

## ERIC Forum 2

### Requirements to build the reporting platform, including KPI and SEI Needs and Requirements specifications

Work Package 1 - Deliverable 1.2

Project name	Second implementation project for the ERIC Forum
Project acronym	ERIC Forum 2
Project number	101124559
Deliverable no	1.2
Deliverable Title	Requirements to build the reporting platform, including KPI and SEI Needs and Requirements specifications
Contractual delivery month	M14
Responsible Partner	ICOS ERIC
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Dissemination level	PU - Public
Description of deliverable	Platform building requirements

## Executive summary

European Research Infrastructure Consortia (ERICs) play a considerable role in supporting Europe's scientific excellence globally and have become a fundamental pillar of the European Research Area (ERA). ERICs significantly contribute to the way science is performed nowadays, with a strong emphasis on collaboration, openness and inclusiveness.

There are 28 established ERICs in Europe covering a wide range of research fields and contributing to societal challenges. However, despite the large scope, finding information about ERICs can be challenging due to a lack of aggregated and coherent data available.

This deliverable is intended to describe a scenario for developing a common repository to facilitate the assessment and visibility of data about ERICs. The document summarises the different steps that led to the identification of user requirements and a system architecture.

First of all, previous attempts to collect data were analysed as well as the numerous existing sources of information available. A first set of user requirements was collected through a series of interviews with identified stakeholders. This task led to the identification of user stories which have successively been prioritised to define the most relevant functionalities that the platform should feature. The ERIC Forum Executive Board was also consulted to decide on a viable scenario to work with according to these findings.

Finally, the deliverable presents a first draft of a tentative system architecture, including some technical considerations and recommendations. The platform development will be outsourced to an external service provider. Therefore, this document represents a solid foundation for launching the tender process and preparing the next steps. In the meantime, we continue interacting with stakeholders and other existing data sources seeking collaboration opportunities. Another important upcoming task focuses on outlining strategies for continuous data collection and drawing a governance model supported and agreed by the ERIC Forum as a whole.

## Document log

Issue	Date (yyyy-mm-dd)	Comment	Author/partner
0.1	2024-09-24	Addition of <i>Context</i> and <i>User Requirements</i> sections	Marco Raciti, Arnaud Roi (DARIAH ERIC), Elisa Baioni (CERIC ERIC)
0.2	2024-10-17	System architecture	Matthew Morris (CESSDA ERIC), Serkan Ücer (ESS ERIC)
0.3	2024-10-23	System architecture and descriptions of functions & components updated	Serkan Ücer (ESS ERIC), Matthew Morris (CESSDA ERIC)
0.4	2024-10-25	Finalisation of Chapter 4	Arnaud Roi (DARIAH ERIC)
0.5	2024-10-28	Internal Review	Elisa Baioni (CERIC ERIC)
0.6	2024-10-30	Proofreading	Megan Black (DARIAH ERIC)
1.0	2024-10-31	Final version	Arnaud Roi, Marco Raciti (DARIAH ERIC), Werner Kutsch (ICOS ERIC)

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## 1. Introduction

The *Second implementation project for the ERIC Forum* (ERIC Forum 2) project aims at further consolidating the coordination and monitoring of ERICs. In particular, much effort is dedicated to structure the cooperation between ERICs, support the implementation of the ERIC Regulation and ERICs services, and consolidate the integration of the ERICs in the European Research Area.

One of its thematic pillars focuses on monitoring and reporting, with the aim of developing an online platform to collect data related to ERICs. Ideally, this “one-stop shop” tool will allow users to consult a wide array of information about ERICs in a single centralised platform rather than in many different sources. This platform comes with a great benefit for the potential users, as it will be designed to offer a wider overview of what ERICs are and what their impact is, in comparison with the databases currently available.

The development and final release of the platform will follow these main sequential steps. First of all, data already collected in previous efforts (e.g. ERIC Forum Implementation project, from now on referred to as ERIC Forum 1) is schematised and analysed, while identified stakeholders are consulted in an effort to gather information regarding user requirements and a tentative system architecture. Conceptual maps of a governance model of the platform will also be investigated. Secondly, the technical development of the platform is outsourced to an external service provider, for which a tender process is carried out. Projects partners actively steer the platform development and platform functionalities will be tested. The third and last step is designed to evaluate feedback received from users before the final version of the platform is released. Management, maintenance and sustainability are the three keywords that should be carefully taken into consideration all along the process.

The main purpose of this deliverable is the provision of the technical requirements for designing the reporting platform. It will serve as a solid instrument to working with the external service provider and external sources for data. The document contains the following core content:

- Context and state-of-the-art;
- Overview of the different data sources;
- User stories and requirements;
- Design, development and functionalities of the information platform;
- System architecture, descriptions of functions and components and technology recommendations.

The deliverable is structured into six chapters, with the body of the content in the central four chapters. After the introduction in Chapter 1, Chapter 2 describes the general context in which the platform is developed and its main purpose. It also examines how data about ERICs is currently dispersed through many different instances, which doesn't allow for a comprehensive overview of the ERIC system and of each ERIC. For this reason, a data template was added to better analyse the type of data currently available and its characteristics.

Chapter 3 presents a collection of user requirements, which is a fundamental part in order to start the reflection towards technical requirements. This section explains the method used to gather user stories through a series of interviews conducted with relevant stakeholders.

Chapter 4 outlines some considerations towards different options for designing the platform. Details concerning data collection aspects, Key Performance Indicators (KPIs) and Socio-Economic Impacts (SEI), data management, GDPR, integration with the existing website and sustainability are also investigated.

Chapter 5 presents a tentative system architecture through a diagram and provides a description of the functions and components. It also outlines some technical recommendations which are based on the work that has been carried out so far.

## 2. Data identification for the information platform on ERICs

### 2.1 Context

The European Research Infrastructure Consortium (ERIC) is a specific legal form that facilitates the establishment and operation of Research Infrastructures with European interest. The Community legal framework for a European Research Infrastructure Consortium (ERIC) entered into force in 2019 with the Council Regulation (EC) No 723/2009. In the Regulation, Research infrastructures are defined as follows: “[...] *facilities, resources and related services that are used by the scientific community to conduct top-level research in their respective fields and covers major scientific equipment or sets of instruments; knowledge-based resources such as collections, archives or structures for scientific information; enabling Information and Communications Technology-based infrastructures such as Grid, computing, software and communication, or any other entity of a unique nature essential to achieve excellence in research. Such infrastructures may be ‘single-sited’ or ‘distributed’ (an organised network of resources)*”.<sup>1</sup>

Since their set-up, ERICs have significantly contributed to attain the objective of strengthening research and technological development in Europe, with an emphasis on collaboration, inclusiveness and openness.

In a report published in April 2024, *Much more than a market – Speed, Security, Solidarity*, the former Prime Minister of Italy, Enrico Letta, laid out a vision for incorporating research as a central pillar of the Single Market. Namely, alongside the four cornerstones of the Single Market (goods, services, people and capital), Letta argued for a “fifth freedom”, which encompass research, innovation, data, competences, knowledge and education. To achieve this vision, one of the key aspects, according to Letta, revolves around the empowerment of research infrastructures: “*By facilitating access to laboratories, digital platforms, and cutting-edge equipment across Europe, we equip our research community to take on complex, multidisciplinary challenges vital to our collective future.*”<sup>2</sup>

While being largely renowned for pooling resources for better science, the legal structure of ERICs and their contributions to societal challenges and EU priorities are often poorly understood outside their inner circles. Collecting and curating data on ERICs offers a more transparent approach to stakeholders and the general public. At the same time, this data helps to monitor impact and improve findability and reuse of relevant information overall which might be specifically important for research funding organisations being tasked by their governments to run evaluations of those research infrastructures their countries are members of, at national level.

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<sup>1</sup> Council Regulation (EC) No 723/2009 of 25 June 2009 on the Community legal framework for a European Research Infrastructure Consortium (ERIC), art. 2 (a). <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009R0723>

<sup>2</sup> Letta E., *Much more than a market – Speed, Security, Solidarity. Empowering the Single Market to deliver a sustainable future and prosperity for all EU Citizens*, Jacques Delors Institute, Paris, p. 19.  
<https://www.consilium.europa.eu/media/ny3j24sm/much-more-than-a-market-report-by-enrico-letta.pdf>

In the Horizon Europe Work Programme 2023-2025 for Research Infrastructures<sup>3</sup>, one action (not subject to a call for proposals) was dedicated to the Coordination and Monitoring of the European Research Infrastructure Consortia. One of the expected outcomes of the action is widened access to up-to-date and consolidated data and information on ERICs for European and national authorities, funding agencies, European Strategy Forum on Research Infrastructures (ESFRI), research infrastructures, research organisations, higher education institutions, umbrella associations and other ERA stakeholders. This objective is inspired by the assessment of an expert group on the implementation of the ERIC Regulation.<sup>4</sup> The expert group recommended to develop a structure ‘*allowing to specify the data to be acquired, curated and assessed to give a detailed overview of the ERIC system and of each ERIC, including all its operational sites, hubs and nodes*’<sup>5</sup> to address fragmentation, improve transparency, reinforce governance and enhance coordination. Furthermore, the action should address the following aspects concerning monitoring and reporting:

- The collection of basic data: ERIC statutes, memberships, annual reports, links to Commission Decisions, to ERICs websites;
- The development of an online platform reflecting the data and the knowledge of the ERICs. The platform shall guarantee proper management of access rights and enable easy upload and update of relevant information and data of the ERICs;
- The identification of additional data beyond the basic “ones” described above.

The proposal led to the ERIC Forum 2 project, which is structured in four thematic pillars: 1) Monitoring and Reporting, 2) Reinforcing European research infrastructure policy and international cooperation; 3) Implementing the ERIC Regulation, strengthening capacities and identifying possible shared resources; 4) Coordinating the project, ERIC Forum Executive Board secretariat and communication.<sup>6</sup> The first Pillar is entirely dedicated to the design and development of an online platform. The Work Packages under Pillar 1 are defined as follows: WP1 carries out an analysis of the data already collected in the first funded ERIC Forum project<sup>7</sup> and provides the first set of user requirements to build the platform. WP2 will outsource the technical development of the platform to an external company through a tender process. Successively, first versions will be released and tested. WP3 will be dedicated to the final release of the platform and it will also give suitable indications for further development areas, as well as for long-term sustainability, maintenance and governance aspects of the platform.

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<sup>3</sup> Horizon Europe Work Programme 2023-2025, 3. Research Infrastructures.  
[https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-3-research-infrastructures\\_horizon-2023-2024\\_en.pdf](https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-3-research-infrastructures_horizon-2023-2024_en.pdf) (last accessed 10 October 2024).

<sup>4</sup> European Commission: Directorate-General for Research and Innovation, *Assessment on the implementation of the Eric Regulation*, Publications Office of the European Union, 2021, <https://data.europa.eu/doi/10.2777/747211>

<sup>5</sup> *Ibid.*, pag. 4.

<sup>6</sup> <https://cordis.europa.eu/project/id/101124559> (last accessed 10 October 2024).

<sup>7</sup> <https://cordis.europa.eu/project/id/823798> (last accessed 10 October 2024).

The starting point of Work Package 1 was the identification of the data already collected in the framework of the first funded ERIC Forum project and how these are collected and managed in the ERIC Forum website. Further data that could provide a deeper overview of ERICs are available online, however they are currently collected for various purposes and fragmented across multiple sources. The initial step was to draw a list of information sources, analyse them and structure the available data into logical categories. The aim of this exercise was two-fold: on the one hand, we conducted a gap analysis to identify valuable data that is currently not being collected or at least not promoted enough. On the other hand, we formulated the hypothesis of automatically ingesting data from external sources to avoid duplication of work and fragmentation (e.g. uploading the same data to different platforms). While the work described in the section below is not deemed to be exhaustive, it led to interesting considerations nonetheless.

Before introducing the section 2.2, a precision needs to be made. While the Pillar 1 of the project is called *“Monitoring and Reporting”*, our assumption is that *“information platform”* better suits the outcome of this work rather than *“reporting”* or *“monitoring”* platform. Although the platform could potentially be used by stakeholders to evaluate the performance and impact of a certain ERIC, no formal reporting or monitoring are foreseen through the implementation of such a platform. The platform will be designed with the idea of being an informative tool containing relevant data in a single user-friendly environment for all the different ERIC stakeholders, from the European Commission to the general public through the ERIC national representatives. As a consequence, we will use in the document mostly the terms *“information platform”* or simply *“platform”* to refer to the *“online platform reflecting the data and the knowledge of the ERICs”*.

## 2.2 Existing sources of information

There is already a large quantity of data related to ERICs currently available online, however this is distributed and scattered across different websites. On top of this, the data is collected for different purposes, primarily for communication, visibility and monitoring. In some of these data sources, information is added by the ERICs themselves, while in others data is aggregated from external sources. An overview of the main existing sources of information for data and information related to ERICs is given below.

### 2.2.1 ERIC Landscape

The ERIC landscape was created as part of the ERIC Forum website<sup>8</sup>, developed during the first ERIC Forum Implementation project<sup>9</sup>. It gives a basic overview of the currently established ERICs through a dedicated page, where ERICs are grouped into five science clusters: Energy, Environment, Health & Food,

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<sup>8</sup> <https://www.eric-forum.eu/the-eric-landscape/> (last accessed 10 October 2024).

<sup>9</sup> <https://cordis.europa.eu/project/id/823798/reporting>



Physical Sciences & Engineering, and Social & Cultural Innovation. For each ERIC, the following information can be found: a very short description of its mission, its establishment date, its contribution to societal challenges, a link to the Commission implementing decision, its main address (headquarters) and a link to its website. The list of established ERICs can be filtered according to three criteria: the scientific cluster to which they belong (“Research Field”), their host country (“Country of Seat”) and their establishment year (“Commission Decision Year”). An interactive map of Europe shows the geographical implementation of ERICs based on the address of their headquarters.

When clicking on a Google Maps pin representing a specific ERIC, its member countries are highlighted in blue. It should be noted that the pins of ERICs whose headquarters are located in the same city overlap, which can lead to navigation issues. Additionally, the map lacks a clear legend explaining the different shades of blue, making it more difficult to interpret.

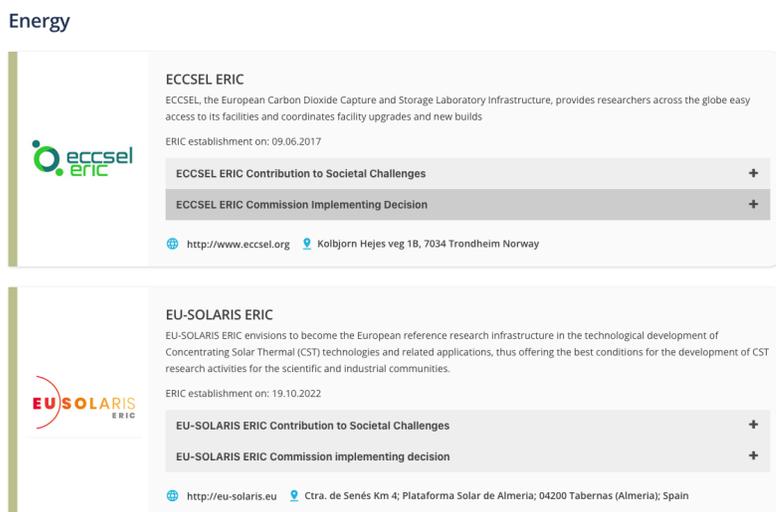


Figure 1: ERIC landscape page

The Landscape section is currently managed by the leader of the Work Package(s) responsible for ERIC Forum communication and the process for data update is as follows. When a new ERIC joins the community, the WP leader identifies the communication contact for the new ERIC and requests via email the necessary information, which will then be manually entered into the website. Similarly, when an established ERIC wishes to update its content, it needs to contact the WP leader or coordination team via email, specifying the updates needed. The maintenance of this section is closely tied to project funding and faces several challenges, including delays in reaching the appropriate individuals who can provide the required information, risk of errors when delegating updates, and lack of responsibility and investment by ERICs in updating their data.

## 2.2.2 ERIC Forum Website

Data concerning ERICs can also be found in the ERIC Forum website outside of the ERIC Landscape page. As part of the first ERIC Forum Implementation project, annual reports for the years 2020 and 2021 as well as a selection of Gender Equality Plans (GEPs)<sup>10</sup> (from BBMRI ERIC, EMSO ERIC, Euro-BiolImaging ERIC, and Instruct-ERIC) were collected and dedicated blog posts were created.<sup>11</sup> This collection presents a series of shortcomings. As mentioned above, this collection was initiated during the previous funded ERIC Forum project. As soon as the project ended, the collection of annual reports stopped and has not resumed since. The work for the GEPs was carried out in the framework of Work Package 3 of the first ERIC Forum Implementation project. The main objective was to provide guidance on how to set up such a document and develop a publicly available template. The GEPs shown in the webpage are indicated as resources, but they do not represent an exhaustive collection. Moreover, it is particularly hard to retrieve this information on the website, as this was posted in the news section and not referenced elsewhere. The search function helps to find the information, but it is nevertheless not sufficiently integrated with the ERIC Landscape page.

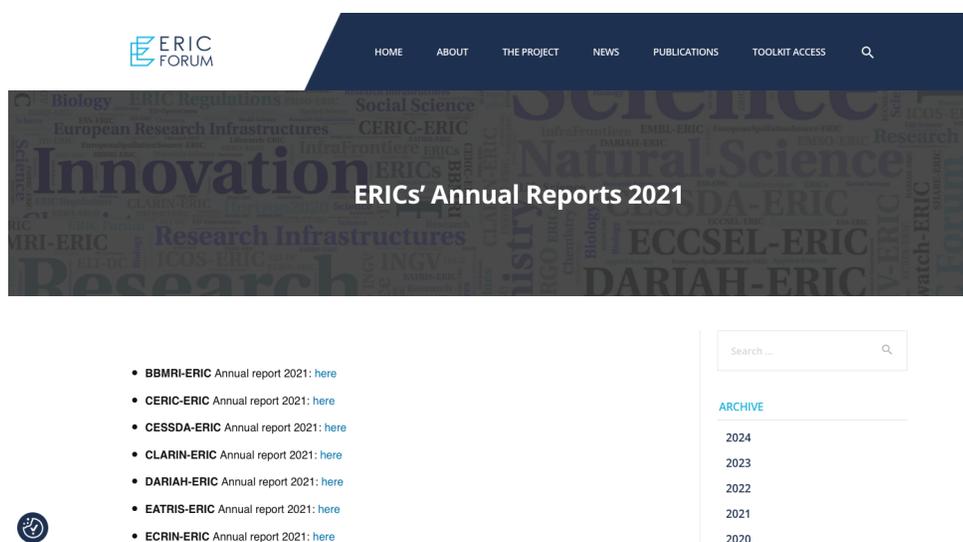


Figure 2: Annual Reports section on the ERIC Forum website

<sup>10</sup> Collected GEPs can be found here: <https://www.eric-forum.eu/2022/09/01/eric-forum-and-the-gep-gender-equality-plan/> (last accessed 25 October 2024).

<sup>11</sup> For example annual reports for the year 2021 can be found here: <https://www.eric-forum.eu/2022/10/28/eric-annual-reports-2021/> (last access 25 October 2024).

### 2.2.3 Individual ERICs websites

A fundamental source of information can be found on each individual ERIC website. Each ERIC runs a website in which, alongside a news section, users can find an exhaustive description of the mission and vision, the organisation and governance, a list of members and observers, documents (such as the Statutes, Annual Reports, Gender Equality Plans), the type of access, tools and services, training opportunities, etc. Extracting this information would be crucial to develop an online platform reflecting the data and the knowledge of the ERICs. However, all websites are structured in a different way and it is technically impossible to harvest data which is not homogeneously structured. Even retrieving documents such as Statutes and Annual Reports through web scraping would be challenging from a technical point of view.

### 2.2.4 ESFRI Monitoring System

The European Strategy Forum on Research Infrastructures (ESFRI) has developed, within the framework of the Horizon Europe project StR-ESFRI<sup>12</sup>, an online platform to collect information on ESFRI Projects and Landmarks, the ESFRI Monitoring System (MoS). On the one hand, the platform was created for the submission of new proposals for Research Infrastructures to enter the ESFRI Roadmap and the monitoring of the existing ESFRI projects and landmarks. On the other hand, it serves as a database for the ESFRI RIs portfolio<sup>13</sup>, which provides information on Research Infrastructures to its stakeholders and to the general public. ESFRI Projects and Landmarks can view, edit or add their own basic data and statistics at any time. During a monitoring process every couple of years, ESFRI requests each RI to complete a mandatory questionnaire. The standard information required for all RIs is divided into five domains:

- **'General Data'** groups the following information: logo, acronym, full name, infrastructure type, class, website, scientific domain, other relevant domain, access type, address, timeline about the lifecycle of the RI (design, preparation, implementation, operation, termination) and its associated cost for each period as well as description of the RI, its activity and its impact;
- **'Political support'** details the lead country/entity, the current members, the prospective members and for each of them the country/entity type, its name, its representative institution and the relevant documentation (statutes, resolution, expression of support, etc);
- **'Financial commitment'** lists the countries/entities which committed financially to the operation of the RI (similarly structured as political support) as well as their coverage of real and estimated costs;

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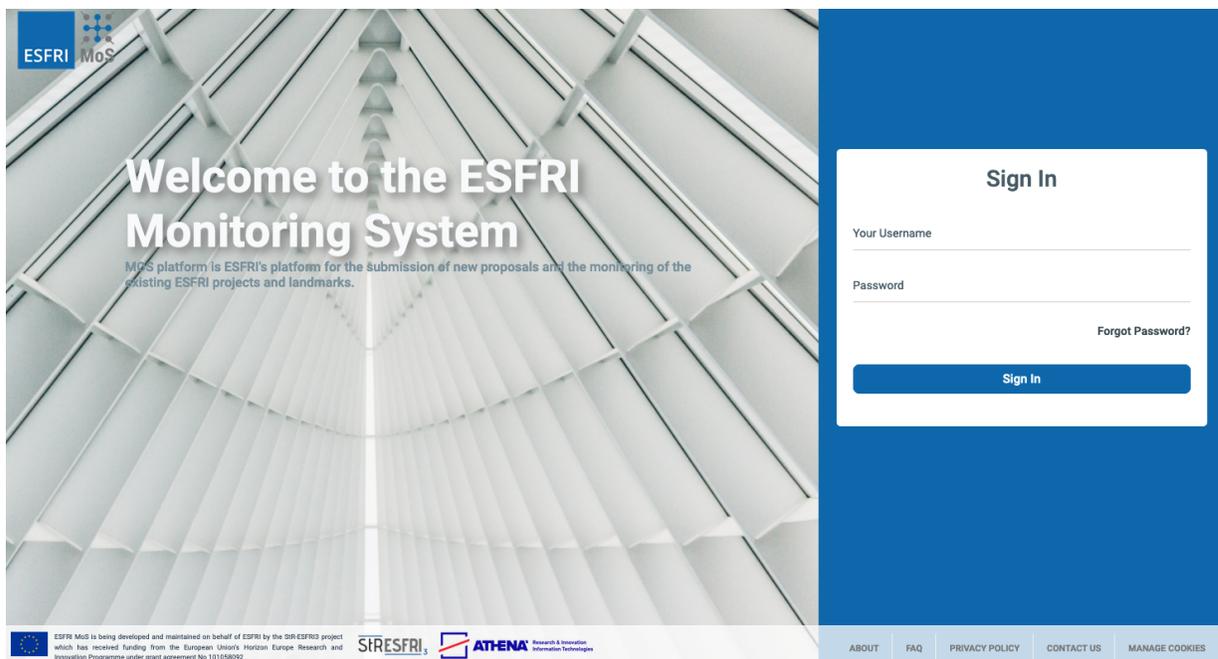
<sup>12</sup> Support to Reinforce the European Strategy Forum on Research Infrastructures 3, Grant agreement No 101058092. <https://cordis.europa.eu/project/id/101058092> (last accessed 28 October 2024).

<sup>13</sup> Click [here](#) for the link to the ESFRI RIs portfolio (last accessed 28 October 2024).

- **‘Research Infrastructure Consortium’** provides information about the coordinator and the participants to the consortium such as their type, their representative institution, their address, the name of the representative and a contact email. A Memorandum of Understanding can also be uploaded;
- **‘Other Relevant Info’** provides description of the RI’s services and its cooperations with fellow RIs.

This data is well-structured and organised, as well as regularly updated by the ESFRI Projects and Landmarks themselves. The system architecture of the ESFRI MoS was designed in such a way (pull APIs<sup>14</sup>) that it would be possible to easily extract this information. Furthermore, as only two ERICs are currently not part of the ESFRI Roadmap (JIV ERIC and CERIC ERIC), the possibility to harvest data from the ESFRI MoS platform would not only be an excellent source of information on ERICs, but would also ease the work of the ERICs themselves, as a good amount of data in the new ERIC information platform would be automatically populated.

Through its monitoring process, ESFRI collects a lot of other data on Research Infrastructures such as their user strategy and access policy, key performance indicators and socio-economic impact, governance, risk management or environmental policy to name a few. Unfortunately, to date, these are not structured so that it is difficult to manage, analyse, compare or extract them. Furthermore, these data are not publicly available.



*Figure 3: ESFRI Monitoring System Homepage*

<sup>14</sup> An API, or application programming interface, is a set of rules or protocols that enables software applications to communicate with each other to exchange data, features and functionality.

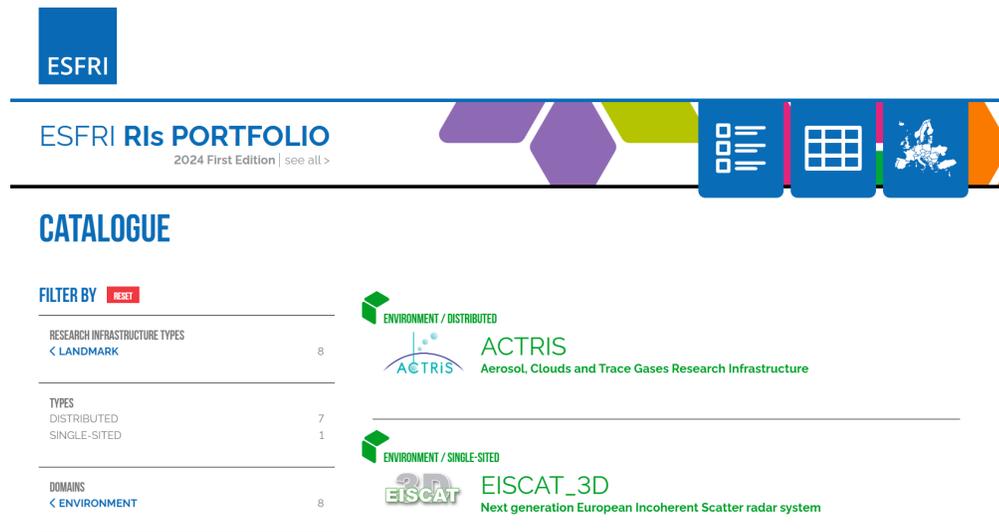


Figure 4: ESFRI RI Portfolio Homepage

### 2.2.5 European Commission website

A limited amount of information is displayed by the European Commission website in the section dedicated to ERICs.<sup>15</sup> For each established ERIC, a short description is provided, as well as a link to the Commission decision, the Statutes (only the first version published on the Official Journal of the European Commission) and a redirection to the ERICs websites.

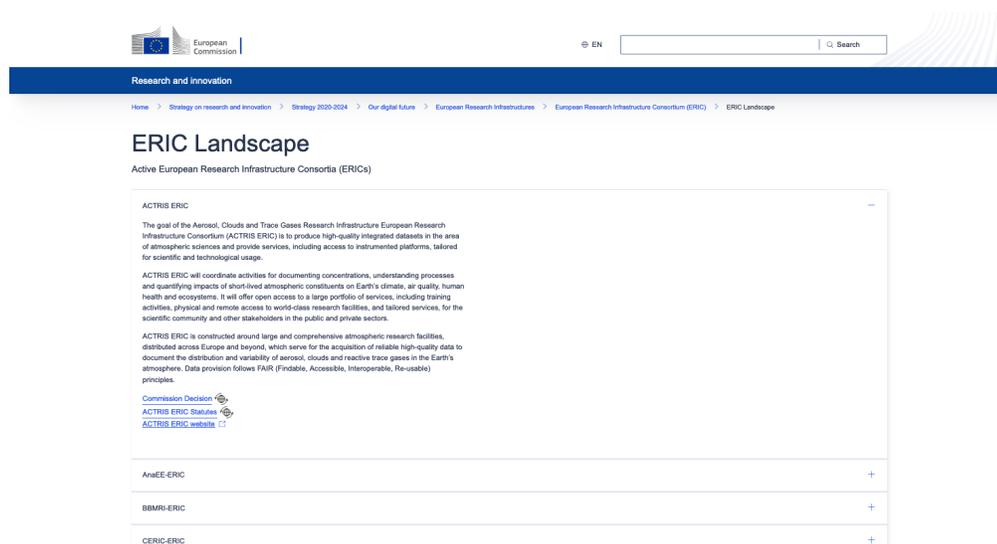


Figure 5: ERIC Landscape Page in the European Commission Website

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[https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/european-research-infrastructure/eric/eric-landscape\\_en](https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/european-research-infrastructure/eric/eric-landscape_en) (last accessed 28 October 2024).

### 2.2.6 OpenAIRE (Explore, Gateway, Zenodo)

OpenAIRE is a non-profit organisation with a mission to promote open scholarship and improve discoverability of data-driven research results on an international scale. The organisation operates a European e-infrastructure offering a diverse set of public services to accelerate the adoption of Open Science. OpenAIRE Explore<sup>16</sup> is an open dataset of research information covering millions of publications, research data, research software items, from a wide range of data sources. Information about ERICs concerns mostly research products (publications and datasets). Another source of information related to OpenAIRE is the OpenAIRE Research Community Gateway<sup>17</sup>, which is an overlay platform that gives the possibility to research communities and infrastructures to share, link, disseminate and monitor publications, research data and research software. It consists of a Virtual Research Environment (VRE) which is customisable via a backend administration tool. The information in the VRE is curated by administrators, which makes it an interesting source of research data, although not many ERICs have their own space. The access to some VREs is also restricted.

Closely related to OpenAIRE, we should also cite Zenodo<sup>18</sup>, which is a general-purpose open-repository which allows researchers to deposit research papers, data sets, research software, reports etc. Zenodo offers the possibility to create communities to collect various digital research artefacts and many established ERICs curate their own communities. While Zenodo does not catch all the scientific and societal contributions fostered by the ERICs, it still represents a valuable showcase for external stakeholders.

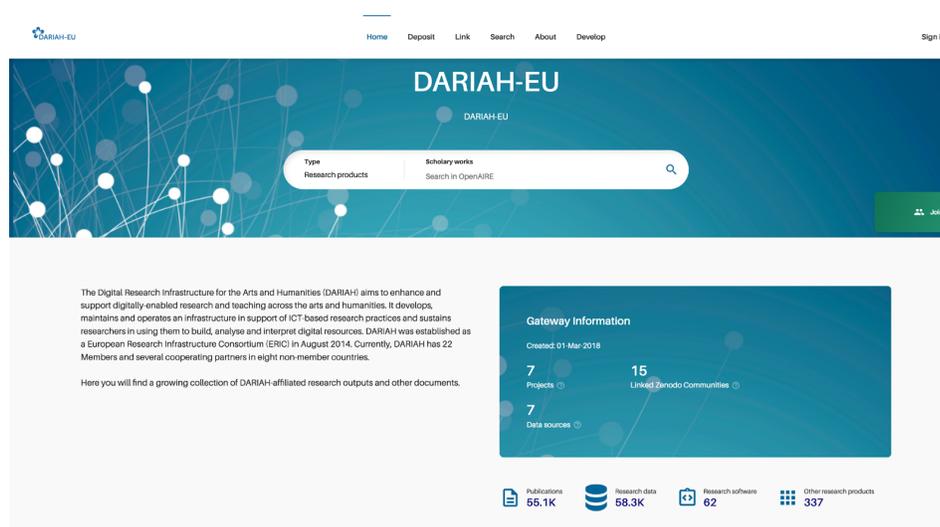


Figure 6: DARIAH-EU Virtual Research Environment in the OpenAIRE Research Gateway

<sup>16</sup> <https://explore.openaire.eu/> (last accessed 28 October 2024).

<sup>17</sup> <https://www.openaire.eu/research-community-gateway-guide> (last accessed 28 October 2024).

<sup>18</sup> <https://zenodo.org/> (last accessed 28 October 2024).

## 2.2.7 CORDIS

CORDIS<sup>19</sup> is a website run by the European Commission since 1994 where users can access comprehensive information about EU Research & Development projects. CORDIS is a comprehensive database of projects, topics and publications funded by the EU's research programs. ERICs participate in many projects funded through the Framework Programmes for Research and Technological Development. These funded projects are crucial to complement the core funding to perform research and innovation activities. Therefore, it would be of added value to aggregate this data concerning the participation of ERICs in the various Framework Programmes to the ERIC platform. Financial data and collaboration networks gathered from CORDIS could be extremely useful for stakeholders. CORDIS is also one of the data sources of OpenAIRE Explore.



**HORIZON EUROPE**

### Second implementation project for the ERIC Forum

Fact Sheet

#### Objective

The ERICs (European Research Infrastructure Consortia), under the umbrella of the ERIC Forum, represent one of the leading science policy voices in Europe and play a key role in structuring the research infrastructure landscape. Following the successful set-up and implementation of the ERIC Forum (2019-2022), further efforts are needed to consolidate its achievements and expand the coordination and monitoring of the ERICs. This project aims to structure the cooperation between ERICs, support the implementation of the ERIC Regulation and ERICs services, and consolidate the integration of the ERICs in the European Research Area by deepening the ERIC Forum's contribution to research policies. To reach its objectives, the project relies on a multi-disciplinary consortium involving all identified ERICs, both multi- and single-sited, and representing the five science clusters of the ERICs. The project is structured in four thematic pillars: 1) Monitoring and Reporting, 2) Reinforcing European research infrastructure policy and international cooperation; 3) Implementing the ERIC Regulation, strengthening capacities and identifying possible shared resources; 4) Coordinating the project, ERIC Forum Executive Board secretariat and communication. The activities carried out within the project will ensure the implementation of specific results on three key target groups: the ERICs and ERICs-to-be, in order to increase their knowledge and propose solutions for key aspects of the ERIC Regulation implementation; the policy-makers and stakeholders by setting-up and managing the new ERIC Forum monitoring and reporting platform, thus ensuring an easy access to updated and consolidated data and information about the ERICs, as well as a further strengthened role in the European science policy; and finally the users, as the project will investigate the sustainability and open access of its services, as well as address the challenges related to the commercial aspects of service provision.

#### Keywords

ERIC Forum 2

**Project Information**

**ERIC Forum 2**  
Grant agreement ID: 101124559

**DOI**  
[10.3030/101124559](https://doi.org/10.3030/101124559)

**EC signature date**  
28 July 2023

**Start date** 1 September 2023 **End date** 31 August 2027

**Funded under**  
Research infrastructures

**Total cost**  
No data

**EU contribution**  
€ 2 999 463,88

**Coordinated by**  
BIOBANKS AND BIOMOLECULAR RESOURCES RESEARCH INFRASTRUCTURE CONSORTIUM (BBMRI-ERIC)  
Austria

Figure 7: ERIC Forum 2 Dedicated Page in CORDIS

<sup>19</sup> <https://cordis.europa.eu/> (last accessed 28 October 2024).

## 2.2.8 Horizon Dashboard

Similarly to CORDIS, the Horizon Dashboard<sup>20</sup> is composed of a set of sheets that allows a series of views to discover and filter Horizon 2020 and Horizon Europe data. The dashboard presents advanced filtering and smart search features, allowing users to visualise a series of statistics related to EU funded projects. By searching through an organisation PIC, users can visualise for example the overall funding received by the participant, the number of projects in which the organisation has received EU funding, collaborations and, among others, the full list of projects (including financial information) with a link to CORDIS.

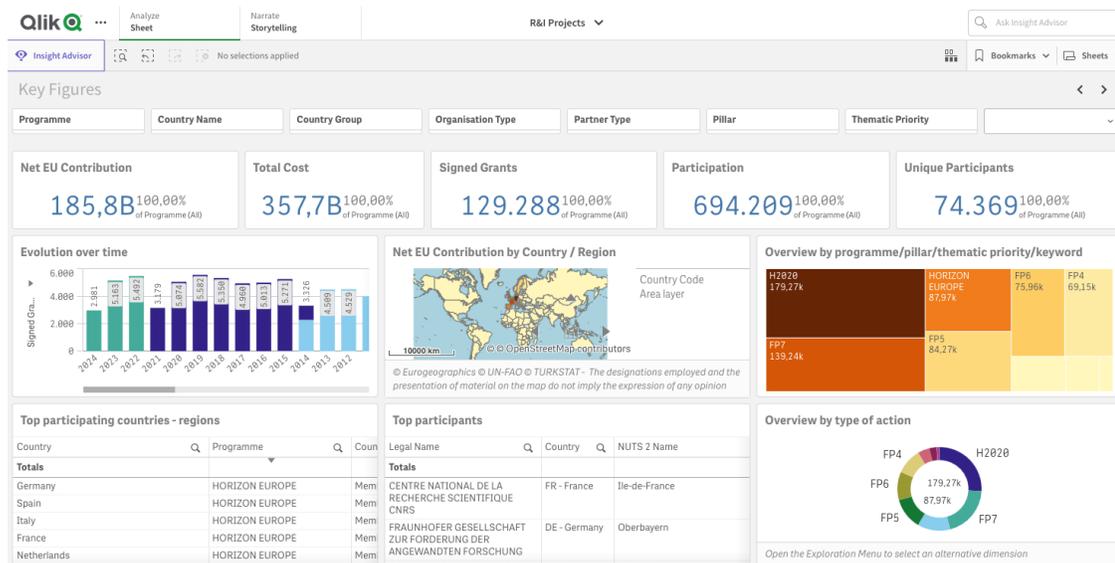


Figure 8: Horizon Dashboard

## 2.2.9 Summary of Platforms

The image below shows the websites/platforms consulted and gives an overview of where a certain type of data can be found. In **green**, the information is completely available, in **yellow** the information is partially available, in **red** the information is not available.

	ERIC identity	Contact details	Admin & Legal	Outreach	Members	National consortia	Financial information	Services	KPIs and SEIs	EU projects	Publications
ERIC Landscape	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗
ERIC Forum Website	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Individual ERICs websites	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ESFRI MoS	✓	✓	✗	✗	✓	✓	✓	✓	✗	✗	✗
EU Commission website	✓	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
OpenAIRE	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓
CORDIS	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓
Horizon Dashboard	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✗

Figure 9: Overview of Data Sources and Available Data

<sup>20</sup> <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/horizon-dashboard> (last accessed 28 October 2024).

To allow a better understanding of the table, a brief description of each category is listed hereafter:

- **ERIC Identity:** descriptive information about the ERICS, including full name, acronym, logo, establishment date, type of infrastructure, access type, research domain, description of the ERIC;
- **Contact details:** address of the headquarters, contact email, contact phone number;
- **Admin & Legal:** Commission implementing decision, Statutes, Internal Rules of Procedure (where publicly available);
- **Outreach:** Website URL, Social Media, Annual report;
- **Members:** Name of country/entity, Type of membership, National Representative Entity;
- **National consortia:** Name of the institution, Country of the institution, Statute of the institution;
- **Financial information:** Cash contributions, in-kind contributions, Total revenue, Total expenses;
- **Services:** List of Services offered by the ERIC;
- **KPIs and SEI:** Information about Key Performance Indicators and/or Socio-Economic Impact;
- **EU projects:** Information about EU projects in which ERICs participate or have participated;
- **Publications:** Research outputs related to the ERIC.

From the information collected above, we developed a data template to better analyse the types of data available. We have tried to describe the data, define its characteristics, assess its plurality and indicate where it is located. This preliminary work led to the table presented in the section below. It should be noted that this data, in our view, represents what we would aim to display in the information platform, although some adjustments might occur before the final version is released.

## 2.3 Data available

Table 1: Overview of data currently available divided into categories

#	Main category	Sub-category	Data	Description	Data characteristic	Data Plurality	Data source
1	<u>Organisation</u>	<b>ERIC identity</b>	ERIC acronym		text	Unique	ERIC Landscape (ERIC Forum), ESFRI MoS
2			ERIC full name		text	Unique	ERIC Landscape (EU Commission), ESFRI MoS
3			ERIC logo		image	Unique	ERIC Landscape (ERIC Forum), ESFRI MoS
4			Establishment date		date	Unique	ERIC Landscape (ERIC Forum), ESFRI MoS
5			Type of infrastructure	single sited / distributed	text	Unique	ESFRI MoS
6			Access type	physical / remote / digital	text	Multiple	ESFRI MoS
7			Research domain	thematic clusters	text	Multiple	ERIC Landscape (ERIC Forum), ESFRI MoS
8			Description of the ERIC	description of the activities, mission, vision.	text	Unique	ERIC Landscape (ERIC Forum) for the short version, ESFRI MoS for the long version

9		Contact details	Localisation head office	full address (extra info, street, street number, zip code, city, country)	text	Unique	ERIC Landscape (ERIC Forum), Individual ERICs websites
10			Contact email		email	Multiple	ERICs websites
11			Contact phone number		number	Multiple	ERICs websites
12	<u>Admin &amp; Legal</u>		Commission implementing decision	extract of the Official Journal of the European Union	link	Unique	ERIC Landscape (ERIC Forum), ERIC Landscape (EU Commission)
13			Statutes	last version of the statutes	PDF	Multiple	Individual ERICs websites
14			Internal Rules of Procedure	last version of the IRP	PDF	Multiple	Individual ERICs websites
15			Gender Equality Plan	last approved version of the GEP	PDF	Multiple	Individual ERICs websites, ERIC Forum website
16	<u>Outreach</u>		Website		link	Unique	ERIC Landscape (ERIC Forum), ERIC Landscape (EU Commission), ESFRI MoS
17			Social Media (e.g. X, LinkedIn, Facebook...)		link	Multiple	Individual ERICs websites
18			Annual Report		PDF	Multiple	Individual ERICs websites, ERIC Forum website

19	<u>Members</u>		Name of country/entity		text	Unique	ESFRI MoS, ERIC Landscape (ERIC Forum)
20			Type of membership	member / observer	text	Unique	ESFRI MoS
21			National Representative Entity	name of the ministry/funding agency representing the member	text	Unique	ESFRI MoS
22	<u>National consortia</u>		Name of the institution		text	Unique	ESFRI MoS
23			Country of the institution		text	Unique	ESFRI MoS
24			Statute of the institution	coordinator / participant	text	Unique	ESFRI MoS
25	<u>Financial information</u>	<b>Cash contribution</b>	Name of country/entity		text	Unique	Individual ERICs websites <sup>21</sup>
26			Year		date	Unique	Individual ERICs websites
27			Amount		value (€)	Unique	Individual ERICs websites
28		<b>In-kind contribution</b>	Name of country/entity		text	Unique	Individual ERICs websites
29			Year		date	Unique	Individual ERICs websites
30			Amount		value (€)	Unique	Individual ERICs websites

<sup>21</sup> Financial information can be found, in most cases, in the Annual Reports, which can be found in individual ERICs websites.



31		<b>Total revenue</b>	Budget/Value of the infrastructure		value (€)	Unique	Individual ERICs websites
32		<b>Total expenses</b>	Personnel expenses		value (€)	Unique	Individual ERICs websites
33			Operation expenses		value (€)	Unique	Individual ERICs websites
34			Investment		value (€)	Unique	Individual ERICs websites
35	<u>Services</u>		Name flagship ERICs service $n^{22}$		text <sup>23</sup>	Unique	ESFRI MoS, ESFRI websites
36			Description flagship ERICs service $n$		tex	Unique	ESFRI MoS, ESFRI websites
37			Website flagship ERICs service $n$		link	Unique	ESFRI MoS, ESFRI websites
38	<u>KPIs</u>		Name KPI $n$		text	Unique	Individual ERICs websites
39			Description KPI $n$		text	Unique	Individual ERICs websites
40			Year KPI $n$		Number (year)	Multiple	Individual ERICs websites
41			Value KPI $n$		Number + Unit	Multiple	Individual ERICs websites
42	<u>EU projects</u>		Projects	project details (acronym, abstract, number, duration...)	text	Multiple	CORDIS, Horizon Dashboard, OpenAIRE

<sup>22</sup> Each ERIC can individually choose the number of service it wants to highlight

<sup>23</sup> The ESFRI MoS requires ERICs to add information concerning services offered as part of a questionnaire. Data about flagship services can be found in the “resources hub” section of the European Open Science Cloud - EU Node website. As the EOSC Portal has been recently dismissed and EOSC EU Node has not been launched at the time of writing, it was decided to not include EOSC in the list of existing sources of information. However, we will closely follow future developments and analyse if EOSC Node could be used as a data source for the platform.

43			Net EU Contribution	funding received by the EU	text	Unique	Horizon Dashboard
44			Number of signed grants		text	Unique	CORDIS, Horizon Dashboard
45			Project status	ongoing / closed	text	Unique	CORDIS, Horizon Dashboard
46			Collaboration Network	collaboration links in the projects	tabular	Unique	Horizon Dashboard
47	<u>Publications</u>		Publications	list of scientific publications related to ERICs	link	Unique	OpenAIRE (Zenodo)

*Table 1: Overview of data currently available divided into categories*

### 3. User requirements

The User requirements collection has been a key part of our work to develop a first set of specifications. A central aspect of the work was to align our approach with User-Centered Design principles and agile approach to software development. After conducting a desk analysis described in the previous section, we worked on identifying key stakeholders, including potential future users of the platform. We conducted a series of interviews to identify and develop user stories. Before transforming user stories into initial technical specifications, we submitted three viable scenarios to the ERIC Forum Executive Board for decision, in order to involve the higher management in the preliminary design of the platform.

#### 3.1 Target Users

The starting point for identifying potential users of the platform was represented by the deliverable 14.1 *Updated ERIC Forum Communications Strategy*, submitted in February 2024 in the framework of Work Package 14 of the ERIC Forum 2 project. The document identifies the following relevant stakeholders for the ERIC Forum 2 project, which are by default relevant for the ERICs as a whole:

- Policy makers at the European, national and regional level;
- Media organisations, journalists and the general public;
- Project partners and bodies (established ERICs and bodies representing ERICs);
- Research communities in academia (and industry);
- Pan-European Research Infrastructures;
- Prospective ERICs from all clusters.

This list above was drawn from the ERIC Forum 1 project (which received funding through the Horizon 2020 programme from January 2019 to December 2022) and was considered to still be fit for purpose. In addition, WP14 slightly readjusted the target audiences as follows:

- Community of European Research Infrastructures, including ESFRI;
- Community of current and future ERICs;
- EC, in particular EC- Directorate-General for Research and Innovation; and EP and EU Council;
- National Ministries for research;
- National Ministries of finances;
- Wider stakeholders including universities/academic institutions at an international level;
- Media;
- Citizens.<sup>24</sup>

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<sup>24</sup> Swift Stefan, Baioni Elisa, D14.1 *Updated ERIC Forum Communications Strategy*, February 2024, p. 6. The document is not yet publicly available as of 31 October 2024.

To get a better understanding of what potential users expect from the development of a platform containing data about ERICs, for which purposes would they use it (discover their intent) and what would be their benefit, it was decided to conduct a series of interviews with representatives of the target users described above. It was also decided to streamline the target users list as following:

- European Commission;
- National Representatives of national Ministries / Funding agencies;
- ESFRI delegates;
- ERICs;
- Research Infrastructures in their preparatory phase.

Other stakeholder groups have been taken into consideration, such as academia, media, industry and the general public, but have been considered as secondary users (e.g. not using the platform regularly on a professional-led basis). We then interviewed people from all main stakeholder groups with the aim of creating user stories to find out their needs and expectations. For example, a user story looks as follows:

*As a Policy Officer in the Ministry of Research and Higher Education in charge of several ERICs [user role], I want to access financial data, including the value of in-kind contributions [intent, not the feature], so that I can calculate the total investment of my country in research infrastructures and better advocate for funding at national and European level [overall benefits for the user].*

### 3.2 User stories

In accordance with the previously outlined methodology, we conducted 13 interviews. Our aim was to ensure comprehensive coverage of all the categories of target users previously identified, as well as to gain insights from experts across the five science clusters<sup>25</sup>. It was decided to conduct semi-structured interviews. We asked the same set of predetermined questions to interviewees, with the opportunity for the interviewer to explore particular themes or responses further. The questions were slightly adapted to match the specificities of the target users (without modifying the inner scope of the questions). The full interview framework is available in Annex 2 at page 45. An example of the set of questions asked to ERIC members is given below:

1. What is your role within your institution (brief description)?
2. Are you using the current website <https://www.eric-forum.eu/>. If yes, what for?
3. What benefits could a unified reporting platform bring for your specific institution?

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<sup>25</sup> The science clusters have grown out of five collaborative projects funded by the European Union in 2019 to link ESFRI and other world-class Research Infrastructures (RIs) to the European Open Science Cloud (EOSC). The five science clusters are: Astronomy and Particle Physics, Environmental Science, Life Science, Photon and Neutron Science, Social Sciences and Humanities. <https://science-clusters.eu/> (last accessed 31 October 2024).

4. Which data should be displayed on the platform? For what purpose would you use this platform? E.g. communication (interface with media, public), reporting (stakeholders)...
5. As an ERIC, you would need to provide data for the platform. What would be in your opinion the best way to do it in regards to the reporting methodology you already have?
6. What kind of features should a platform focused on ERICs data have, in your opinion, to help you communicate with your stakeholders?

After conducting the interviews the following step was to transcribe, summarise and analyse them. Secondly, those interviews had to be turned into user stories in order to schematise users’ expectations and, successively, translate them into more technical requirements. An example of what an user story resemble is given in the table below:

User story number	Role of User	User Need	Benefit	User requirements
3.1	Policy Officer at National Research Council	To have a central repository for Statutes	To be able to retrieve the latest version of the Statutes to prepare for General Assemblies, without searching in different places	A repository for Statutes

*Table 2: Example of a single user story extracted from the interviews*

The full list of user stories can be consulted in Annex 1 at page 42.

Eight main thematic groups of user stories emerged from this merging exercise. Those are either related to specific types of content the future users expected to find on the ERICs platform or more broadly to the platform’s user-friendliness and management. Identified groups of user stories are as follows:

1. **Legal:** “I want to easily find legal information about the ERIC to better prepare my work and/or answer my problem/request”
2. **Financial:** “I want to find financial figures about ERICs to better analyse how funding is being used to finance research infrastructures of European interest”
3. **Organisational:** “I want to search organisational and administrative information about ERICs to better understand how they are structured”
4. **Scientific:** “I want to understand the scientific impact of research infrastructure in the European landscape”
5. **Visualisation:** “I want the information to be easily findable and exportable with infographics”
6. **Openness:** I want information to be as open as possible, but with the possibility of hiding sensitive information where needed”

- 7. **Collaboration:** “I want to use the platform to find opportunities for collaboration on certain topics”
- 8. **Communication:** “I want to use the platform for communication purposes for stakeholders”

### 3.3 Prioritisation

As can be deduced from the user stories, the possibilities are endless but an important step is to prioritise the user requirements (following the MoSCoW method).<sup>26</sup> Here the aim is to not only get an accurate summary of user priorities, but also to focus on a limited set of scenarios. These scenarios will take into account the effort requested to the ERICs to provide information on a regular basis but also the maintenance level required in the long term.

The requirements have been prioritised using four categories: 1) Must have, 2) Should have, 3) Nice to have, 4) Would not have.

**1) Must have (core priorities, repeatedly mentioned in the interviews, easily implementable during the project framework, low-level maintenance efforts requested)**

Item #	User requirements
1. Legal	- Possibility to find the latest version of the Statutes through a centralised repository
3. Organisational	- Possibility to find the list of member countries for each ERIC
5. Visualisation	- Possibility consult the information through a clear and well structured interface, allowing a search function and the possibility to classify the information according to the data type
5. Visualisation	- Possibility to find the latest information about ERICs without having to search directly through their websites (platform is regularly updated)
8. Communication	- Possibility to consult the Annual Reports according to their year of publication

*Table 3: List of “must have” content and features as part of the prioritisation exercise*

**2) Should have (identified as important, but which requires a more demanding technical implementation or additional resources for long-term maintenance)**

Item #	User requirements
2. Financial	- Possibility to find baseline financial information and/or estimations (total budget, contributions from member countries, revenues)

<sup>26</sup> The MoSCoW method is a prioritisation technique used in software development.

2. Financial	- Possibility to consult data about EU funding grants awarded to ERICs
3. Organisational	- Possibility to identify the nodes of distributed ERICs
5. Visualisation	- Possibility to display the data through interactive data visualisation features
5. Visualisation	- Possibility to integrate APIs from existing sources already containing data about ERICs allowing data exchange
6. Openness	- Possibility to provide differentiated access according to the stakeholder group to hide sensitive information
8. Communication	- Possibility to filter and export data
8. Communication	- Possibility to consult published Gender Equality Plans

*Table 4: List of “should have” content and features as part of the prioritisation exercise*

**3) Nice to have (possible to implement and generally feasible in the long run, more demanding maintenance level)**

Item #	User requirements
4. Scientific	- Possibility to have consult statistics to evaluate scientific performance (publication, access to the Research Infrastructure)
4. Scientific	- Possibility to have structured data about KPIs and SEIs
7. Collaboration	- Possibility to have an updated registry of contacts

*Table 5: List of “nice to have” content and features as part of the prioritisation exercise*

**4) Would not have (non-implementable either in terms of technical implications or because they wouldn’t meet the initial objectives)**

Item #	User requirements
8. Communication	- Possibility to have a online chat service associated to the platform

*Table 6: List of “would not have” content and features as part of the prioritisation exercise*

This work of interviewing, analysing, classifying and prioritising has enabled us to define the most relevant functionalities that future users wanted to have on the platform. However, this work also highlighted the different, and sometimes conflicting, visions of what the platform should be, what it

should bring to its users, but also the efforts it will require from those who will maintain it. The next step for WP1 was to propose a summary of what had been learned from the series of stakeholder consultations, organise them into coherent solutions and ultimately choose the most sensible ones together in order to draft the requirements for its creation.

## 4. Design, development, and functionalities of the information platform

During the stakeholders' consultation, we realised that not everyone shared the same vision of what the platform's core objective should be. Some proposed that the platform should primarily be a communication tool toward the stakeholders, some others a "one-stop shop" to find general information on ERICs, or even a collaboration tool between ERICs themselves (and prospective ERICs) with an integrated messaging system. In terms of data management, collection and analysis, some stakeholders pointed out that the platform had to remain simple and easy to maintain if it was to continue to exist beyond the end of the project. Others emphasised the importance of being integrated into an existing ecosystem, automatically collecting data from reliable sources and thus reducing the workload for ERICs while providing up-to-date information. Others highlighted the benefits of being able to filter and extract data to carry out analyses by country, science cluster or time period.

At this point, given the difficulty of reconciling all the sometimes conflicting perspectives, we felt that it was necessary to consult the ERIC Forum Executive Board which represents the ERICs' variety, to steer the development of the platform in the right direction.

### 4.1 Different options under consideration

To guide the ERIC Forum Executive Board's decision, we have compiled our findings on data and user requirements into three different scenarios.

The main concept of the **first scenario** was to improve the current ERIC Landscape page on the ERIC Forum website. We would use the existing layout of a WordPress plugin and simply add certain data fields or redesign the page. This would aim to better present the infrastructures, facilitate the search while expanding the scope of information available for each ERIC. This dedicated page would be fully integrated in the current ERIC Forum website. The advantages of such a scenario would be to have one single ERIC Forum website with three dimensions: news about the ERIC Forum news and its activities, information on ERICs, and a toolkit to exchange best practices between ERICs. This scenario would be cost-effective and use an already-known technology, which would be a plus both for the content manager and the developer. However, the first scenario also presents certain limitations. For instance, it may not fully meet all the requirements outlined in the call for proposals of the ERIC Forum 2 project. The scope of available data would be limited and a centralised content management approach could create bottlenecks in the update process. Furthermore, it would not be possible to have interoperability with other data sources. The possibility of having restricted data accessible only to users with authorised access would also be very hard to implement. Lastly, the platform may only provide snapshots of information, limiting the ability to analyse data over time.

The core idea of the **second scenario** was to create a web application, where data collection, management and processing would play a prominent role. In this application, each ERIC would have its own personal space, accessible only after logging in, where it can enter or update its information. The application would automatically ingest data from one or two identified sources so that a large number of data fields would be prefilled and automatically updated. On the front end of the application, the visitor would be able to see all ERICs, zoom in on a particular one for a full detailed description of the infrastructure or use the filtering/search options to fulfil a specific request across all ERICs (for example have an overview of all those in which Belgium is a member). Only certain visitors would have privileged access, once their identity has been confirmed, and they would be able to access more sensitive information (personal, financial, etc.) upon login. On the one hand, this application would offer several advantages, including access to a large dataset, alignment with the expectations of the European Commission, interoperability with other data sources, differentiated access to public and private data, and advanced filtering and research capabilities. On the other hand, the integration of the application with the existing ERIC Forum website could be challenging, and building such a platform can be more demanding compared to the previous scenario.

The **third scenario** expanded upon the second by offering a web application with advanced features, including a communication dimension. It would automatically ingest data from more sources (e.g., Horizon dashboard for EU projects, OpenAIRE Connect for publications, etc). It would also provide enhanced capabilities for filtering, researching, and visualising data, transforming it into a powerful observatory tool. This independent application would operate separately from the ERIC Forum website, serving as a dedicated communication platform for ERICs stakeholders. In addition to the advantages listed in scenario 2, the third scenario also offers advanced visualisation options. However, it also introduces the complexity of a separate, independent application. This divergence from the current ERIC Forum website could lead to a proliferation of platforms, potentially causing confusion and competition among them. Additionally, the budgetary constraints to build the platform may limit the full implementation of the ambitious features outlined in the third scenario.

We presented the three scenarios to the Executive Board of the ERIC Forum on 7 August 2024. For each one, we presented a comprehensive overview, including the core concept, advantages, and disadvantages. We also delved into the specific details of data collection and management, technical considerations, and long-term sustainability. Following a Q&A session, the Executive Board concluded that the second scenario was the most suitable option. However, the Board did not consider it necessary to implement restricted access to safeguard sensitive data. They reasoned that the anticipated data for the platform is not classified as sensitive, and promoting transparency and openness is essential for research infrastructures primarily funded by public funds. The Board also suggested that, budget permitting, the visualisation features outlined in scenario 3 could be considered for implementation.

The subsequent sections will provide a comprehensive overview of the platform's foundational principles and operational processes, in accordance with the Executive Board's decision. This includes a discussion

of data collection and management strategies with a separate reference to key performance indicators (KPIs), integration with the existing ERIC Forum website, long-term sustainability of the platform, user experience and last but not least the underlying technical architecture.

## 4.2 Data collection

The data to be collected for the platform has been detailed in section 2.3. The list might change a little between now and the final release of the web application, however the current selection ensures that the platform would be built around a robust and informative dataset, relevant for all ERIC stakeholders. Data will be collected in two different ways on the platform: what we would call “direct data collection” and “automatic data collection”.

The direct collection involves the manual input of data into the platform, typically by authorised users such as designated ERIC staff in charge of updating information on the platform. This method is suitable for data that could not be ingested from external sources. It is important to underline again at this point that certain data sources are not sufficiently structured or do not have an interface so that the data can be retrieved efficiently and reliably. Within the scope of Pillar 1, WP participants will collect this data through desk research. This streamlined approach aims to minimise the workload for ERICs, who will only be responsible for validating or correcting the collected data as needed.

The automatic collection leverages automated data extraction techniques to gather data from external sources, such as databases, APIs, or web scraping. This is one of the main features of the web application that will be developed. A large part of the basic data we identified are already available on the ESFRI Monitoring System (cf. section 2.2.3) for almost all ERICs (except two, JIVE ERIC and CERIC ERIC). Moreover, thanks to APIs, it will be possible to retrieve the information and structure it according to our needs. This should minimise the workload for ERICs (avoid repeating the same task many times), reduce the risk of error, and harmonise data across both platforms. If the technical feasibility of ingesting and populating the platform with data from ESFRI MoS has been confirmed through discussions with the relevant personnel, a formal agreement between ESFRI and ERIC Forum will be necessary to establish the necessary permissions and data sharing arrangements. The data entrusted to ESFRI by the ERICs cannot indeed be used without their prior agreement. Discussions with ESFRI are currently progressing positively, and we are optimistic about reaching a mutually agreeable solution involving ESFRI, the ERICs, and the ERIC Forum.

Similar procedures will also be carried out with other external data sources identified in section 2.2, e.g. OpenAIRE Gateway or Horizon Dashboard.

## 4.3 KPIs and SEIs needs

Among the data identified in section 2.3, key performance indicators (KPIs) and socio-economic impact (SEI) have a distinct status. In its position paper on the Development of KPIs for Research Infrastructures,

the ERIC Forum highlighted that *“every ERIC is unique in terms of its raison d’être, objectives, mission and vision. Even ERICs active in the same scientific domain differ. To be properly meaningful, any metric needs to be customised to the unique character of each RI.”*<sup>27</sup> It also added that *“KPIs recommended by ESFRI should provide a common ground for a monitoring system that should later be tailored to the specific needs of each ERIC. KPIs cannot and should not be used to compare one RI against another because their domains, objectives, activities etc. are heterogenous. Even KPIs with the same names often have fundamentally different meanings for different RIs.”* First issued in May 2019, the document is still relevant a few years later. This lack of a standardised approach to KPI collection is for example reflected in ESFRI's still ongoing reporting and monitoring campaign among its Landmarks (which concerns all ERICs but two). Rather than implementing a structured system, ESFRI relies on a free-form questionnaire, allowing each RI to independently select its own set of KPIs.

In order to adapt to this situation, we imagined that this data field should be as flexible as possible, leaving ERICs free to choose the number of KPIs they want to report in the platform and their description. Each of them will be assigned a value and a unit for a specific year. As a consequence, it won't be possible to compare ERICs based on their KPIs but the stakeholders will be able to monitor the KPIs evolution of a specific ERIC over longer time scales. We envisaged the possibility for each ERIC to choose two or three KPIs that they could highlight, should an identity card presenting briefly each ERIC be available on the platform.

In terms of socio-economic impact (SEI), the deliverable 4.3 *Report on SEI ERIC Framework*<sup>28</sup> (issued in the framework of the ERIC Forum 1 project) concluded the survey conducted among ERICs *“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.”* At the time of the survey in 2022, 70% of the ERICs had not carried out an SEI assessment. Given this situation, we intend to contact the ERICs that have already carried out the SEI assessment to find out what would be the best solution to integrate their results into the platform.

#### 4.4 Data management

One of the platform's key features is the provision of dedicated spaces for each ERIC. These spaces empower ERICs to independently input and update their data, fostering autonomy and control over their information representation on the platform. This decentralised approach promotes data ownership and ensures that ERICs have the ability to maintain the accuracy and relevance of their data. Unlike the current situation where ERICs have to go through a third party – the leader of the WP on communication

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<sup>27</sup> <https://www.eric-forum.eu/2019/07/09/eric-forum-position-paper-on-the-development-of-kpis-for-research-infrastructures/> (last accessed 30 October 2024).

<sup>28</sup> Riikonen Evi-Carita, Andersen Jimmy, D4.3 *Report on SEI ERIC Framework*, June 2022:

<https://www.eric-forum.eu/wp-content/uploads/D4.3-EF-Report-on-SEI-ERIC-Framework.pdf> (last accessed 30 October 2024).

as described in section 2.2.1 – to update their data on the ERIC Forum landscape page, this personal space will enable them to take responsibility for the management and quality of their data. By granting ERICs control over their dedicated spaces, the platform also significantly reduces the risk of errors during data updates. It is to be noted that thanks to the automatic ingestion of external sources, a large amount of the data in the platform will be pre-populated. This approach simplifies the process for ERICs, as they will only need to verify the accuracy of the data and make necessary corrections directly at the source. This streamlined workflow minimises the effort required from ERICs, ensuring efficient and accurate data management.

The platform will incorporate a backend user management system to oversee access to personal spaces for each ERIC. Users will be required to authenticate themselves through a frontend process to gain authorised access to their designated areas.

#### 4.5 Data privacy and GDPR

The Executive Board of the ERIC Forum emphasised the importance of transparency and accessibility for the platform, given the significant public funding of ERICs. While the data identified in section 2.3 is currently accessible through various channels like ERIC activity reports, websites, and third-party platforms, the web application will centralise them and make them more accessible. However, an ERIC could maintain data privacy by choosing not to disclose certain pieces of information in the relevant data fields. Although this approach seems reasonable at present, given the selected dataset, it would be prudent to retain the option of restricting access to specific categories of information during the platform's construction. It is conceivable that, at some future date, ERICs might choose to make sensitive data available to identified stakeholders.

It is also of great importance to design the platform in accordance with European legislation, in particular the General Data Protection Regulation (GDPR). A number of stakeholders have indicated that they would like the ability to access a contact list so that they can directly communicate with individuals occupying specific positions.<sup>29</sup> In such instances, if additional information beyond the name of the director and a general contact email address, both of which are public knowledge, is provided, it would be prudent to restrict access to this list and, more crucially, to obtain the necessary approvals from those listed before sharing their contact details on the platform.

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<sup>29</sup> Cf section 3.3, “Nice to have” 7. Collaboration - Possibility to have an updated registry of contacts

#### 4.6 Integration with the existing ERIC Forum website

The current ERIC Forum website could be divided into three distinct parts: 1) news related to the ERIC Forum's activities, 2) the ERIC landscape, and 3) the Toolkit.

- 1) News related to the ERIC Forum's activities is designed to inform visitors about the ERIC Forum, its missions and the activities carried out by the ERIC Forum, such as the publication of position papers and its participation in policy consultations. It also describes the work carried out as part of the ERIC Forum 1 and ERIC Forum 2 projects.
- 2) The ERIC landscape was described at length in section 2.2.1 and provides visitors with information about every ERIC.
- 3) The Toolkit<sup>30</sup>, developed during the EU project ERIC Forum 1, is a platform aimed mostly at current and future ERICs, containing knowledge and best practices about how to set-up or operate an ERIC. In the Toolkit, one can find answers to most practical questions relevant to ERICs, whether it comes to financing, administration, human resources, communication, impact and evaluation.

The three parts, though distinct in purpose, form a coherent entity, providing a single point of entry into the complex world of ERICS. The proposed platform aims to supersede the current ERIC landscape page, offering a more comprehensive and informative overview of all ERICs. However, due to its complex nature and specific technical requirements, seamless integration with the existing WordPress site presents a significant technical challenge. The specific details of this integration, including the technical approach and potential complexities, have yet to be fully determined.

#### 4.7 User experience (research, filtering and visualisation)

A further crucial function of the platform is data processing. This encompasses a variety of activities, including data search, analysis and visualisation. Automating these processes allows the platform to improve data quality, extract valuable insights and facilitate informed decision-making for ERIC's stakeholders. Furthermore, data processing enables the platform to generate reports, dashboards and other data-driven tools that can be used to monitor performance, identify trends and support strategic planning.

We could imagine visualisation features like geographical mapping. A visitor could consult a map showing the geographical distribution of a specific ERIC, its headquarters, member countries, national nodes, and related infrastructure across Europe. Automated graphs and charts could help visualise the evolution of an ERIC's set of KPIs or its financial turnover during a certain time period.

Advanced search features could help national representatives of a certain country to see all ERICs in which they are involved at once, providing both a clear overview and consolidated data.

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<sup>30</sup> <https://www.eric-forum.eu/toolkit/> (last accessed 30 October 2024).

The platform could include an automated report generator that delivers predefined reports for each ERIC. These reports could contain essential data like members list, financial summaries, and key performance indicators for a given year. Additionally, the platform could provide customizable reporting options. This would enable users to generate tailored reports by selecting specific data sets and applying filters to refine the information.

The scope of advanced functionalities will be determined in collaboration with the institution or company responsible for the building of the platform, with budgetary constraints being a primary limiting factor.

#### 4.8 Sustainability

A sustainable web application must consider three key dimensions: financial viability, technical maintainability, and data quality. If the maintenance of the platform is financially assured during the project duration, we would need to assess the cost of hosting, maintaining and eventually upgrading it after the completion of the project. Selecting cost-effective hosting solutions or minimising maintenance overhead could be some solutions to look into. Technically, a sustainable application must be well-designed, modular, and easily maintainable. Adhering to best practices, using open source tools and software as much as possible, and establishing comprehensive documentation are essential for long-term sustainability. Finally, data quality is crucial for the application's reliability and accuracy. This requires the implementation of best practices, comprehensive documentation, and appropriate incentives to ensure the timely and accurate updating of data by ERICS.

These aspects will be further developed for the deliverable 3.2 *Sustainability plan for reporting platform* due in M48.

This section comprehensively addresses each of the prioritised user requirements outlined in Section 3.3. (must-have, should-have, nice-to-have, would-not-have). In the following section, we will explore the detailed system architecture necessary to support the functionalities and performance requirements of the information platform on ERICs.

## 5. System Architecture

### 5.1 Description of Functions & Components

The system architecture has a separate front-end and back-end, which is detailed below.

#### 5.1.1 Back end

The back end manages all the data stored by the ERIC Forum platform. To gather external data, the backend contains API clients for all external data sources (such as ESFRI). These should be implemented as extensions allowing more API clients to be easily added in the future.

To gather data on websites without an API, the back end also contains a web scraper for extracting resources from arbitrary web pages.

To combine the data from all the platform's data sources, the back end contains a data aggregator. The aggregator creates the final data result using source prioritisation rules to select data from the best source. It also determines which fields are user editable if fields are missing from the data sources.

The back end manages users and controls permissions assigned to them.

The back end stores all state in the platform's database. All access to the database is mediated by the back-end. The front-end never accesses the database directly.

#### 5.1.2 Front end

The front end is what users and API consumers interact with. It serves the user interface and the API endpoints and provides all necessary data for these functionalities.

The front end contains interfaces with the back end. These interfaces are not public and may change at any time.

The front end provides data editing capabilities and user management facilities. The API endpoints provided by the front end are stable and versioned.

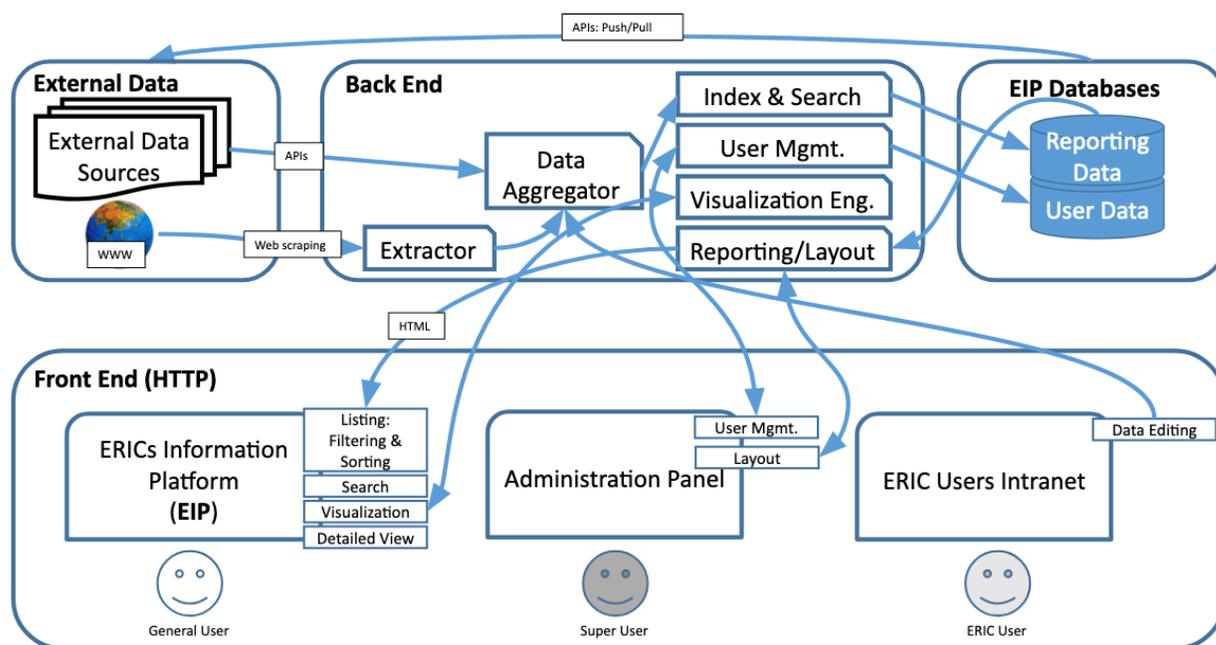


Figure 10: System Architecture diagram

The table below describes in detail the components that make up the entities in the diagram above. A detailed description of each component is provided.

Entity	Component	Description
<b>External Data</b>		
External Data	External Data	Collection of external data sources to <b>EIP</b>
External Data	External Data Sources	Collection of structured data sources that have capability to export data through APIs to <b>EIP</b> (i.e ESFRI MoS, CORDIS, OpenAIRE etc.)
External Data	WWW	Refers to world wide web. <b>EIP</b> should be able to scrape WWW resources to deploy data
<b>Back End</b>		
Back End	Data Aggregator	The component is responsible for structuring the data collected via external

		sources to transform and ingesting it into the <b>EIP</b> databases. It would employ filters, mappers and data policy on, for example how to deal with updates/conflicts and how frequently query external data sources.
Back End	Extractor	Can be considered as a special kind of Aggregator that takes text/html as input and extracts relevant information from it, then feeds it into the Data Aggregator component.
Back End	Index & Search	Provides mechanisms (including a search engine) providing search & sort features of the <b>EIP</b> , supporting keyword search.
Back End	User Management	This component is responsible for creating and distributing ERIC User accounts that have authority to add/modify/publish data regarding the ERIC which user affiliated with.
Back End	Visualisation Engine	Provides several visualisation libraries providing various static/dynamic images produced from Reporting Data. This might include bar charts, network graphs, tagged world maps etc.
Back End	Reporting/Layouting	Provides creation/modifications of templates to present reporting data on <b>EIP</b>
<b>EIP Databases</b>		<b>EIP</b> Databases should be able/ready to export data via APIs.
<b>EIP Databases</b>	Reporting Data	This part refers to data stored which has been defined in section '2.3 <i>Data Available</i> '.
<b>EIP Databases</b>	User Data	This part refers to data regarding user credentials (i.e. system users and ERIC users).
<b>Front End</b>		
Front End	ERICs Information Platform	This component is the main interface for presenting the data to the General User (i.e. public).

Front End	Administration Panel	This component is private to Super User (i.e. Admin) interface for <ul style="list-style-type: none"> <li>- controlling the User Data;</li> <li>- validation of Reporting Data; and</li> <li>- modification of data presentation layers.</li> </ul>
Front End	ERIC Users Intranet	This component is the private to ERIC User(s) interface for creating/modifying Reporting Data belonging to their ERICs.

*Table 7: Description of the entities and components of the system architecture*

## 5.2 Technology Recommendation to build the platform

The technologies chosen must support REST requests so that the platform can extract data from external data sources. There should be the ability to model the data types of the external data sources.

The technologies chosen must support acting as a REST server for internal and external API purposes.

The database technology chosen should be a mature, widely supported, open-source solution. Examples of such technologies are PostgreSQL or MySQL.

The application design should consider automatic migration of database schemas in its design. This is to better facilitate upgrades of the ERIC Forum application from the operator’s perspective.

A search engine should be provided to optimise the performance of searches. This may be part of the main database or a separate component.

## 6. Conclusion

The purpose of this document is to deliver an initial set of user and technical requirements as the first step to design the information platform for ERICs. As the development will be outsourced to an external service provider, some of these initial considerations, from the technical point of view, might be changed accordingly. The system architecture provided in the document identifies a schema which we believe is a good compromise between users' expectations and a platform that can be easily managed and maintained over time.

The initial idea behind this deliverable was to avoid duplication of work as much as possible, by feeding into the platform data which is already available in other existing sources. However, a clear governance should be agreed by all ERICs, as it is unrealistic to run the platform in the medium-long term without a shared responsibility among all research infrastructures involved. Ideally, the platform, by showing relevant data, could be used as a communication tool to give an accurate overview of individual ERICs. Hence, the need to keep the platform updated as a public vehicle is extremely important.

Deliverable 1.1 *Strategy for collection, curation and stewardship of data, information and knowledge relevant for the reporting platform* to be submitted in M18 (February 2025), will start investigating these aspects and propose a first sketch of a governance model agreed by all ERICs. We think that this is a crucial aspect of the work as only with a clear management model defining responsibilities, practices, policies, and procedures, the platform could outlast the funding period of the ERIC Forum 2 project.

We further recommend a high-level dialogue between the ERIC Forum and ESFRI on the distribution of tasks and content between the ERIC Forum platform and the ESFRI MoS platform to achieve synergies and avoid parallel developments.

## Annex 1 - User Stories

User story number	Role of User	User Need	Benefit	User requirements
1.1	Policy Officer at the EU Commission	To have one single place to consult information about ERICs	To find information without having to consult a lot of websites	Well organised content
1.2	Policy Officer at the EU Commission	To have a platform to feature ERIC's contributions to high-level EU priorities	To better analyse how research infrastructures are responding to societal challenges	A list of ERIC's contributions to societal challenges
1.3	Policy Officer at the EU Commission	To be able to identify ERICs nodes	To determine the impact at national/regional level	A list of nodes per distributed ERIC
1.4	Policy Officer at the EU Commission	To use the platform as a communication tool	To disseminate information about the ERICs more efficiently	Visualisation features
2.1	Manager at ESFRI	To have information on financial figures	To see the current financial gaps	Realistic financial estimations
2.2	Manager at ESFRI	To complement the platform with the ESFRI MoS	To get updates about ERICs more regularly	APIs
2.3	Manager at ESFRI	To locate national/regional nodes	To have an overview of which structural funds could be deployed	A list of local nodes per distributed ERIC
3.1	Policy Officer at National Research Council	To have a central repository for Statutes	To be able to retrieve the latest version of the Statutes to prepare for General Assemblies, without searching in different places	A repository for Statutes
3.2	Policy Officer at National Research Council	To have information on financial data and budget estimates	To see the overall funding a country has budgeted for all Research Infrastructures	Realistic financial estimations
3.3	Policy Officer at National Research Council	To see scientific impact and statistics on access to the RI	To determine the scientific impact of an ERIC to take informed decisions at national level	A list of scientific publications
3.4	Policy Officer at National Research Council	To have headline KPIs	To have a basic range of common KPIs among	A set of headline KPIs

			ERICs to evaluate their performance over the time	
3.5	Policy Officer at National Research Council	To have visualisation tools	To capture the needed information quickly	Visualisation features
3.6	Policy Officer at National Research Council	To show statistics about countries joining/leaving ERICs over the time	To follow how national strategies are evolving in terms of their participation to RIs	A list of countries joining or leaving ERICs over the time
3.7	Policy Officer at National Research Council	To display the attribution of EU Funding to ERICs	To see how much EU funding is awarded to ERICs and in which topics, to better adapt national strategies	Statistics about EU funding awarded and collaborations
4.1	Secretary General of ERIC	To have a repository for Annual reports	To work towards more standardised models of Annual Reports and increase the reproduction of best practices	A list of Annual Reports per publication year
4.2	Secretary General of ERIC	To integrate Gender Equality Plans	To increase the reproduction of best practices towards gender equality	A list of Gender Equality plans per ERIC
4.3	Secretary General of ERIC	To display interactive data visualisation	To capture information through filtering and grouping types of data, as a better data overview could help ERICs stakeholders	Visualisation features
4.4	Secretary General of ERIC	To show impact indicators	To help informed decision making for KPIs and SEIs	A set of “basic” KPIs
4.5	Secretary General of ERIC	To avoid duplication of information to be collected in different reporting platforms	To save time if different platform can exchange data	APIs
4.6	Secretary General of ERIC	To use the platform as a communication tool	To quickly grasp information about ERICs, aimed for new users and stakeholders	Visualisation, data export
5.1	Project Manager of ERIC in its preparatory phase	To show a list of scientific domains and societal contributions	To understand the scientific directions of the different ERICs for potential collaborations	A list of scientific domains and societal contributions
5.2	Project Manager of ERIC in its preparatory phase	To display the attribution of EU Funding to ERICs	To increase the possibility of collaborations in certain calls	Statistics about EU funding awarded and collaborations

5.3	Project Manager of ERIC in its preparatory phase	To have a central repository for Statutes	To help draft Statutes and save time in finding those of established ERICs	A repository for Statutes
5.4	Project Manager of ERIC in its preparatory phase	To include a list of contacts	To easily find contacts to clarify certain topics and increase possibilities of collaborations	An updated list of contacts of high-level ERICs managers
5.5	Project Manager of ERIC in its preparatory phase	To have a good search engine	To find needed information quickly	Filtering options, visualisation features
5.6	Project Manager of ERIC in its preparatory phase	To identify local nodes	To find good examples on how distributed ERICs are structured	A list of local nodes
5.7	Project Manager of ERIC in its preparatory phase	To have an overview of flagship services and access provisions offered by the ERICs	To work on consolidated practices for structuring a future ERIC	A list of flagship services/access provisions

*Table 8: List of User Stories*

## Annex 2: Interview framework to guide the creation of the ERIC information platform

Interviews should help to create user stories such as: “As a [persona], I [want to], [so that].”

*Breaking this down:*

*“As a [persona]”:* Who are we building this for? We’re not just after a job title, we’re after the persona of the person. Max. Our team should have a shared understanding of who Max is. We’ve hopefully interviewed plenty of Max’s. We understand how that person works, how they think and what they feel. We have empathy for Max.

*“Wants to”:* Here we’re describing their intent — not the features they use. What is it they’re actually trying to achieve? This statement should be implementation free — if you’re describing any part of the UI and not what the user goal is you’re missing the point.

*“So that”:* how does their immediate desire to do something fit into their bigger picture? What’s the overall benefit they’re trying to achieve? What is the big problem that needs solving?

### General structure

1. Information to collect in advance/ask during interview if incomplete

Name:

Gender:

Age:

Institution:

Position:

2. What is your role within your institution (brief description)?
3. What part do ERICs play in your work? To which extent? (%)
4. Which data are important to fulfil your tasks related to ERICs? For what purpose do you use this data?
5. At the moment, where do you source the data you need to fulfil your tasks?
6. What are the problems you have when collecting these data (if any)?
7. What kind of features should a platform focused on ERICs data have, in your opinion, to facilitate your task(s)?

### **Declination for the user group “European Commission”**

1. Information to collect in advance/ask during interview if incomplete

Name:

Gender:

Age:

Institution and department (e.g. DG RTD/ Connect, etc.):

Position:

2. What is your role within your institution (brief description)?
3. What part do ERICs play in your work? To which extent? (%)
4. Which data are important to fulfil your tasks related to ERICs? For what purpose do you use this data?
5. At the moment, where do you source the data you need to fulfil your tasks?
6. What are the problems you have when collecting these data (if any)?
7. What kind of features should a platform focused on ERICs data have, in your opinion, to facilitate your task(s)?

### **Declination for the user group “National Ministries/Funding Agencies”**

1. Information to collect in advance/ask during interview if incomplete

Name:

Gender:

Age:

Institution and department:

Position:

2. What is your role within your institution (brief description)?
3. What part do ERICs play in your work? To which extent? (%)
4. Which data are important to fulfil your tasks related to ERICs? For what purpose do you use this data?
5. At the moment, where do you source the data you need to fulfil your tasks?
6. What are the problems you have when collecting these data (if any)?
7. What kind of features should a platform focused on ERICs data have, in your opinion, to facilitate your task(s)?

## Declination for the user group “ESFRIs”

1. Information to collect in advance/ask during interview if incomplete

Name:

Gender:

Age:

Position at ESFRI:

Affiliation and position (outside ESFRI):

2. What is your role within ESFRI (brief description)?
3. What part do ERICs play in your work? To which extent? (%)
4. Which data are important to fulfil your tasks related to ERICs? For what purpose do you use this data?
5. Are all ERIC-related data you need collected through the ESFRI reporting platform or do you use alternative data sources? (if yes which one)
6. What benefits could a unified information platform about ERICs bring to ESFRI? To what extent would it overlap/complement the ESFRI reporting platform?

## Declination for the user group “ERICs”

1. Information to collect in advance/ask during interview if incomplete

Name:

Gender:

Age:

ERIC:

Position:

2. What is your role within your institution (brief description)?
3. Are you using the current website <https://www.eric-forum.eu/>. If yes, what for?
4. What benefits could a unified reporting platform bring for your specific ERIC?
5. Which data should be displayed on the platform? For what purpose would you use this platform? (Communication [interface with media, public], Reporting [stakeholders])
6. As an ERIC, you would need to provide data for the platform. What would be in your opinion the best way to do it in regards to the reporting methodology you already have?
7. What kind of features should a platform focused on ERICs data have, in your opinion, to help you communicate with your stakeholders?