conduct the monitoring of performance. KPIs are a useful component of the monitoring process which can facilitate the assessment of performance according to the selected and accepted criteria.

Research infrastructures, representing by their nature important investments and thus being financed in the largest part by public money from their hosting states, are subject of attentive follow up by their funders.

The ESFRI monitoring approach, and in particular the KPIs proposed in the report of ESFRI monitoring group, was developed by experts in the first place for ESFRI Landmarks. It will be continuously improved based on the collaboration with the RIs and will thus be a high-quality resource to be used even beyond its original purpose. The KPIs developed by ESFRI will most probably contribute to more efficient monitoring of existing research infrastructures and will also simplify the development of the KPIs by the new RIs. ESFRI KPIs are suggested as general ones, and if necessary, have to be complemented by the RI specific ones.

4.2 Wide adoption of ESFRI Monitoring approach to facilitate the work of governing bodies and policymakers across Europe

Broad use of the ESFRI Monitoring approach and adoption of ESFRI KPIs, by the RIs, wherever applicable, would facilitate the work of governing bodies of RIs and policymakers across Europe. The benefits and the added value of using common ESFRI methodology, thoroughly

examined and adapted to RIs needs, will become evident soon. The stakeholders will be better enabled to carry out effective pan-European and national multi-stakeholder monitoring processes based on the commonly adopted principles and KPIs. This will be beneficial for interpreting and understanding of monitoring findings: the analysis, communication and use of these findings could be easily compared between the countries using the same methodology.

High acceptance of the KPIs by the RIs and their governing bodies would contribute to better management of the RIs. A number of representatives of governments and funding bodies sit on several governing bodies of the RIs. Applying the same methodology to different pan-European RIs would significantly facilitate the monitoring comprehension.

The ESFRI streamlined monitoring process could be also largely used at national levels and it will certainly produce reliable, useful and comprehensive data. Thus, governments and national stakeholders will benefit from the robust evidence produced by a strengthened country-level monitoring process.

4.3 Streamlined ESFRI methodology as a significant contribution of ESFRI to ERA

A typical scientific policy cycle involves a design/priority setting phase, its implementation and monitoring. ESFRI, as a strategic instrument to develop the scientific integration of Europe and to strengthen its international outreach, supports the policy cycle on the EU level. Development of the monitoring approach is a part of it, as also mandated by the Competitiveness Council on 29 May 2018. Broad voluntary adoption of the ESFRI Monitoring Approach would significantly contribute to the implementation of the renewed ERA in the field of RIs and contribute to a Europe-wide appreciation of the achievements of ESFRI.

Mandate and Authors of this Report

In its meeting on 1st and 2nd October 2020 the Forum asked the EB to prepare jointly with the Chairs of the SWG's and the IG and with interested delegations a proposal for the approach to be used, within the frame given in the White Paper. Within this mandate, the EB established an informal working group to compile this report. Members of this group were Bente Maegaard (SWG SCI), Elena Hoffert (EB), Jeanette Ridder-Numan (IG), Jean-Marie Flaud (SWG ENV), Björn Halleröd (EB), Gelsomina Pappalardo (EB), Jana Kolar (EB), Dominik Sobczak (EC) and Peter Wenzel-Constabel (EB).