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Pan European Technology Energy Research
Approach

Work Package 8

Dissemination and Communication activities

Deliverable D8.3

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Smart Grids**

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Abbreviations

<i>CSA</i>	Coordination and Support Action
<i>DER</i>	Distributed Energy Resources
<i>DG ENER</i>	Directorate General for Energy (DG ENER)
<i>DL</i>	Deliverable
<i>EC</i>	European Commission
<i>ENTSO-E</i>	European Network of Transmission System Operators for Electricity
<i>ETIP SNET</i>	European Technology and Innovation Platform for Smart Networks for Energy Transition
<i>EU</i>	European Union
<i>GA</i>	Grant Agreement
<i>JRC</i>	Joint Research Center
<i>KPI</i>	Key Performance Indicator
<i>PC</i>	Project Coordinator
<i>R&I</i>	Research & Innovation
<i>RCS</i>	Regulation, grid code and standards
<i>RI</i>	Research Infrastructure
<i>RICAP</i>	R&I status and Continuous Gap analysis
<i>SPRING</i>	<i>Service contract by DG Energy supporting the work of ETIP SNET and BRIDGE</i>
<i>UI</i>	User Interface
<i>WP</i>	Work Package
<i>WG</i>	Working Group

Executive Summary

The current deliverable “PANTERA Collaboration Platform: European Hub for Smart Grids”, prepared within the Dissemination and Communication activities (WP8), presents the EIRIE platform, created to bring in one place the EU’s R&I community and strengthen participation and collaboration towards Energy Transition, while improving the participation of low-spending countries in R&I activities in the area of Smart Energy Systems.

The document explores what the EIRIE Platform stands for, the objectives of the platform, the target audience and functionalities of the platform. Furthermore, the methods to ensure the sustainability of the platform after the project ends are described. Indeed, DG ENER, SPRING, and PANTERA projects representatives discussed during several meetings to find a solution, and these led to the decision that SPRING would take on the responsibility of maintaining, expanding, and creating content for the EIRIE platform after PANTERA ends.

A critical contribution of PANTERA and EIRIE are the collaboration activities with stakeholders from low activity countries giving them the forum through which they can get organised and share common objectives. The PANTERA 6+1 approach introduced through EIRIE, is an integral part of the PANTERA process, which aims to strengthen national participation rates in smart grid investments by making national stakeholders’ needs and expectations more visible at the European level. The PANTERA 6+1 approach includes six PANTERA Regional Desks targeting countries which appear to have a lower rate of smart grid investment, and one best-practice Desk elaborating on gathering and systemising good experiences in projects and R&I governance from more successful countries, that can be selectively replicated under matching frameworks.

Furthermore, this deliverable gives more details regarding Research Infrastructure and the collaborations that have been established in that regard. Based on the gap analysis performed within the PANTERA project it has been identified that forming a common repository for critical research infrastructure is among the most important factors for strengthening R&I in the low activity countries. The information gained from the questionnaires, interviews, workshops panel discussions, roundtables, and interactive stakeholder sessions witness that the countries which are left behind cannot be competitive compared to the large and well-established countries which have built their research infrastructure predominantly using strong national funding. The fruitful cooperation of JRC, DERlab and ERIGrid 2.0 to form a single repository for the whole EU is noteworthy giving though this visibility and accessibility to all the community with added benefits to the low activity countries.

A significant part of the PANTERA project is a RICAP (R&I status and Continuous gAP analysis) process, that brings together the different dimensions, Regional Desks, Working Teams, and activities that ultimately have been feeding into the EIRIE platform. Hence, a cross reference to codes and standards giving real evidence of where gaps exist, is of prime importance to the R&I community. For this reason, we capture in this deliverable what has been delivered through EIRIE in relating the maturity of technologies to the existence of codes and standards covering them, revealing work done and gaps that exist, calling for further work in specific directions.

We do note that matured technologies/systems without any defined regulation, grid code and standard (RCS) can’t be integrated into the energy system network for real-life operation. Hence, all the reviewed RCS documentation (including the most important information and useful links) has been populated in the EIRIE platform. Making available valuable information in support of the work of the R&I community.

Finally, the next steps to optimize this process is discussed, identifying areas where emphasis should be given, that include among others the following:

- Extend the collaboration area within EIRIE to host the work related to Regulations, Codes in relation to Technologies, in addition to the area developed for Standards, serving the R&I

- needs for identifying maturity gaps.
- The collaboration area will contain full details with cross-references for siting the required Codes and helping R&I consortia of accessing them and using them.
 - Develop a guide for searching, finding and using the CODES developed by the Operators to serve specific research objectives and needs.
 - Develop a selection of case studies of specific research questions and the process to be followed for achieving the targeted questions as a guide to researchers for the best use of the CODES repository on the intranet of ENTSO-E.

1 Introduction

Pan-European **T**echnology **E**nergy **R**esearch **A**pproach (PANTERA) is a H2020 Coordination and Support Action (CSA) which aims to foster Smart Grid Research and Innovation (SG R&I) by:

- Developing enhanced knowledge-sharing mechanisms to tackle the key R&I challenges for the energy transition.
- Delivering ready-made tools that will facilitate the collection of real data / results from on-going projects and the building of a useful shareable data repository.
- Being an umbrella bringing together all European initiatives focused on smart grids such as JRC, ETIP-SNET, ERA-NET SES etc.

Collaborative work is pivotal in the ambitious work that the consortium proposes through the PANTERA CSA. Through this coordinated activity, the consortium is confident that it delivers a multi-dimensional platform of pan-European status and influence, capable of leveraging coherence and trust as a pull towards enhanced R&I in energy systems centered on an integrated grid active and responsive.

1.1 Scope and objectives of this document

This deliverable 8.3 “PANTERA Collaboration Platform: European Hub for Smart Grids” related to the Dissemination and Communication Work package (WP8) provides an overview of the multi-functional collaborative platform called EIRIE, developed within the PANTERA project. More specifically, the objectives, target audience, features and functionalities, and sustainability of the EIRIE Platform will be described.

Furthermore, the collaborative activities and efforts regarding research infrastructure will be reported, as well as the activities related to Standards and codes, and their importance for the Research and Innovation community.

1.2 Structure of the document

The first section gives an overview of the present document’s scope and introduction. Section 2 summarizes the PANTERA project and the main objectives of the platform. In Section 3, the EIRIE platform, the objectives, target audiences, features and functionalities, and sustainability of the platform are reported. Sections 4 deals with Research Infrastructure and section 5 elaborates on Regulations and Standards.

2 The PANTERA project and EIRIE multi-functional collaborative platform

The main objective of PANTERA’s interactive multi-functional platform is to connect the EU Research & Innovation community in smart grids, storage and local energy systems, to enhance collaboration, wider interest and use on the project results, avoid redundancy and lost financing, strengthen the participation of all Member States in support of the fifth pillar of the Energy Union and energy transition mentioned in “A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy”. All contributing entities will benefit through the enhanced connectivity and wider range of services to all beneficiaries and prospective users.

EIRIE is giving an easy access (simply by using the EU credentials) to all the resources needed to play an active role within the European research community. With PANTERA and especially the EIRIE platform, the consortium aims to bridge the gaps that currently exist in the energy field in Europe between Member States, by bringing through a single point of access, the benefits and attractiveness of successful partnerships and R&I, being national, regional, or European.

It is PANTERA’s vision to create, through the multi-functional collaborative platform, a reference operational point to:

- Unify and harmonize European activity.
- Incentivize further investments in smart grids.
- Support access to exploitable results that can spark further work and cooperation.

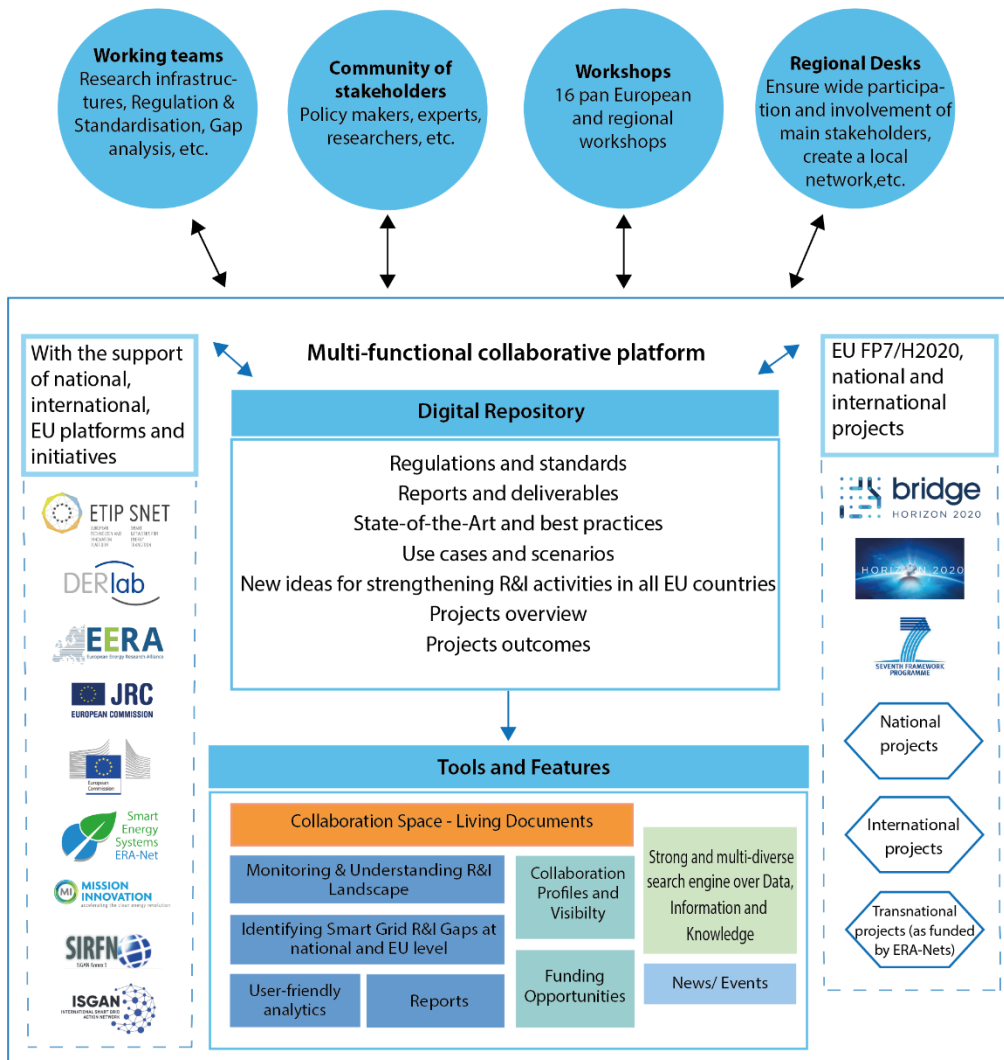


Figure 1: The PANTERA Concept

The consortium closely collaborated with important stakeholders to ensure connectivity with the following platforms: the Smart Electricity Systems and Interoperability Platform of JRC, the Knowledge Sharing Platform of ETIP-SNET, the BRIDGE portal, the EXPERA platform of ERANET Smart Energy Systems, the Mission Innovation Platform, the EU Research Results Platform (CORDIS), the DERlab Research Infrastructures database and the ASSET platform offering training material in the area of smart grids. Following the successful merging of EIRIE with the above-mentioned platforms, the next steps would be to extend the achieved connectivity with all active platforms in the EU that are active in smart grids, storage, and local energy networks. Therefore, a functional architecture was designed, which is adaptive, flexible, and expandable to cover the needs of all EU. The figure below shows a vision that can be extended to other platforms operating on the same principles. *(More details are provided in the [4] EIRIE manual)*

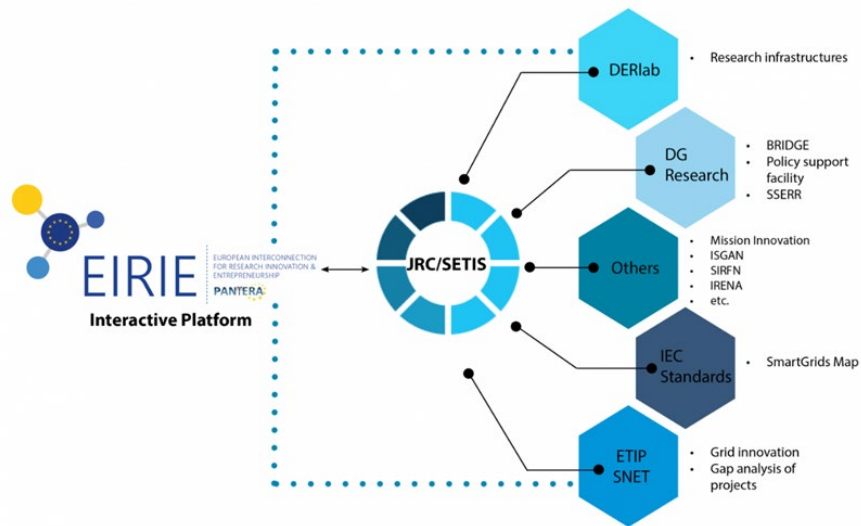


Figure 2: EIRIE: an interactive platform

3 The EIRIE Platform

3.1 What does the EIRIE Platform stand for?

EIRIE is the “European Interconnection for Research Innovation & Entrepreneurship”.

3.2 Objectives of the platform

The key objective of the EIRIE platform is to connect and bring together the European Union’s Research & Innovation community in smart grids, storage, and local energy systems, in one place. EIRIE embodies an interactive multi-functional platform that aims at connecting the R&I community of EU to enhance collaboration, strengthen the participation of all Member States in support of the Energy Transition and improve the participation of low-spending countries in R&I activities in the area of Smart Energy Systems.

EIRIE openly facilitates collaboration between researchers, R&I organizations, and policy makers, building a research database which aims at levelized investments in Smart Grids, Storage and Local Energy Systems throughout Europe, leaving no one behind. Users can enjoy an easy access to information on potential funding and consortium building, projects data collection (results and outcomes, best practices, reports, and deliverables, etc.), standards and regulations, all of these searchable via an easy-to-use dynamic search tool. Through EIRIE, collaboration is enriched via the

Confluence¹ tool, seamlessly integrated within the EIRIE platform.

3.3 Target audience of the platform

The target audience of the project and thus the EIRIE platform's users have been established as R&I stakeholders across the EU in the domain of Smart Grids, storage, and Local Energy Systems.

To have a better idea of the needs and challenges faced by the stakeholders, a series of activities were organised within the project duration, such as surveys conducted under WP2 and WP4, interviews and Q&A sessions held during the workshops organised by the consortium (with a hybrid, physical presence and online - format), targeted dissemination efforts, nano-workshops (short-format workshops in relevant events and conferences).

A non-exhaustive list of the workshops organised by the PANTERA consortium during the project duration:

- PANTERA Sofia Workshop “Pan European Research and Innovation activities for Smart Grids, Energy Storage and Local Energy Systems”, Sofia (BG), 2 July 2019
- PANTERA Dublin Workshop: Ireland’s Smartgrid, Energy Storage and Local Energy Systems Landscape: Research & Innovation Roadmap, Dublin (IE), 2 December 2019
- PANTERA Athens Workshop “Green Islands as a driver for the Energy Transition – Going Renewable and Smart”, Athens (GR), 13 February 2020
- First PANTERA pan-European workshop: “For widening R&I activities in the EU in support of the energy transition” (EUSEW Energy Day) online, 24 June 2020
- PANTERA Regional Workshop, “Energy transition through optimal use of the rich Renewable Energy Resources of the Mediterranean basin”, online, MedPower 2020, 10 & 11 November 2020
- DERlab/ERIGrid 2.0/PANTERA Webinar “Remote Testing & EIRIE Platform”, online, 8 March 2021
- PANTERA & SUPEERA joint nano-workshop: “Boosting the R&I activity on Smart Grid (SG) Technologies” at the 6th International Conference on Smart and Sustainable Technologies – SpliTech 2021, Split and Bol (HR) and online, 10 September 2021
- PANTERA/SUPEERA Joint Workshop “Energy Transition in the Baltic States: Funding Opportunities for Smart Energy Research and Innovation”, Hybrid: Online & Riga (LV), 27 April 2022
- PANTERA Workshop at 22nd International Scientific Conference on Electric Power Engineering (EPE 2022), Kouty nad Desnou (CZ), 8 June 2022
- PANTERA-SUPEERA joint workshop “Boosting the R&I of Smart Grids, Storage and Energy communities. Country: Malta” at the 13th Mediterranean Conference on Power Generation, Transmission, Distribution and Energy Conversion, Valletta (MT), 8 November 2022
- PANTERA-SUPEERA joint Workshop “International research collaboration opportunities fostering EU Clean Energy transition in Romania”, Bucharest (RO), 23 March 2023
- PANTERA-SUPEERA joint workshop “International research collaboration opportunities: fostering EU Clean Energy transition in Lithuania”, Vilnius on 27 April 2023.

A list of all the workshops can be found on the [PANTERA website](#).

These activities allowed the consortium to understand the needs and respond to them accordingly via the functionalities and tools offered within the EIRIE platform.

¹ [\[1\] https://www.atlassian.com/software/confluence](https://www.atlassian.com/software/confluence) : Confluence is your remote-friendly team workspace where knowledge and collaboration meet.

3.3.1 Key stakeholders identified within PANTERA

PANTERA aims at setting up a European forum composed of Research & Innovation stakeholders representing the EU energy system. Therefore, the project has selected multiple target audiences:

- R&I actors active in the fields of smart grids, storage and local energy systems (including policy makers, standardisation bodies, experts in research and academia, etc.) representing the European energy system.
- National, international, and pan-European platforms and initiatives (SIRFN, ISGAN, Mission Innovation, ETIP SNET, JRC, etc.).
- Other EU projects, national and international projects with similar interests and possibilities of collaboration and synergies.

Stakeholder	
Global	IEA
	ISGAN
	IEEE/IET
	CIGRE
	GSGF
	Mission Innovation
EU	JRC
	DG ENER
	ETIP SNET
	SETIS
	BRIDGE
	EERA JP SmartGrid
	DERlab
	ENTSO-E
	EDSO
	EURELECTRIC
National	Energy Policy/Regulatory Body
	TSO
	DSO
	IPPs / Generators
	Technology / System Providers
	Aggregator / ESCO / Supplier
	Utility Service Provider
	Industries/SMEs
	Academic/Research Institute
	Energy Agency/Association
	Energy Communities/Cooperatives
	Energy Active Citizens

Table 1: Categories of PANTERA stakeholders

One of the project’s goals was to understand the differences and help bridge the gap between low-spending and high-spending countries, thus the need to target stakeholders from both types of countries. For low-spending countries, to ensure their increased involvement with EU level initiatives

and for high-spending countries, to play a supporting and motivating role to enhance research & innovation in the energy field on a pan-European level offering best practice orientations as a guide and motivation to the low activity countries.

Regional stakeholder desks in the target regions were established, to ensure wide participation and involvement of the stakeholders throughout the project and enable collaboration. The term “Regional” describes the way the work is organised within the consortium rather than geographical division; it stresses the intention of PANTERA to be closer to the local stakeholders and adapt to the local processes and cultures. A relevant and chosen PANTERA partner is responsible for the host country and for the closer, so called associated, countries.

The PANTERA 6+1 approach is an integral part of the PANTERA process, which aims to strengthen national participation rates in smart grid investments by making national stakeholders’ needs and expectations more visible at the European level. The PANTERA 6+1 approach includes six PANTERA Regional Desks targeting countries which appear to have a lower rate of smart grid investment, and one best-practice Desk elaborating on gathering and systemising good experiences in projects and R&I governance from more successful countries, that can be selectively replicated under matching frameworks.

PANTERA 6+1



Figure 3: Low spending countries according to Smart Grid Projects Outlook 2017, per capita

3.4 Functionalities of the platform

The functionalities of the platform are a direct result of the findings of the abovementioned surveys during workshops and interviews with the stakeholders, as well as stakeholders’ questionnaires. Indeed, the results have supported the consortium in developing the functionalities that would effectively address stakeholders’ needs and provides an excellent environment for fostering collaboration. *(More details on users’ needs in [1] D7.1 Exploitation Strategy and Plan)*

A few findings based on the responses from the stakeholders:
It has been determined that there is an increasing demand for:

- Access to a pan-European data base with analytical and exploitable information on smart

- grid projects
- Information about best practices in R&D sector
 - First-hand insights into interesting smart grid projects, results, ideas, initiatives
 - Exchange of know-how with other R&I actors
 - Cross-promotion opportunities, encouraging synergies with projects and initiatives through information sharing and promotion opportunities through highlighting key achievements as best practices.
 - Pooling together different available instruments into one platform, in such a way that it will effectively contribute to the increase of knowledge, coordination of R&I activities and networking.
 - Making feasible for the low spending, in R&I, countries to be engaged in a more active manner in EU processes.

The UI (User Interface) of the platform has been developed and structured to provide a rich bundle of functionalities (*as shown in figure 4 below*) that are split into 4 primary functional areas/bundles:

- Project Evaluation and Reporting Services, involving simple analytics and visualizations over aggregated project-relevant data, giving a quick snapshot about the status quo of R&I activities per member state, technology type, involved stakeholders, etc. EIRIE also offers an innovative tool developed by the PATNERA team using expert contribution from WG5 of ETIP SNET capable of evaluating the maturity index of technologies progressed by projects and to what degree they contribute to the maturity of the interconnected grid and the system as a whole. This tool gives the basis for evaluating the R&I needs through real quantification of results that is of immense value to the R&I community in building future R&I roadmaps and implementation plans. Finally, EIRIE will offer services for getting access to R&I Facilities and Infrastructures for validating research results.
- Stakeholder Community Building, with emphasis given on the operation of 6+1 Regional Desks, towards fostering discussion and collaboration between regional stakeholders and increasing awareness on regional activities towards increasing R&I funding in the area of Smart Energy Systems.
- Sustainability and Collaboration Services towards knowledge co-creation, through living/online collaborative documents that capture the joint know how of the PANTERA community.
- Data Search Services, capitalizing on a strong and versatile search engine (classic filtering and list-based results), complemented with Data Linking functions towards facilitating discovery and identification of relevant information that might be of interest to the EIRIE community stakeholders.

Additional Services, including:

- Matchmaking Services for fostering and enhancing collaboration between R&I stakeholders and reinforcing participation of low-spending countries in funded activities.
- Training Services, for educating stakeholders on Smart Grids R&I relevant topics, through tertiary (reports, best practices) and vocational (webinars) education.
- News and Events services, for keeping the EIRIE community members up to date with relevant information and events of their interest.

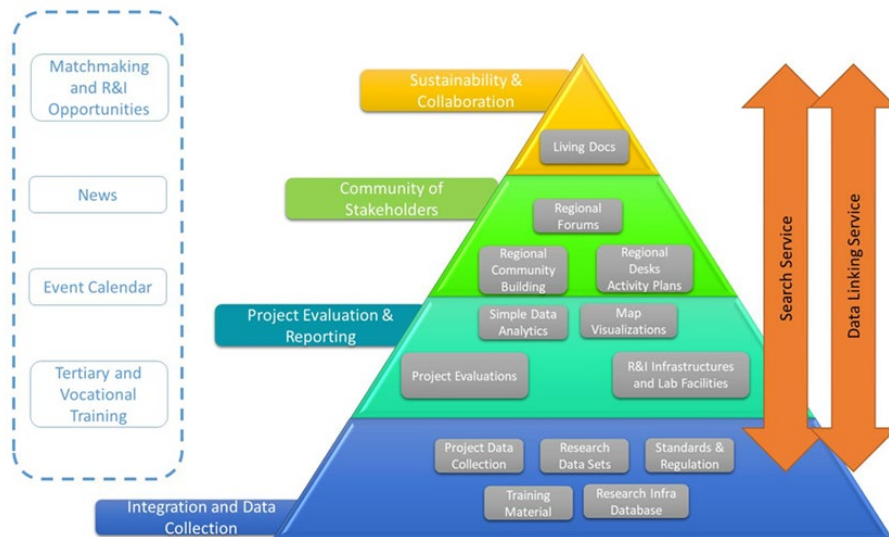


Figure 4: The EIRIE Platform Structure

A summary of all functionalities can be found in the following table (extracted from deliverable 7.3 [2])

Functionality ID	Functionality Description
A1 - B1	Smart Grid Data Collection - Smart Grid Projects Information Creation <i>Integration with JRC and EXPERA and ETIP SNET</i>
A1 - B1	Smart Grid Data Collection - Smart Grid Projects Information Creation <i>Migration of CORDIS database</i>
C1	Living Documents
A4 - B6 - C2	Data Area Search Functionality - Information Area Search Functionality - Knowledge Area Search Functionality
A2- A3 – B3	Research Datasets from other projects - Standards & Regulation database - Research Infrastructure Database
B2	Simple Data Analytics
D1	Matchmaking functionality
D2	Event Calendar
D3	News/ Newsletter Functionality
A5 - B7 - C3	Linking Functionality
D5	Research and Innovation Marketplace
A1 - B1	Smart Grid Data Collection - Smart Grid Projects Information Creation <i>Integration with ASSET, Mission Innovation, EPRI</i>
D4	Training Area
A1 - B1	Smart Grid Data Collection - Smart Grid Projects Information Creation <i>Integration with any other platform (per platform)</i>

Table 2: EIRIE functionalities

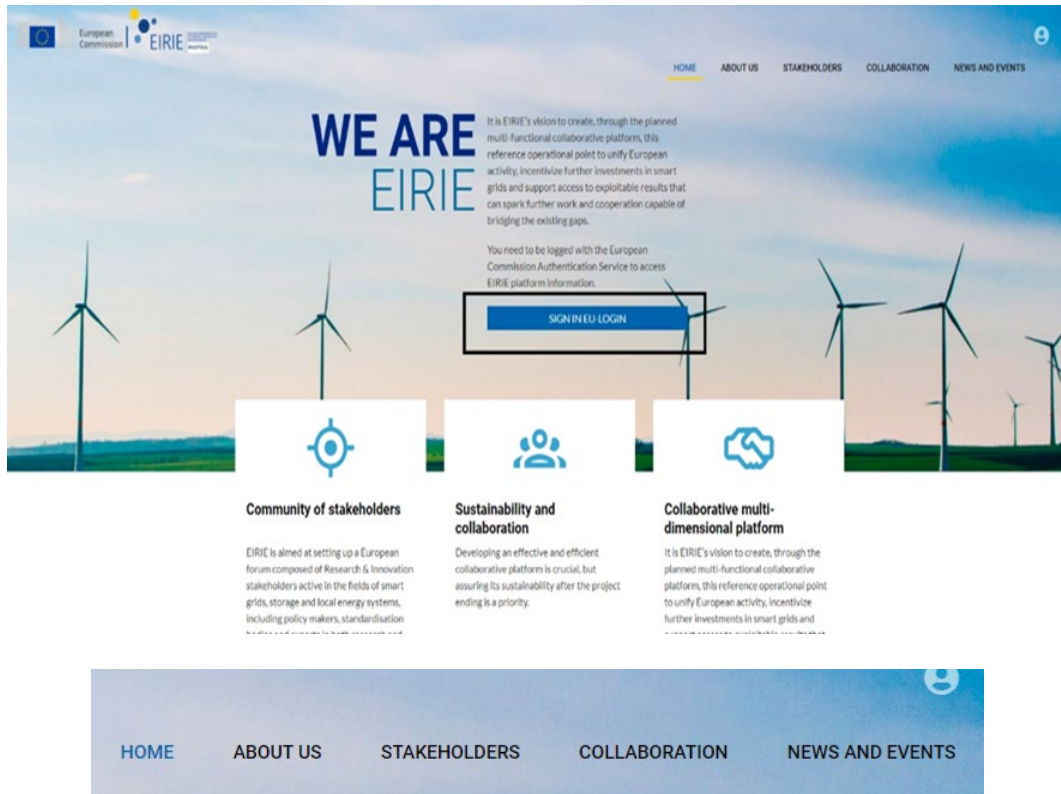


Figure 5: The EIRIE homepage

Furthermore, different types of roles have been implemented. The platform functionalities and view will be different according to the role. There are in total 6 roles:

Role 1: Users from other platforms we integrate with: They should have access to all information available in the platform. These users should be provided with the capability to upload data through a UI that allows them to also perform the mapping to the platform taxonomy.

Role 2: PANTERA project Users / Platform users / Partners: Full access to all information and areas, data upload, mapping capabilities and document editing rights. Partner users: refers to the PANTERA consortium members. They should have extended rights to support the operation of the platform with data uploading capabilities and access to all relevant information available in the platform.

Platform users should be given the ability to upload (but also map) their data to the platform. Project users: Users coming from project will have limited access rights that will be defined by the platform administrator based on their expected contributions

Role 3: External users split into the following groups (i.e. 'EU Research Community'):

- Simple users with access only to the information area and the additional functionalities.
- Collaborators with access to all areas, data upload, mapping and document editing rights
- A special user type refers to the Regional Actors that will, instead of having access as collaborators, also have exclusive rights with regards to specific functionalities (e.g., will be the only ones that can post an organization profile in the matchmaking service offered from the platform)

- Activity-specific collaborators: access to the information area and the additional functionalities area, but limited access to the Knowledge Area based (referring to the provision of access to living documents and associated information linked to their specific collaboration purpose e.g., a specific space for Working Group X of ETIP-SNET or BRIDGE)

Role 4: Content Manager: A PANTERA User/ Partner that is responsible for approving all content uploaded to the platform (manually) before it becomes publicly available (Data fed into the platform via APIs will be pre-approved), generating new categories of content and updating the taxonomy/ data model.

Role 5: Platform Administrator (Super User): A super user that after the login of any new user (as a simple user) can manage user rights and provide upon request additional rights for the different functions of the platform.

Role 6: Anonymous user

EIRIE website uses the EU LOGIN to manage the users and roles. When an anonymous user clicks on the login to register, they will be redirected to the EU LOGIN. This page contains the following information:

- Short description about EIRIE PLATFORM
- Explanation of the need to have an EU LOGIN account in order to access the application.
- Create account / Login button / Go to EU LOGIN

If the anonymous user already has an EULOGIN account, they can use it to access to the register form in EIRIE.

3.5 Sustainability of the platform

The project exploitation strategy is thoroughly defined in Deliverable D7.1, "Exploitation Strategy and Plan" but a summary will be provided here as well to give a complete overview of EIRIE.

Several activities took place to ensure the post-project sustainability of the EIRIE platform. This will be accomplished through the close collaboration with JRC and DG ENER. JRC will be hosting the platform in their server infrastructures and under the europa.eu web domain, with support from the SPRING project, for the maintenance and extension of the functionality and services of the EIRIE platform.

Additionally, new collaborations are expected to take place in the near future, especially addressing the need for promoting R&I under the Clean Energy Transition Partnership and initiatives promoting the digitalization of the energy system. Such collaborations with experts, working groups and task forces are expected to increase engagement and collaboration within the EIRIE Platform.

4 Research Infrastructure

4.1 Description

Based on the gap analysis performed within the PANTERA project it has been identified that forming a critical research infrastructure is among the most important factors for strengthening R&I in the low activity countries. The information gained from the questionnaires, interviews, workshops' panel discussions, round tables, and interactive stakeholder sessions witness that the countries which are left behind cannot be competitive compared to the large and well-established countries which have built their research infrastructure predominantly using strong national funding.

The countries which have been left behind are not capable to provide a top-class research

infrastructure and this contributes to widening the gap in the RI level. Not including all EU countries in crucial research topics will bring significant political and technical risks for the continental Europe power system integrity and for the successful EU energy transition. It has been identified that step by step approach towards building, learning how to use, and extending research infrastructure is needed for the countries which have been left behind.

The following main supporting actions were defined and performed:

4.1.1 Research Infrastructure presentation on EIRIE Platform

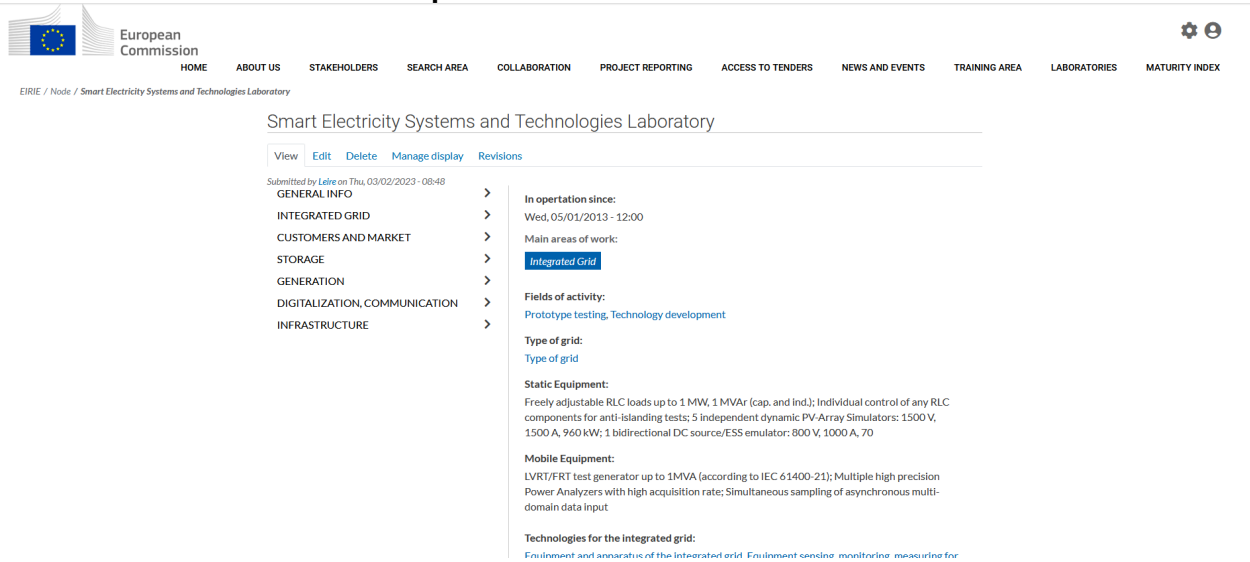


Figure 6: Exemplary Laboratory Display

Figure 6: Exemplary Laboratory Display shows how the EIRIE platform displays the information of a laboratory. The structure of the entry was proposed in collaboration with JRC, ERIGRID 2.0 project and DERlab.

On the left-hand side, there are anchor links that jump to the corresponding section. An entry currently contains general information, for example the address, the main areas of work, mobile and static equipment, simulation equipment, testing services and accreditation standards. Subsequently, it lists more specialized information about technologies the laboratory is active in. The technologies correspond to the technology's matrix developed within the PANTERA project.

Currently and in the future, there will be ongoing activities that aim to improve and support the information quality and structure regarding the laboratory entries with support from the service contract financed by DG Energy.

4.1.2 Research Infrastructure presentation on the regional corner of EIRIE Platform

It has been found that presenting the available Research Infrastructure on local regional level has had many benefits for the stakeholders. Thus, this option is developed within the regional corner collaboration EIRIE Platform (using Confluence). The environment allows for direct generation and modification of RI information which can easily be performed. Figure 7 below shows an example from Regional Desk 2.

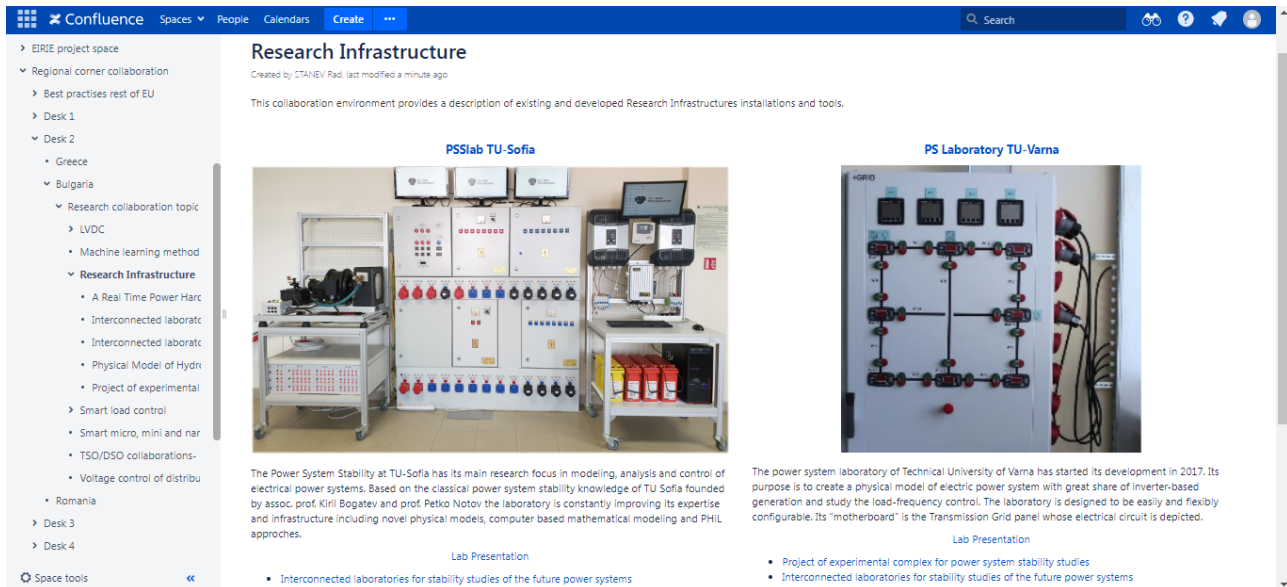


Figure 7: Research Infrastructure in Confluence collaboration area

4.2 Collaboration with JRC and ERIGrid 2.0 project

A partnership between PANTERA and the H2020 ERIGrid 2.0 project has been established to support the stakeholders from the lower-activity countries to get in touch and obtain free access to leading smart grid and energy systems laboratories and services of the best laboratories of Europe including 21 physical laboratories, 10 virtual laboratories, education in smart grids and smart energy systems as well as resources which support the process of establishing and developing research infrastructure.

To supply the EIRIE platform with initial information about research infrastructures, JRC and DERlab agreed to share their information and databases. In collaboration with PANTERA, they worked out a database structure for research infrastructures that reconciles the structure of both sources of information. This database structure contains fields that adhere to the technologies matrix that was developed within the scope of the PANTERA project. After agreeing upon a common database format, both parties provided the respective data to the EIRIE platform. Further development has been taken over by the service contract of DG Energy. Currently, the discussion revolves around the topic of how to keep the owners of the provided research infrastructures engaged such that they regularly update their respective entry in the platform. Collectively, JRC and DERlab will continue to support the common repository on behalf of the providers of the infrastructures but more direct support from the owners is pursued.

In parallel, common workshops, webinars and education activities on the most important and RI development topics were conducted.

4.2.1 Webinars

As a good example, the joint PANTERA- ERIGrid 2.0 webinar "Remote Testing & EIRIE Platform" held on 08 March 2021 can be given. A joint team formed by Graeme Burt, Mohamed Shalaby, Thomas Strasser, J. Emilio Rodriguez-Seco, Kai Heussen, Steffen Vogel, Kostas Latoufis, Venizelos Efthymiou, presented key topics considering the integrated validation and testing approaches in the domain of power and energy systems. Due to the raising complexity this issue becomes more critical and requires adequate research infrastructure and technology development. Additionally, advanced approaches with virtual services were presented in the context of the activities of ERIGrid 2.0 and

the PANTERA projects and the DERlab network.

During the webinar, the following main key topics were considered:

- Overview of the ERIGrid 2.0 Research Infrastructure for Smart Grids and Smart Energy Systems
- Introduction of the ERIGrid 2.0 Lab Access Programme
- Experiences with Remote Lab Access Services on the Example VILLAS4ERIGrid
- Virtual Research Services in ERIGrid 2.0
- Demo of the VLab Services from RWTH Aachen
- Demo of the OpenAFPM Services from ICCS-NTUA
- PANTERA project - A pan European Technology Energy Research Approach

As a result, significant increase in the participation of stakeholders from the lower-activity countries has been achieved, through which the RI knowledge in these countries is increased and valuable connections have been established.

4.2.2 Participation of Stakeholders from low activity countries in the educational activities of ERIGrid 2.0.

The participation of stakeholders willing to improve their RI in the educational activities of ERIGrid showed valuable knowledge transfer.

A good example is the participation of the Bulgarian research infrastructure staff in the ERIGrid Summer School on “Advanced operation and control of active distribution networks” which took place in Athens on 10-14 June 2019. The event was co-organised by ICCS-NTUA and HEDNO, in collaboration with RTDS Technologies, including lectures, laboratory work, visits to industrial and research infrastructure. Taking into account that the distribution networks will have a key role in the transformation of the energy system, due to the massive integration of distributed generation, storage and electric vehicles, adoption of ICT solutions and consumer engagement, the ERIGrid Summer School considered the following major aspects:

- Advanced inverter functions to provide ancillary services
- Optimal operation and control of distribution networks
- Machine learning applications in smart grids
- Energy markets and demand response
- Grid integration of Electric Vehicles
- Adaptive protection of distribution networks
- Service restoration of distribution networks
- Power system resilience
- Microgrid applications using real-time simulation.

4.2.3 Outcomes

The actions mentioned above offered improved knowledge transfer in the field of RI building and usage. It also made possible the establishment of contacts between researchers who are seeking collaborative participation in EU funded projects. This has further enabled more intensive participation of partners from low activity countries in some of the prospective project proposals.

A good example demonstrating this process is the associated participation and inclusion of RI stakeholders from Bulgaria, Romania and Greece (National Technical University of Athens (NTUA), Technical University of Sofia (TUS), Universitatea Politehnica din București (UPB)), in a project proposal for the Horizon programme call '[HORIZON-INFRA-2023-SERV-01-01] - Research infrastructure services to enable R&I addressing EU priorities' together with a solid consortium conformed by prestigious research institutes.

5 Regulations and Standards

5.1 Repository Search Tool

EIRIE offers a strong and versatile search engine through which anyone can search and find fine-grained and targeted information available in the EIRIE platform. One of such areas is “Regulations and Standards”. The following figure 8 shows the repository search tool area in the EIRIE platform.

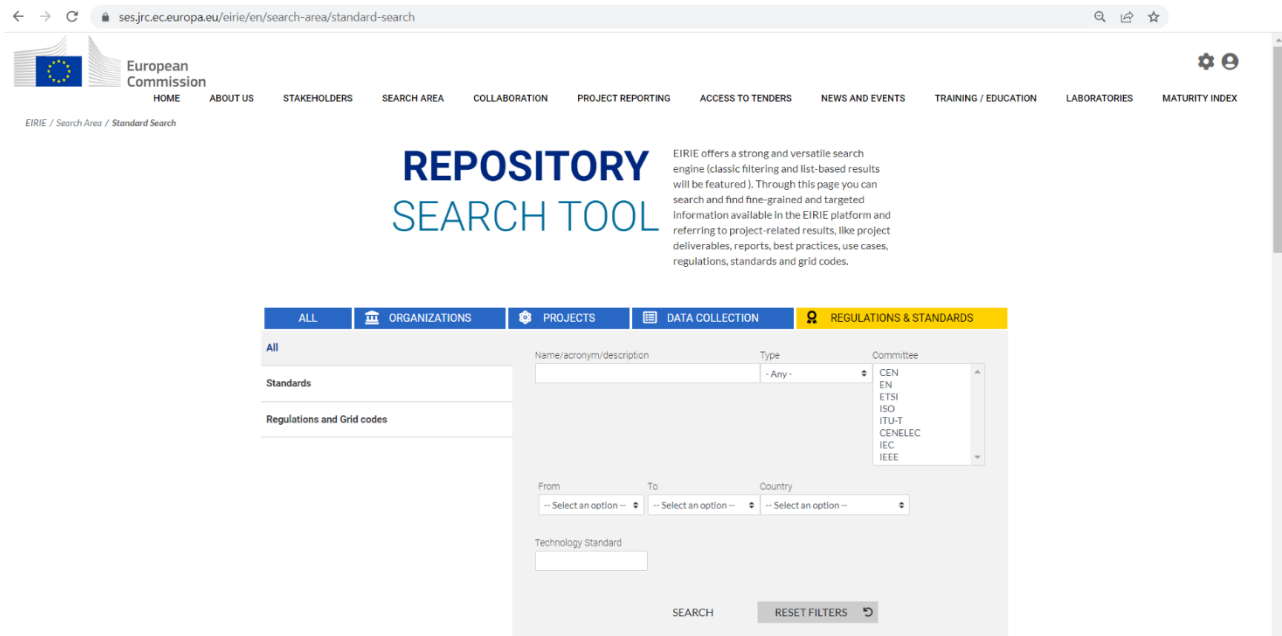


Figure 8: EIRIE’s Repository Search Tool

5.2 Relevance for the Research & Innovation Community

A significant part of the PANTERA project is a RICAP (R&I status and Continuous gAP analysis) process, described in deliverable D3.1, that brings together the different dimensions, Regional Desks, Working Teams, and activities that ultimately have been feeding into the EIRIE platform.

Matured technologies/systems without any defined regulation, grid code and standard (RCS) can’t be integrated into the energy system network for real-life operation. In PANTERA deliverable D3.2, more details of this review can be found, which offer an additional validation of the Technology Classification (as proposed by the PANTERA team and well accepted by the ETIP SNET and BRIDGE communities) and their linking to the Functionalities through the extensive review of RCS. Hence, all the reviewed RCS documentation (including the most important information and useful links) has been populated in the EIRIE platform. One of the examples of the outcomes is shown in Figure 9 below.

The screenshot displays the 'REGULATIONS & STANDARDS' section of the PANTERA platform. The interface includes a navigation bar with tabs for 'ALL', 'ORGANIZATIONS', 'PROJECTS', 'DATA COLLECTION', and 'REGULATIONS & STANDARDS'. A sidebar on the left shows 'All', 'Standards', and 'Regulations and Grid codes'. The main search area features a text input for 'Name/acronym/description' (containing 'HVDC'), a dropdown for 'Committee' (listing CEN, EN, ETSI, ISO, ITU-T, CENELEC, IEC, IEEE), and filters for 'From', 'To', and 'Country'. A 'SEARCH' button and a 'RESET FILTERS' button are at the bottom. Below the search area, three search results are shown for IEC TR 61850-90-14:2021 and IEC 61378-3:2015.

Figure 9: Standards, Regulations and Grid Codes

This process will

- provide future users of the EIRIE platform search capabilities linking technologies of projects to RCS and hence easily identify those RCS that are of interest to the project.
- Contribution to the R&I community of Europe covering the important RCS field that is now missing and thus offering a must-needed process for identifying the RCS needs of projects.
- Support the R&I community to identify the R&I gaps and required activities for a specific technology to achieve its unity maturity index for market uptake.
- Further support in contributing to the replicability & scalability index of projects and technologies.

The advancement towards the integrated grid requires an update of the tools (hardware and software) that are required for power systems and market operation and control. This includes the development and validation of new technologies, protection schemes and the upgrade of power flow control tools. In this context, controllability, stability, and reliability assessments of the integrated energy system, including upgrades in regulations, grid codes and standards, are of utmost importance. For example, as outlined in ENTSO-E’s new roadmap, “ENTSO-E Research, Development & Innovation Roadmap 2020 – 2030” [5], TSOs will require new optimisation techniques to exploit the best new functionalities of the hybrid AC/DC grid.

Hence, before 2025, consolidated and validated regulation/grid code updated with requirements for the DC side of grid forming converters are needed. Thus, the R&I activity within this area will define a new regulatory framework supporting to full exploit the new ancillary services of grid-forming converters, such as synthetic inertia response and fast frequency primary reserves. Thus, the new regulation will help to achieve the maturity of the technology.

5.3 Next steps

- Extend the collaboration area within EIRIE to host the work related to Regulations, Codes in relation to Technologies, in addition to the area developed for Standards, serving the R&I needs for identifying maturity gaps.
- The collaboration area will contain full details with cross-references for siting the required Codes and helping R&I consortia of accessing them and using them.
- Develop a guide for searching, finding and using the CODES developed by the Operators to serve specific research objectives and needs.
- Develop a selection of case studies of specific research questions and the process to be followed for achieving the targeted questions as a guide to researchers for the best use of the CODES repository on the intranet of ENTSO-E.

6 Conclusions

Deliverable D8.3 outlines the main outcomes and results of the EIRIE platform. A lot of work has been done to ensure the platform would effectively respond to the needs of the EU R&I community. To that effect, workshops, surveys, interviews, etc. have been conducted and stakeholders have been regularly consulted during the process of the creation of the EIRIE platform. The platform and its different functionalities have been developed with the clear objective of supporting participation and collaboration of all countries in the EU. Indeed, the EIRIE Platform was developed to connect the EU R&I community and enhance the participation of low-spending countries in R&I activities related to Smart Energy Systems.

Another important aspect that was described in this deliverable was the sustainability of the EIRIE platform, which is key to ensure its success and viability.

Furthermore, the Research Infrastructure and multiple collaborations that have been established in that regard were described in this document. Indeed, the data gathered from the questionnaires, interviews, workshops panel discussions, roundtables and interactive stakeholder sessions attest that the countries which are left behind cannot be competitive compared to the large and well-established countries which have built their research infrastructure predominantly using strong national funding, thus the need for more centralised information on European Research Infrastructures.

Finally, the Repository Search Tool and its relevance for the R&I community were explained, as well as the next steps to optimize this process, such as the extension of the collaboration area within EIRIE to host the work related to Regulations, Codes, Technologies, Standards, and R&I needs for identifying maturity gaps, developing a guide for searching, finding and using the CODES developed by the Operators to serve specific research objectives and needs, and more.

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