ERIC Forum 2
Assessment of strategies and best practices for developing fruitful relationships with the industry

Work Package 9 Deliverable 9.2

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Dissemination level	PU
Description of deliverable	This report contains strategic and operative recommendations for ERICs to develop fruitful collaborations with industry and the accompanying toolbox.

Executive summary

This report assesses and gives recommendations for how the European Research Infrastructure Consortia (ERICs), today including 30 organisations, can develop fruitful collaborations with industry. One important goal when the ERICs are showing clearly their importance as strategic assets for achieving scientific, technological and societal impact. The report shows why this is important by pointing at some important analyses done in the EU system and how challenges need to be met by using all parts of society together. Starting out by assessing and summarising what has been done in the last few years with the results of several relevant earlier projects, like ENVRIPlus, ENRIITC and ENVRI-fair, the working group has tried to gather what is most important. This results in both strategic and operative recommendations. The overall strategic engagement needs to foster a productive collaboration between research infrastructure and industry, based on understanding the industry's needs, measuring results with relevant KPIs, finding mutual benefits for the collaboration and aligning with resources. To accomplish this objective, the RI must develop an innovation culture within the organisation. The report points to different ways of achieving this. Among many things, including appointing responsible functions, the constitution of advisory boards, and participation in regional and international clusters and networks Universities are important stakeholders, together with research and technology organisations (RTOs), in reaching the industry and bridging the gap between different actors in the innovation system. The Public-Private Partnership (PPP) way of working is described as a toolbox and attempts to cover all aspects of collaboration with industry. This is not a full account. The toolbox covers models and types of collaboration, some of the legal and regulatory considerations necessary and funding and financing of different variety, and includes:

- Strategy for industry and innovation engagement starting with the primary interest of industry.
- Multi-disciplinary, gender-balanced Industry Advisory Board
- A full-time Innovation/Industry Contact officer
- A Communications Office with commercial experience
- Identify the intermediaries (clusters, RTOs) relevant to the RI and set up Way of Working including both tuning the offer, filter companies and outreach activities.
- Setting a target for how much cooperation with industry should ideally contribute to RI annual revenues
- Analys if the LIEPT Model is relevant to use, and if so, decide on scope, stakeholders and KPIs.
- Set up a part/link web page designed to provide general information for industry and meet their special needs, promote success stories, offer a catalogue of services and collaboration models
- Set up an innovation helpdesk to act as an expertise centre providing access to essential tools for collaboration, such as guidelines on IP rights, open innovation and legal agreement templates.

The provided recommendations and toolbox are completed with cases to showcase how the work can be done.

More and more research infrastructures are engaging with industry and thus could benefit from this toolbox and the described approaches. In some areas, industry is more advanced than academia and can form strong alliances to remain at the forefront of technological and scientific innovation.

Collaboration is key to securing Europe's position as a global leader and addressing future societal challenges. ERICs must embrace more efficient partnerships with industry and leverage the wealth of existing knowledge to achieve this. The working group hopes that this toolbox will serve as a valuable resource to initiate and guide these efforts.

ERIC Forum 2 has received funding from the Horizon Europe research and innovation programme under grant agreement N. 101124559.

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1. Introduction

As part of the ERIC Forum Project 2, Task 9.2 focused on assessing strategies and best practices for fostering productive relationships with the industry. This deliverable, along with an accompanying toolbox, is presented in this report.
In an era defined by rapid technological advancements, global interconnectedness and societal challenges, the importance of robust Research Infrastructures in Europe cannot be overstated. European Research Infrastructure Consortia (ERICs) currently include 28 organisations. They are an essential element of the European Research Area, transcending national boundaries. After more than a decade of operation, ERICs have demonstrated their value as strategic assets and stand among Europe's most effective instruments for driving scientific, technological, and societal impact. Since the inception of this report, the competitiveness strategy for Europe by Mario Draghi, has been published. This comprehensive strategy underlines how all actors in the innovation ecosystem in the EU need to be prepared to change their way of working and create new opportunities for collaboration. Here is the ERIC, one very important piece in the puzzle. Moreover, the critical importance of data and AI capacity has risen even further on the agenda, highlighting the need for cutting-edge research infrastructures to meet these challenges.

Building upon the outcomes of the work done by several ERICs in past and present EU-funded projects (including H2020, Horizon Europe, Innovative Health Initiative), the task aims at assessing and tuning strategies and best practices, already drafted, for engaging the industry as a partner of the ERICs. The main outcome of this task is to improve coordination among the ERICs and their capacity to collaborate with the private sector by having a common approach that will reinforce their sustainability and their socio-economic impact.

1.1 Landscape Analysis

ESFRI Landscape Analysis Report
ESFRI has closely monitored and provided a thorough landscape analysis of the European RI ecosystem since 2016. The latest **Landscape Analysis report** analyses the current status, impact, trends, gaps and needs in each of the five science clusters, namely ENVRI (environmental sciences), ESCAPE (physics and astrophysics), EOSC-Life (biomedical sciences), PANOSC (photon and neutron), and SSHOC (Social Sciences and Humanities). These science clusters integrate multiple RIs and diverse research communities, closely collaborating with pan-European e-infrastructures to support the implementation of the EOSC Federation as a system of “Web of FAIR Data and Services for Science” (Petzold, A. et al., 2024). However, despite their ambitious objectives of harmonising models for data access, tools. workflows. and training, they face challenges because the RIs and research communities involved vary significantly in terms of maturity and innovation level, adopting different approaches in applying the FAIR and CARE principles to their data, services and research data management practices.

Furthermore, the infrastructures also differ in terms of technological capabilities, organisation, human resources, and financing. These differences can become hurdles in cross-domain collaborative data-driven research projects that address urgent societal needs and require flexible research infrastructures and advanced technologies and methods. Understanding these differences can help in designing strategies for the RIs to enhance innovation and collaboration with the private sector, which is heavily influenced and transformed by the rapid development of Artificial Intelligence (AI) and large language models (LLM). For more information on the current RI landscape, please see the ESFRI report.

Common European Data Spaces (2023-2026)
European Strategy for Data set out to create Common European Data Spaces[1] in a number of fields, e.g. health, agriculture, manufacturing, energy, mobility, financial public administration, skills, the European Open Science

[1] https://digital-strategy.ec.europa.eu/en/policies/data-spaces

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Cloud, media and cultural heritage. These data spaces have their secure infrastructure to pool, access, share, process and use data, and aim to converge into a single market for data

European Language Data Space (LDS)

The European Language Data Space[2] is currently being set up as an EU-compliant data market for the exchange of language data resources in the public and private sectors, which can be used for the development of **multilingual and multimodal language technologies and language-centric AI**. The initiative does not aim to build another data infrastructure, but to connect existing platforms and infrastructures and create a pan-European network. Members of the network, among which also ERIC RIs, can share and monetise their language data, models and other language data resources through a common platform. In addition, members can connect and exchange with other stakeholders.

EU Digital Innovation Hubs Network (EDIH)

The Member States have established a network of companies and public sector organisations[3], envisaged under the DIGITAL Europe Programme, to accelerate digital transformation and provide custom digitalisation support to SMEs and public sector organisations in all regions and sectors of the EU. The network offers a catalogue to search for innovation hubs[4] in the EU. Users can search the catalogue by country, service type, technology type, and sector. The hubs are being funded jointly by the Commission and Member States with EUR 1.5 billion over a period of 7 years. The funding received by the EDIHs is used to provide digital services to their customers, who will either receive those services for free or at a reduced rate. Services include "test before investing", expert advice, skills and training, ecosystem building and support with access to finance.

What can be ascertained is that data and computer capacity together with machine learning and language is becoming more and more important. The different initiatives that are mentioned above are only some that will be of interest. The important message is that ERICs in their future development need to take this into account. The need from industry for different collaborations will always include data, computer capacity and AI. An area under constant change.

2. Past project outcomes and examples

In recent years, three projects have been particularly relevant in shaping the strategy that the ESFRI Landmarks could implement to improve their relationships with the private sector. Those projects are:

- ENVRIPlus: Environmental Research Infrastructures Providing Shared Solutions for Science and Society
- ENRIITC: European Network of Research Infrastructures & IndusTry for Collaboration
- ENVRI-fair: ENVironmental Research Infrastructures building Fair services Accessible for society, Innovation and Research

This report presents an overview of these project outcomes that are useful for the objectives of ERIC FORUM 2 and task 9.2 in particular. There are three other areas described as well, that the working group found relevant.

[2] https://language-data-space.ec.europa.eu/index_en
[3] https://european-digital-innovation-hubs.ec.europa.eu/home
[4] https://european-digital-innovation-hubs.ec.europa.eu/edih-catalogue?f%5B0%5D=edih_soe%3Aedih&f%5B1%5D=edih_soe%3Asoe

2.1 ENVRIPlus

The ENVRIPLUS project was funded under H2020 and lasted over 51 months. It included many activities, workshops, internal and external consultations, and the creation of new tools and services mainly to benefit the participating Research Infrastructures.

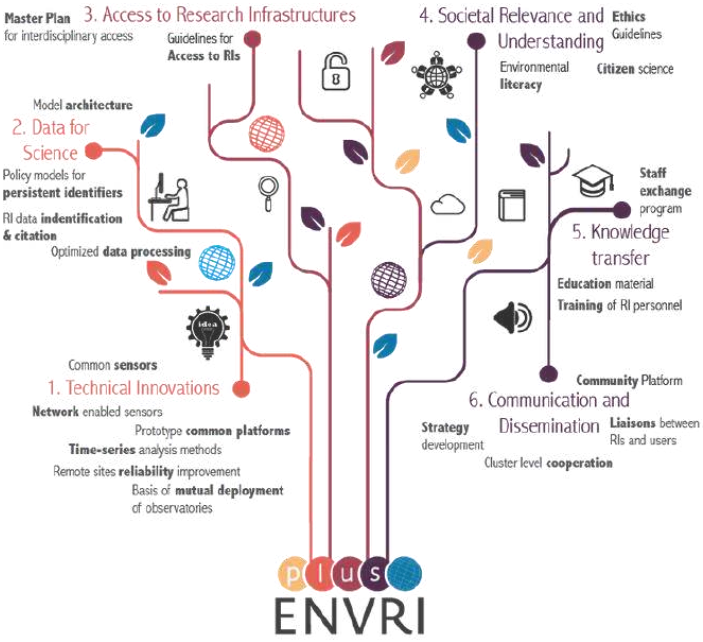

Figure 1 - The ENVRIPLUS structure.

The project aimed to:

1. Encourage interaction and exchange of ideas among different research infrastructures.
2. Introduce and incorporate new technologies and innovative approaches throughout research infrastructures.
3. Expand access to environmental research and innovation for a broader audience beyond the confines of research infrastructures.

Specifically, the initiative sought to enhance the monitoring and analysis of Earth's ecosystems by standardizing and innovating monitoring systems and strategies. This effort aimed to create unified solutions to technological and data management challenges faced across the board and to standardize access policies, thereby streamlining the knowledge transfer among research infrastructures.
Moreover, comprehensive **guidelines** were established to **promote interdisciplinary utilization of data and data products**, supported by practical examples involving diverse research infrastructures. Coordinated efforts were made to **enhance communication and collaboration**, addressing the needs of environmental research infrastructures at every level, from management to end-users. This included initiating **exchange programs** for research infrastructure staff, developing resources for their **training**, and proposing unified **strategies to improve services for users** and **assess the socio-economic impacts** of these enhancements.

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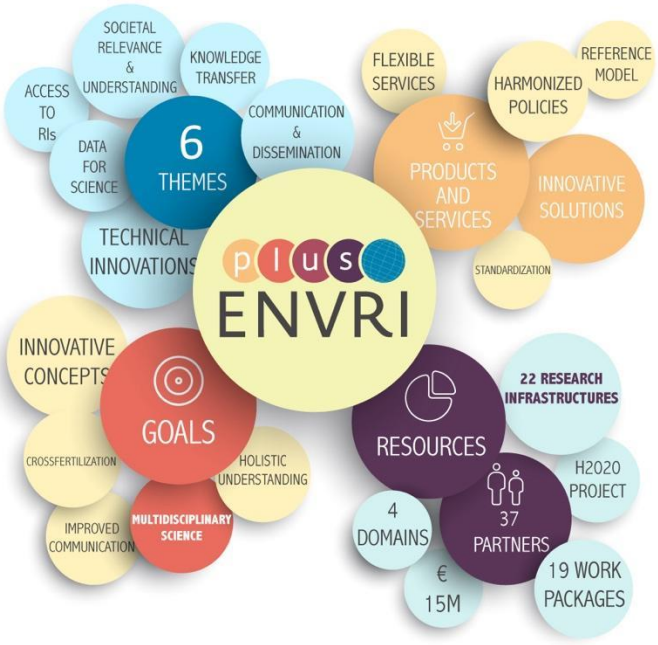

Figure 2 - The ENVRIPLUS main components.

The ENVRIPLUS D18.5 deliverable, "The RI Innovation and Industry Liaison Preparedness Roadmap", developed by EMSO personnel, is particularly relevant for this report. This document marks the first presentation of the "Research Infrastructures Innovation-Preparedness Roadmap", which we will discuss in the next sections.
The roadmap serves as an essential instrument for the ESFRI research infrastructures, as it provides strategies and guidelines on how to enhance their internal organisation and foster long-lasting collaborations with the private sector, while also showcasing the economic benefits derived from successful industry partnerships.
The deliverable presented thirteen recommendations for ENVRI RI to:

1. Introduce “Innovation Cooperation with Industry” as a priority in every ENVRI’s Annual Strategic Plan.
2. Ensure its website homepage has a high-level "Industry" or “Innovation” menu tab and section.
3. Prepare an annual Innovation and Industry-Liaison Strategy as an annex to the RI Business Plan.
4. Hire a full-time Innovation/Industry Liaison officer.
5. Hire a Communication Officer with commercial experience.
6. Set a target for how much cooperation with Industry should ideally contribute to RI annual revenues (%).
7. Establish a multi-disciplinary, gender-balanced Industry Advisory Committee.
8. Highlight four Industry-cooperation success stories on its website and in annual reports to the EC and ESFRI.
9. Ensure its Data Portal offers users open, user-friendly access to RI data and services.
10. Publish an online RI Services Catalogue, including specific services/opportunities for the industry.
11. Publish on the website a standard Service Level Agreement (SLA) and IP Policy Guideline for SMEs interested in licensing RI data to (co-)develop value-added products and applications.
12. Establish an annual Training Action Plan and Program as annexes to the Business Plan in consultation with the industry to bring together RI researchers and company engineers and managers.
13. Develop an RI Talent-Attraction Exchange Program with industry to train the next generation of young scientists and engineers.

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The roadmap proposed in ENVRI PLUS was further improved in the H2020 ENRIITC project, which is summarised in the next section.

2.2 ENRIITC

ENRIITC is an H2020 project that ended in December 2022, funded by the European Commission, with a consortium composed of 11 Partners and 60+ Associated Partners working together to establish a pan-European network of Industrial Liaison and Contact Officers (ILOs/ICOs) to improve the RI-industry cooperation and boost the innovation ecosystem in Europe.

The ENRIITC project was created to foster mutual learning among Industry Liaison Officers and Industry Contact Officers, promote partnerships between research infrastructures and industry, and enhance strategies and best practices for these collaborations. Its goals also include increasing industry awareness of cooperation opportunities with research infrastructures and highlighting the impact of such partnerships. This network seeks to leverage the untapped innovation potential of European Research Infrastructures, thereby enhancing their societal and economic contributions throughout the innovation process. Importantly, ENRIITC's scope goes beyond the ENVRI projects, encompassing research infrastructures across all ESFRI sectors.
The improved Roadmap led by EMSO is structured around five primary actions designed to foster a supportive ecosystem for Research Infrastructures aiming to enhance their collaboration with the industrial sector:

1. Creating a pan-European network for ICOs and ILOs.
2. Establishing a foundational skill set for ICOs and ILOs.
3. Identifying and implementing specific crucial actions for each RI.
4. Forming strategic partnership alliances.
5. Crafting a European Research and Knowledge Exchange Strategy specifically for RIs.

A relevant innovation in the ENRIITC edition of the roadmap, particularly concerning the first action, is the creation of a pan-European hub-and-spoke network, coordinated by an "Innovation and Industry Services Central Support Hub." The roadmap also includes suggestions for effectively recruiting the Industry Liaison and Contact Officers.

2.3 ENVRI-FAIR

The primary goal of the EU-funded ENVRI-FAIR project was to enhance the FAIR principles of digital resources and integrate them with the European Open Science Cloud (EOSC)[5]. ENVRI-FAIR aimed to establish and implement a set of **technical and governance guidelines** to bridge gaps across different scientific disciplines within the ENVRI community.
As part of this project, EMSO led the development and release of a comprehensive catalogue targeting the private sector in April 2022. This catalogue showcases the innovative products and services developed by the ENVRIs and provides recommendations for industrial partners on the use of research infrastructure services.

The catalogue has a user-friendly interface that helps users navigate, recognise, and use the services effectively. It was designed in two stages: (1) Organising an innovation workshop to collect best practices for unlocking and maximising the innovation potential of RIs and enhance their collaboration with the industry and (2) Surveying the ENRVRI managers to gather insights on their collaboration experience with industry. The results were used to describe the services in the catalogue.
The methodology used to design the catalogue and a thorough analysis of the existing services and practices within ENVRIS have been outlined in a report based on the insights provided by the Board of Environmental Research Infrastructures (BEERI).
It became evident that the partnership with the industrial sector is still evolving. The degree of service centralization and the allocation of resources for industry engagement varied depending on the maturity level of the Research

[5] https://open-science-cloud.ec.europa.eu/

Infrastructures. Indeed, not all were at a stage where they could offer centralized services and resources for industrial liaison.
The key findings of the analysis are summarized below:

- **Landscape**: the majority of ENVRIs operate as distributed RIs (12 out of 13 respondents), utilizing facilities, resources, and services spread across various locations. The organizational structure varies significantly among them, from the number of nodes to their maturity levels. Some have already achieved status as European Research Infrastructure Consortia (ERICs), whereas others are in the project or preparatory stage. This diversity affects their operational capabilities and service provision, with some not yet able to offer centralized services to their industrial users.
- **ENVRI Services**: data services, analytical services, and web-based applications are in high demand among industry users, followed by requests for remote or physical access to facilities. Primarily, ENVRI services cater to users from academic or research backgrounds, with only 2 RIs reporting use by the private sector. Typically, RI data services are accessible to all interested parties, usually under a CC-BY license, without a direct way for the RI to identify the users unless specific feedback mechanisms or curation services are in place.
- **Industry profile**: the main industrial beneficiaries of RI services targeting the private sector are Small and Medium Enterprises (SMEs) at 67%, with larger corporations at 22%, and startups at 11%.
- **RI collaboration and private sector engagement**: the report outlines specific efforts by ENVRIs to foster industrial collaborations and allocate resources to enhance these partnerships. The importance of industry collaboration is acknowledged with a rating of 4.1 out of 5. Although policies on data and access are relatively advanced in ENVRIs, initiatives specifically for the private sector are either in the early stages of development or absent. RIs are keen to increase engagement through events or by highlighting successful industrial partnerships.

Regarding **Intellectual Property Rights (IPR) and data ownership**, the treatment of industrial users varies. Some RIs apply the same rules as for other users, some have not yet encountered this situation due to a lack of industrial users, and others include specific clauses for the private sector, particularly concerning data submission to RI data centres, which is not compulsory if it could compromise potential commercial utilization.
The value of a comprehensive RI service catalogue was recognized by over 75% of RIs as beneficial for clarifying service offerings to users.
Future strategies to bolster RI-industry collaborations highlight the role of EU-funded projects and industry training programs by RI's central hubs as significant facilitators. Conversely, the lack of awareness was seen as a major obstacle to industry collaboration, along with the need for dedicated funding for projects that allow for co-designed pilots with industrial partners.
It is also relevant to highlight that all the previous projects underscored the **importance of appointing an Innovation or Industry Liaison officer within each RI**, and fortunately, EMSO managed to do that. Such specialized staff members play a crucial role in bridging the divide between RIs and the business sector and it is perceived as central in the process. These figures should possess a deep understanding of technology transfer, and commercialization strategies, including patenting, alongside robust market awareness, broad professional networks, and a comprehensive grasp of significant scientific themes and motivations. However, due to variations in their structure and primary aims, some RIs might find it challenging to allocate a dedicated individual to this role. Collaborative innovation efforts among RIs within the same ENVRI area are a potential solution and should be part of a common strategy to address this kind of issue.
This concept was explored and expanded upon in the ENRIITC project (as detailed in Section 2.2.a of this document), proposing the establishment of an Industrial Liaison and Contact Officers (ILOs/ICOs) Hub at the ENVRI Community level to support all the ENVRIs that could not afford to have such a figure internally. The hub's primary mission would be to offer guidance and support to RIs in their industrial engagements by leveraging existing expertise and successful practices, with its knowledge base growing as the hub evolves. Initial efforts will build upon the foundation laid by the ENRIITC's actions and networks. Supporting the Hub, particularly for ENVRIs, represents an initial step towards enhancing their collective readiness for innovation.
In general, this issue is quite relevant for all the RIs, regardless of whether they can hire an Industry Officer. Indeed, the overall success of building fruitful relationships with the private sector could not be considered an effort realised at the

individual level; rather, it should be considered a collective effort. The development of a common framework to support the newcomers and to create a critique mass to support the European Innovation Ecosystem should be the priority.
Regarding the activities that could be carried out by the RIs, the most essential activity is raising awareness. The capacity of the RIs to attract private sector users is closely linked to their efforts in disseminating and promoting their services. It's vital to make the offerings of RIs accessible and comprehensible not only to industry but also to non-traditional end-users. Enhancing mutual awareness between both sectors is necessary.

2.4 CORBEL

CORBEL, an H2020-funded project coordinated by EMBL/ELIXIR (UK), ran from 2015 to 2019 and focused on developing tools, services, and data management systems to support cutting-edge European research initiatives. Through a **user-driven approach**, the project united the Biological and Medical Sciences Research Infrastructures (BMS RIs), creating a robust foundation and integrating their combined capabilities into the scientific workflows of advanced users. **The project enabled the BMS RIs to support users throughout the entire lifecycle of scientific projects, from planning and securing grants to the sustainable management and exploitation of research data**. By streamlining user access, unifying data management, establishing common **ethical and legal frameworks**, and providing joint innovation support, CORBEL introduced a transformative model for biological and medical research in Europe. This model reduced redundancy, simplified project management, and significantly improved researchers' capacity to deliver advanced, cross-disciplinary outcomes.
One key output from the project was the CORBEL Industry Collaboration Best Practice Guide (Zenodo)[6]. Produced collaboratively by staff from multiple research infrastructures as part of the **''Accelerating Innovation''** work package, the guide consolidates best practices for public-private collaboration in biomedical science, reflecting a wide range of insights gathered since CORBEL's inception in 2015. The guide encapsulates learnings from diverse models of industry collaboration, including both pre-competitive and competitive approaches, applied to SMEs and large pharmaceutical companies. It addresses scientific, commercial, and legal considerations, alongside essential interpersonal aspects such as networking, communication, negotiation, and trust-building. In addition, the guide incorporates findings from a workshop held in Ljubljana in December 2018, which included lectures on various aspects of collaboration and an innovative exercise focused on establishing public-private research partnerships. While the guide does not aim to provide exhaustive coverage of every topic, it strives to serve as a comprehensive resource, offering references for further assistance and insights for practitioners in the field. Its authors aim for it to remain a valuable, sustainable product even beyond CORBEL's conclusion.
The project output can be browsed not only through the guide but also via the CORBEL Innovation Helpdesk[7], which aims to assist the European Biological and Medical Research Infrastructures with collaboration with industry and technology transfer. The helpdesk provides access to guidelines, templates, access to specialist knowledge, and FAQs. The Corbel Innovation Helpdesk provides guidance on key considerations for establishing collaborations. While not an exhaustive resource, it aims to introduce the broader context and highlight the essential aspects that need attention. Additionally, it points to several valuable information sources, including templates and tools for Material Transfer Agreements, Confidentiality Agreements, and Collaboration Agreements, which can be consulted for further support.

2.5 Codex4SMEs

Codex4SMEs, an *Interreg NWE*-funded project coordinated by BioRegio STERN Management GmbH, **aimed to address critical challenges faced by SMEs in developing Companion Diagnostics (Cdx)**. The project started in 2017 and in 2021 moved into the Capitalisation Phase with a new set of funding for the Fast Track Programme to create a transnational network supporting SMEs in overcoming the high time and cost barriers associated with Cdx development, alongside the stringent IVD regulations introduced in 2022.

[6] https://zenodo.org/records/2615365
[7] https://www.corbel-project.eu/innovation-helpdesk.html

With the goal of advancing healthcare through the enhanced adoption of personalized medicine in North-West Europe, Codex4SMEs brought together 11 partners from seven countries, pooling their expertise to expedite Cdx development for SMEs. This collaborative effort not only boosted SMEs' innovative capacity but also strengthened their global competitiveness. To further support SMEs, Codex4SMEs refined its support scheme into a Fast-Track Programme to accelerate the time-to-market for novel diagnostic solutions. This expanded focus included general diagnostics, with an emphasis on addressing urgent needs such as COVID-19 diagnostics. **A broad range of services was made available to SMEs**, enabling them to enhance their innovative capabilities and scale their operations. These offerings included:

- Sample Access Service
- Biomarker Validation
- Knowledge Transfer Services on biomarker and biobanking
- Access to an ecosystem of 11 transnational partners
- Business Model and Expert Access Services to support growth and scaling
- Tailored Support based on the product's Technology Readiness Level (TRL)

The efficacy of personalized medicine depends heavily on understanding disease mechanisms at the molecular level. Companion Diagnostics play a crucial role in mapping these mechanisms and improving precision treatment outcomes. Despite their wide applicability, Cdx tools have historically been costly and time-intensive to develop, limiting their use to a few treatments. Codex4SMEs addressed these challenges by streamlining development processes and providing SMEs with access to critical resources, tools, and expertise.
EATRIS offered tailor-made support services in various aspects of diagnostic (Dx) product development through a newly established Fast-Track Programme. This included COVID-19 research services, such as access to biosamples and bioreagents, testing of technology platforms and diagnostic assays, and support for initiating clinical trials. These services were prioritized for SMEs working in the field of COVID-19 but were also available to other areas of diagnostic development.
The services provided included:

- **Partner Search (Matchmaking):** Identifying the best academic collaborators with the right scientific and medical expertise within the EATRIS network of over 114 institutions to meet the specific needs of SMEs.
- **Translational Assessment:** Evaluating the translational pathway and feasibility of projects based on criteria such as unmet medical need, intellectual property, and regulatory pathway.
- **Full Regulatory Assessment and Scientific Advice:** Offering comprehensive guidance to ensure projects aligned with regulatory requirements and standards.

This initiative enabled **SMEs to accelerate the development of their diagnostic products while addressing critical challenges in translational research and regulatory compliance**.
Over the course of the project, EATRIS delivered on 18 service requests including research services, regulatory support, and translational assessments. This effort involved active collaboration with over 15 diagnostics SMEs across the EU, highlighting the project's significant impact and the pivotal role of Research Infrastructures in supporting SMEs within the diagnostic landscape.

2.6 ESS Procurement Rules

European Spallation Source ERIC has procurement rules that, taking into regard the EU rules and regulations for procurement, has made a more elaborated policy to involve industry in a new way upstream.
ESS is to secure the best mix of quality, effectiveness and price over the whole life cycle of goods, works or services purchased. Where possible, the needs should be stated as outcomes as early as possible in a non-prescriptive way to maximize the opportunities for innovators and suppliers to present their solutions. The possibility to invite suppliers early

in the procurement process shall be sought to try and realize the full potential of new ideas. Sustainability is not only a value for the whole organization of ESS, this is also a vital part of the procurement process to achieve reduced environmental impact throughout the life cycle. This may include reduction of greenhouse gas emissions and air pollutants, improved energy and water efficiency, use of renewable resources, reduced hazardous waste and support for recycling.

Another important aspect is to include and promote decent work, social inclusion, employment opportunities, ethical trade and gender equality, provided these are linked to the matter at hand. The goal is to in a sustainable context find ways of finding innovations whatever area is procured.

The way of keeping the infrastructure excellent is to see that not only the machine is excellent or the instruments, the whole organization needs to mirror this. To see many of the suppliers more as partners is an important perspective. Collaboration is what is needed to find the best goods and services to meet future challenges and this means that it is more of building partnerships than looking upon procurement as a traditional supply. The rules are still important to be open and transparent, not to invite corrupt ways of supplying, but the openness is also making longer collaborations possible with an open invitation for others to be included.

3. Strategic recommendations

This section includes strategic recommendations that the RIs can adopt to enhance their opportunities for engagement with industry and non-academic partners.

3.1. Establish a Pan-European ICO/ILO Network

One of the fundamental strategies defined in ENRIITC is to establish a pan-European network of Industry Contact Officers (ICOs) and Industry Liaison Officers (ILOs). This network is designed to provide a robust support system for RIs in their industrial engagements. The core activity of this network, envisioned as a central hub, is to share best practices, provide advice, and foster collaboration across Europe. By drawing upon existing experiences and knowledge, the network aims to build a strong foundation for RIs to improve their industrial interactions over time.
To effectively engage with the private sector, RIs need to adopt a set of core competencies for ICOs. These competencies are essential for the officers to perform their roles effectively, which include communicating and negotiating with industrial partners, managing conflicts, making decisions, and supervising projects. The training path for ICOs should include courses that enhance their expertise in dealing with the evolving landscape of industry engagement.
The suggested competencies to be developed are categorized into soft skills, such as communication and negotiation, and hard skills, including project management, data management, and business management. Regular training and updates in these areas are necessary to ensure that ICOs can meet the dynamic demands of industry collaboration, thereby enhancing the overall effectiveness of the RI in its interactions with the private sector. To have a complete view of the skills to be developed by the officer, have a look at the ENRIITC Deliverable 3.3 on the following page https://enriitc.eu/project/deliverables/.

The network serves as a platform where ICOs and ILOs can exchange knowledge, discuss challenges, and seek guidance on specific cases involving industrial partnerships. It also facilitates the development of strategic alliances at a European level, ensuring that RIs are recognized and understood by potential industrial partners. This collaborative approach helps lower barriers to entry and fosters a more seamless interaction between RIs and industry.
At the moment, the network is not yet operative, but it is advisable for the EU RIs to establish a hub-and-spoke network to support the building of relationships with the private sector. In the sector of the environmental RIs (ENVRI), a first example of this hub could be identified with the ENVRI Digital Innovation Hub (DIH), which is the final object of the HE

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project ENVRINNOV[8]. However, the involvement of the ILOs is not planned in the ENVRINNOV project, but this is something that could be introduced in the second phase.

3.2. Foster Strategic Industry Partnerships and Engagement

Strategic partnerships are essential for RIs to align their capabilities with industry needs. It is of great importance to establish long-term, mutually beneficial relationships with industry players based on clear communication of the value propositions offered by RIs, such as access to unique data sets, cutting-edge technology, and research expertise.
To facilitate these partnerships, RIs should consider the following best practices:

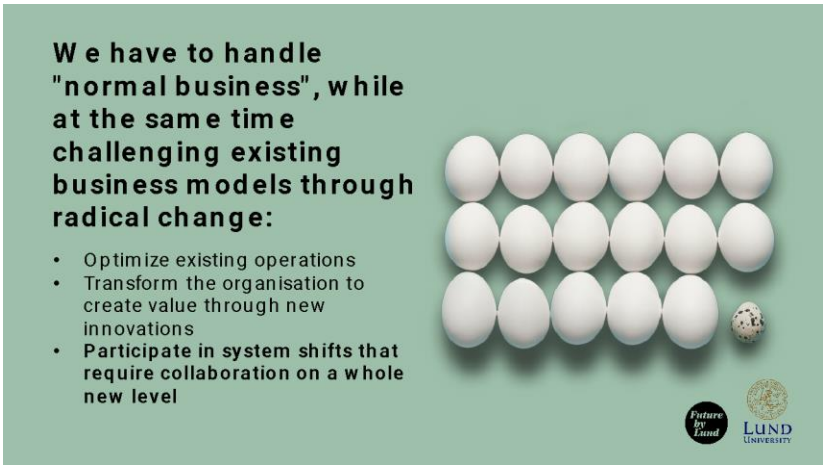
- **Industry Contact Officers (ICOs)**: appoint dedicated ICOs who are responsible for managing and nurturing industry relationships. These officers should have a strong understanding of both the RI's capabilities and the industry's needs, enabling them to act as effective intermediaries.
- **Advisory Committees**: establish Industry Advisory Committees (IACs) to provide regular feedback and guidance on how RIs can better serve industry needs. These committees can also help identify emerging opportunities for collaboration.
- **Tailored Communication**: develop marketing materials and communication strategies that clearly articulate the benefits of collaboration from the industry's perspective. This could include case studies, testimonials, and success stories that demonstrate the tangible value of partnering with RIs.

3.2.1 Innovation Ecosystem Model from Sweden

The third generation of innovation policy on addressing societal challenges requires collaborative engagement and action across a broad base of stakeholders over time to contribute to ambitious missions and transform societal systems. Here the ERICs have a natural role. The strategic governance of such collaborative work in innovation ecosystems requires a collective vision and direction, a shared view of what to do and a way to track progress – to show how various actions contribute to advancing overall aims. Current approaches to monitoring and evaluation are focused on measuring results for specific actors or projects. There is limited experience and few methods used to track progress and guide forward-looking actions for multi-stakeholder environments that undertake a variety of collaborative actions.

The Commission is also raising the question regarding the industry's involvement and use of research infrastructures in connection with the Green Deal and EU's competitiveness and innovation capacity for advanced materials. The report on Advanced Materials for Industrial Leadership states that the private investments are not commensurate with increasing needs and there is a disconnect between innovative research and uptake in industrial applications. These are only some of the points raised in the report.

[8] https://envri.eu/envrinnov/



An open culture is an inherent part of innovation ecosystems which are formed with the very purpose of encouraging collaboration, knowledge sharing and cooperation among systems stakeholders (Chesbrough, 2003). On the other hand, the framework of an innovation ecosystem can serve as a context for understanding how open culture can produce innovation that benefits organizations connected within a certain environment (Moore, 1996; Adner, 2017; Munigala et al., 2018).

In complex areas of innovation and development, growth emerges from interactions across many actors in an ecosystem. To track and learn from these processes – using the information to inform strategic decisions and forward-looking investments, Future by Lund and Lund University have developed a model for tracking portfolios of innovation activities in ecosystems. The LIEPT model leverages existing models and practices to map innovation activities over different development zones, to track the accumulated investments and milestones from innovation projects and activities across organisations, and to visualise data on these project portfolios to show the strength and collective impact of the ecosystem. LIEPT is comprised of four sub-components that are seen as steps or filters that are applied in portfolio management processes (see Figure 2 below)

Working with this model demands a few preparatory steps. First, analyse if LIEPT is relevant for you. There is a checklist to do this available. Then there is a need to set the ecosystem scope and perspective for portfolio tracking. The scope or boundaries of the ecosystem involve both where the coalition of actors is located and what is the focus or driving force for the collaborative actions. Within the scope, the next step is to determine what assets are needed and mobilized, and then finally, what KPIs would be most relevant.

ERIC Forum 2 has received funding from the Horizon Europe research and innovation programme under grant agreement N. 101124559.

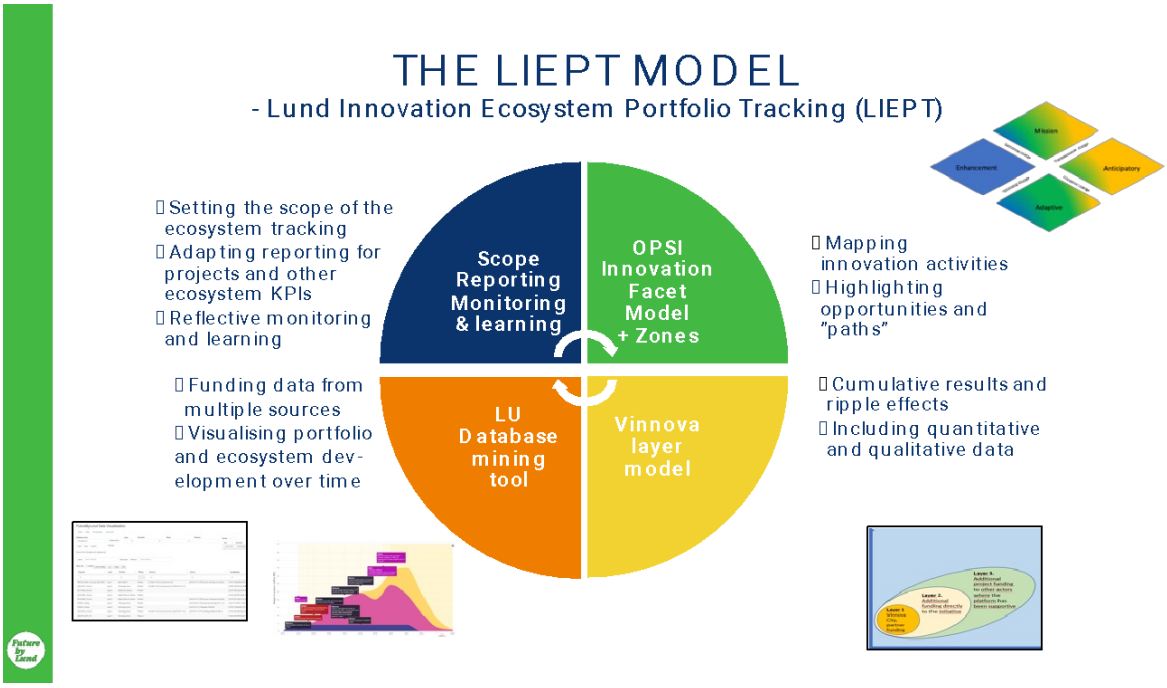


Figure 3 - The LIEPT Model (Lund Innovation Ecosystem Portfolio Tracking Model)

Innovation policies with the aim to address societal challenges and missions will require collaborative engagement across diverse groups of stakeholders, collaborative action across a diverse set of policy areas and innovation portfolios and collaborative investments. Such complex systemic action is often implemented in place-based experiments, with coalitions of actors developing and testing solutions in smaller-scale, systematic environments, scaling up successful solutions over time. The resulting LIEPT model provides a systematic approach for initiating and tracking collaborative development processes over time and for informing investment decisions in multi-stakeholder environments. The aim is that LIEPT can be developed and used as a tool for reflexive monitoring and strategic decision-making and in that way strengthen governance practices in place-based innovation ecosystems.

3.4. Review and Implement Specific Key Actions

Each RI might undertake a thorough review of its current practices and implement specific key actions aimed at improving collaboration with the private sector through a GAP analysis. The ENRIITC project outlines 17 key areas with recommended actions, categorized into four groups: **engagement with the innovation ecosystem, fostering strategic alliances, enhancing operational efficiency, and building a culture of continuous improvement.**
Implementing these actions involves adopting systematic innovation-partnering and industry-liaison programs, which are essential for developing long-term and fruitful relationships with the industry. Additionally, RIs should focus on creating environments conducive to open innovation, where knowledge is freely circulated, and cross-border cooperation is encouraged. This approach not only enhances the RI's innovation potential but also positions it as a pivotal player in the European innovation eco system.

3.5. Building Strategic Alliance Relationships

Building strategic alliances is critical for RIs to position themselves effectively within the industrial landscape. These alliances should be pursued at multiple levels—local, national, and European. At the European level, RIs should leverage

the supporting network or hubs (the ENVRINNOV DIH in the case of the ENVRIs) to build partnerships that enhance their visibility and credibility with industrial stakeholders.
Strategic alliances are also vital for ensuring that the operational models of RIs are recognized and understood by the industry. By fostering these relationships, RIs can lower the barriers to collaboration and create more opportunities for joint ventures, co-innovation, and technology transfer. Moreover, these alliances can help RIs stay aligned with the latest market trends and innovation practices, ensuring their long-term sustainability and relevance.

3.6. Develop a European RI Innovation Strategy

A comprehensive European RI Innovation Strategy is necessary to integrate RIs more effectively with the industry, specifically with an alignment of the goals with the needs of the private sector and the market. This strategy should outline the ambitions and objectives for a deeper collaboration between RIs and the private sector. Key objectives may include enabling RIs to act as core engines of innovation, facilitating the creation of spin-offs and start-ups, and fostering partnerships with private entities and universities.
The strategy should also promote systematic knowledge exchanges between RIs and industry, which is essential for creating new markets and adding value to research outcomes. Additionally, the strategy should emphasize the importance of training and career development within RIs, ensuring they continue to serve as high-quality pipelines for future research and industry leaders.
It is then advisable that the ERICs find a path towards a common innovation strategy beneficial for all and that can share resources and knowledge to support the daily activities in particular of the newcomers.

4. Guidelines for strategic engagement with industry

To foster productive collaborations between RIs and the industry, it is essential to establish a strong foundation that facilitates engagement and innovation. This section outlines the key components necessary for preparing the RIs to interact with potential industry partners effectively. By focusing on organisation structure, advisory mechanisms, and communication tools, as well as actively engaging with the broader innovation ecosystem, RIs can create an environment conducive to collaboration.
A good starting point for establishing the fundamental pillars of effective industry collaboration is the survey conducted in the ENRIITC Project. This survey revealed that 64% of RIs have a strategy for industry engagement, while only 35% have an industry advisory board or a similar entity. Both of these components are essential for efficient collaboration with the industry.
Even if an RI lacks a formal strategy, valuable knowledge and experience often reside with employees who work directly with the industry. Management should first appoint a primary person responsible for developing this strategy—typically someone from management, procurement, or an Industry Contact Officer (ICO), if available. The process aims to gather various pieces of information and articulate the RI's ambitions in this area.
Key considerations for formulating an RI strategy for industry engagement include:

1. **Understanding Industry Interest:** The strategy should be based on understanding the primary interests of the industry, whether they are suppliers, users, co-developers, or tech-transfer partners.
2. **Relevant KPIs:** The strategy should include relevant Key Performance Indicators (KPIs), such as recorded revenues from industry collaborations or the number of industrial users, to monitor progress.
3. **Mutual Benefits:** Clearly outline the benefits for the RI and the companies (and other stakeholders).
4. **Owner or Member State Requirements:** Consider any specific requirements from RI owners or member states, such as geographical distribution of companies, international collaborations, focus on SMEs, or support for the Green Deal.
5. **Alignment with Resources:** Ensure that the number of processes and bureaucratic steps are aligned with the available resources for implementing the strategy.

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Identifying internal stakeholders relevant to the strategy's execution involves answering questions like:

- Who should contribute to the strategy?
- Who approves and "owns" the strategy?
- What is the follow-up process for the strategy?
- How are nodes engaged (in the case of distributed facilities)?

It's essential to recognize that a strategy for industry engagement cannot solely rely on an inside-out approach, focusing only on the RI's strengths and offerings. We recommend that the strategy be "pressure tested" with relevant companies—whether they are suppliers, users, or collaborators—and through ILO networks. Finally, the strategy should be discussed and potentially revised at least once a year to ensure it remains effective and aligned with current industry needs and trends.

4.1 Supporting an innovation culture

4.1.1 Internal organisation of the RI

Engaging with industry is beneficial from political, economic, and societal standpoints. For Research Infrastructures (RIs) with significant procurement activities, it is essential to establish a dedicated procurement group to ensure compliance with public procurement rules. However, distributed RIs may opt to outsource this function to their nodes or parent entities, such as universities.
When it comes to industrial usage and technology transfer, interactions between RIs and companies often do not generate profit and may not even recoup the resources invested by the RIs. Consequently, engaging with industry requires careful prioritization of resources, influencing both management decisions and operational processes.
Transparency with all internal stakeholders is crucial to avoid frustrations and confusion regarding priorities. A key decision is whether to employ a full-time Industry Contact Officer (ICO) and clearly define their job functions, such as:

- What are the expectations for industry contact and engagement?
- What are the expectations for revenue streams?
- Is it expected that the ICO will secure EC projects?
- Will the ICO have a political role in representing the RI to the EC, national governments, and other stakeholders?

Hiring a communications officer or incorporating industry and innovation communications into an existing role can help disseminate information about the RI's industry engagements and market these opportunities to new companies. Ideally, the communications officer should have experience in the private sector. Part of the communication strategy should include operating an industry landing webpage, providing companies with:

- General information tailored to their perspective,
- Promotion of successful past industry collaborations,
- A catalogue of services and collaboration models, including IPR models.

Further organizational details can be found in ENRIITC report D3.1, "Strategy to exploit the innovation potential of RIs". The Key Performance Indicators (KPIs) of ICOs are discussed in ENRIITC D3.5, "Policy recommendations for the optimisation of ILO/ICO performance".

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4.1.2 Forming an Industry Advisory Board

An advisory board with industrial representation is an excellent platform for testing ideas and initiatives before the RI invests significant resources or for refining current methods of industry interaction. Feedback can be gathered ad-hoc from individual companies, through events, or via collaboration with project consortia. Utilizing intermediaries, such as industry associations or ILO networks, is advisable as they can represent multiple companies and have a deep understanding of the industrial mindset.

We recommend **forming an advisory board** that includes representatives from companies and other stakeholders within the innovation ecosystem. According to the ENRIITC ICO survey, only 35% of RIs currently have an advisory board with industry representation.
While this approach presents **challenges**, such as motivating industry representatives to participate, it was noted in ENRIITC stakeholder meetings that post-COVID-19 remote working trends have made it easier to convene individuals from different companies and regions for online sessions. During these meetings, RIs can present their ideas, ambitions, and KPIs, and seek feedback on new or existing initiatives, allowing the board to offer recommendations and insights.

Long-term collaboration with industry - the Euro-BioImaging Industry Board
In 2014, prior to the implementation of the ERIC five years later, Euro-BioImaging set up an Industry Board (EBIB as a platform for cross-collaboration with the industry. By publishing a joint white paper, the industry demonstrated its commitment to supporting a common European infrastructure for imaging.

Since the launch of Euro-BioImaging in 2019, EBIB members now have facilitated access to international imaging communities, including technology developers and providers, as well as to the latest trends in imaging-associated research and information on imaging-related opportunities such as for public-private collaborations to drive innovation. In return, Euro-BioImaging facilities can exchange freely with representatives from the industry on challenges in facility operation, training and marketing of service with industry and identify partners for activities such as workshops, training courses, as well as on technological developments.

In May 2020, the EBIB Advisory Panel was set up as an additional instrument to advise the Euro-BioImaging Directorate on strategic questions, in particular regarding access provision to new imaging technologies and the development of new training activities. The Euro-BioImaging community, which includes users, facility staff, and academic technology developers, greatly values the long-term, trust-based relationships that develop through shared activities and exchanges. This appreciation is also shared by representatives and staff from instrument and tool manufacturers.

4.1.3 Valorisation of the research results

Several Research Infrastructures (RIs) have achieved significant impact by enabling the creation of spin-out start-ups based on the knowledge or technology developed within the RI. These spin-outs have become global players, generating substantial benefits beyond the RI host region. Notable examples include Swiss Neutronics[9] (a PSI spin-off), Dectris[10] (licensed by PSI), Leosphere[11] (LSCE), Soltecture[12] (Helmholtz-Zentrum Berlin), Electrospinning Company (RAL), Novitom[13]

[9] https://www.swissneutronics.ch/
[10] https://www.dectris.com/en/
[11] https://www.vaisala.com/en/press-releases/2020-06/leosphere-vaisala-company-launches-wind-industrys-longest-range-turbine-mounted-lidar-windcuber-nacelle
[12] https://www.soltecture.de/
[13] http://www.novitom.com/en/

(ESRF), Kyma[14] (Elettra), and Instrumentation Technologies (Elettra, Jefferson Lab & PSI). Typically, 90% of the revenue for these companies comes from international sales.

Another example comes from SSH cluster, e.g:

The Centre for Language and Speech Technology at Radboud University[15] is committed to the development of language and speech technology (LST) in an innovative way. The researchers are experts in research, application development and consultancy. They carry out projects for national and international collaborations and on assignment for commercial parties. The centre develops LST for applications assisting in second language learning and reading skills (literacy training) with expertise in pronunciation, morphology, syntax, and vocabulary. For this, the centre launched a spinoff[16] and collaborated with a Dutch publisher (Zwijsen) for educational materials. Their reading method for primary schools, "Veilig leren lezen" is one of the most popular in Dutch education, for which the centre developed supporting speech recognition software for young children[17].

Moreover, these spin-offs continue to engage with their respective RIs, thereby enhancing strategic R&D partnerships and facilitating international knowledge exchange and spill-overs between industry and the RIs. There is potential for further exploration and discussion of these successes with other stakeholders, such as universities, technology brokers, and venture capitalists.

4.2 Engaging with the innovation eco system

4.2.1 Identifying stakeholders and methods of engagement

When engaging with industry, it is essential for a Research Infrastructure (RI) to recognize the various stakeholders within the surrounding innovation ecosystem and to understand the role it should adopt. Before initiating contact with these stakeholders, RIs are advised to follow the Innovation Preparedness Roadmap (as outlined in ENRIITC D3.1) and develop an initial strategy (item 1.1). This preparation allows the RI to clearly define its strategic directions when interacting with stakeholders.

According to insights from the “European Association of National Research Facilities Open to International Access”[18] and the ERF Workshop on “The Socio-Economic Relevance of Research Infrastructures”[19] (2012.06.01) by Regina Rochow, Elettra, many research infrastructures, especially large-scale facilities, serve as central elements within research and innovation campuses. These campuses often include RIs, universities, Research and Technology Organizations (RTOs), Technology and Research Institutes (TRIs), and industries, ranging from large enterprises to small start-ups and incubators. The composition of these campuses is shaped by local characteristics, priorities, and opportunities, which together foster pathways for RIs to connect with industry. While these pathways may focus on local ecosystems, many campuses achieve national and international prominence, particularly when they are well-branded and recognized as integrated entities. Examples of such campuses include the Grenoble Innovation Campus "GIANT"[20] (featuring the international ESRF and ILL

[14] https://kyma-undulators.com/?lang=en
[15] https://www.ru.nl/en/cls/clst
[16] https://www.novo-learning.com/
[17] https://www.ru.nl/en/research/research-projects/dart-dutch-automatic-reading-tutor
[18] https://erf-aisbl.eu/
[19] https://erf-aisbl.eu/wp-content/uploads/20120626-4th-ERF-workshop-Short-report.pdf
[20] https://www.giant-grenoble.org/

RIs), the Harwell campus[21] near Oxford (home to the national DLS and ISIS RIs), and the Saclay Campus[22] near Paris (including the national SOLEIL RI).

4.2.2 Industry clusters and associations

Most companies are part of some form of local network or organization, which often serve as key intermediaries, particularly when engaging with SMEs. These clusters can provide a Research Infrastructure (RI) with valuable insights into their members and activities, enhancing the RI's outreach in several ways:

- Tailoring the RI's offerings to meet industry needs better.
- Identifying relevant companies that are open to innovative approaches aligned with the RI's field.
- Providing established outreach infrastructure (e.g., newsletters, events) that can achieve broader reach than the RI alone.

Clusters operate differently depending on their funding sources, which also influences their focus and methods. Typically, clusters involve some level of innovation or technology scouting for their member companies. The two primary funding models are public or membership-based, with various hybrids in between. Here are some common attributes of clusters, along with recommendations for how an RI should engage with them:

- **Member-financed clusters**: These clusters are highly focused on the immediate needs and requests of their members. Innovation may not be a primary focus, and if the RI's offerings are perceived as too academic, interest may quickly wane. However, these clusters are excellent advocates for their members and will critically assess the value the RI can provide. This feedback is valuable for the RI to learn which aspects of its offerings resonate most with companies in the cluster.
- **Publicly financed clusters**: These clusters receive funding from national or regional grants, often with a strong emphasis on innovation. They are typically required to host events showcasing new technology to their members and are generally eager to co-host events with RIs. They are also usually open to partnerships for innovation grants.

Clusters can also be oriented towards technology or market focus, which affects how an RI should engage with them:

- **Technology clusters**: These clusters are often driven by technical experts from the companies involved, with minimal or no formal funding, sometimes supported by modest contributions to a paid secretary. They seek high levels of innovation and are generally very interested in RI activities that align with their technology focus. For instance, the UK Magnetic Society, which operates with a small staff and is funded by memberships and sponsorships, exemplifies this type. Engaging a board member from such a cluster can be an effective way to start collaboration.
- **Market-targeted clusters**: Companies join these clusters to network with suppliers/customers and stay informed about the latest market and technology developments. These clusters may also have political or lobbying elements, and some may operate internationally, advocating for industry interests at the EU level. Finding the right contact person for innovation can be challenging due to the broad scope of cluster activities, which may include legal and regulatory work. However, these clusters have deep knowledge of market needs and future trends, making them valuable partners for an RI. Examples include Wind Denmark, primarily funded by memberships and event income, and Hydrogen Europe, an international network funded by company fees and European grants.

[21] https://www.harwellcampus.com/
[22] https://welcometoparissaclay.com/fr/

Understanding the type of cluster and its potential benefits from collaboration is crucial before approaching them, ensuring that both the cluster and its members can gain from the partnership.

4.2.3 RTOs and Technological Infrastructures

Europe hosts approximately **350 Research and Technology Organisations (RTOs)** that bridge the gap between academia and industry. These RTOs vary widely; some sustain themselves primarily through commercial activities like testing, certification, and consultancy for companies or public institutions, while others focus on R&D supported by public or regional funding. Many combine both approaches. Notable examples include Fraunhofer (Germany), TNO (Netherlands), RISE (Sweden) and VTT (Finland). Numerous RTOs are members of the EARTO network, which advocates for RTOs at the European level. The term "Technological Infrastructures" has recently been introduced to describe the lab and testing facilities used by companies, typically located within RTOs.
When a company needs analysis, measurement, or expertise, it often turns first to a local RTO. This positions RTOs as valuable multipliers for Research Infrastructures (RIs), enabling them to reach multiple companies either through referrals or by collaborating with RTOs that use RI capabilities to provide services to companies. For instance, RTOs like DTI (Denmark) and RISE (Sweden) offer measurement and analysis services to companies using synchrotron beamlines. Additionally, some national RIs, such as the synchrotron SOLEIL located near CEA in Saclay, France, maintain close relationships with national RTOs.

For an RI, it is essential to identify:

- Which European RTOs are active in the RI's technical field?
- Which European RTOs operate within the industrial sectors relevant to the RI?
- Are there relevant RTOs located near the RI?

It is advisable for the RI to establish relationships with a few relevant RTOs where at least one of these questions is answered affirmatively. This could be achieved by co-hosting events, signing a **Memorandum of Understanding (MoU)**, or offering positions on advisory boards. It is also crucial to ensure that both the RTO and the RI gain tangible benefits from the partnership, as the collaboration will only be sustainable if both parties recognize and derive value from it.

4.2.4 Universities

Most Research Infrastructures (RIs) maintain close connections with university researchers who use the RI for their scientific studies. These relationships can be leveraged to enhance collaboration between the RI and industry. The RI can **engage these researchers** to identify who is already working with companies, using this connection to gain insights into the industrial relevance and depth of these collaborations. This can lead to the **development of case studies** that demonstrate the **societal impact of the RI**, potentially inspiring other companies to collaborate with the university or the RI. It is also sometimes necessary to build collaborations between university and industry to be able to achieve the **competence** to use the advanced technology offered by the RI. Often the competence to use is held by university researchers but the challenge to be solved is owned by the industry. All three are often needed to get the desired result.
The RI should explore these collaborations in terms of both **usage** and **co-development**. In the case of co-development, the potential for industry collaboration might not be immediately apparent to university researchers, who are often focused solely on their research and may overlook the innovation potential, such as in instrument development. Therefore, the **building of triple consortia** is important and needs to be part of the **RI's industrial strategy**. One example is the pilot developed by ESS together with two universities and two companies defining scope and increased competence to use the technology and instruments offered by the RI.

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Universities also play a critical role in **training students for careers in industry**, where the RI can be a valuable partner by offering opportunities to work in a leading scientific environment. If the RI prioritizes this pathway, it should negotiate Memorandums of Understanding (MoUs) or agreements with universities and promote these partnerships to relevant companies. An example of this approach is the InnovaXN program[23] offered by the RIs ESRF and ILL, where the RIs collaborate with a university and a company to offer PhD programs. Another example is the SWEDNESS[24] program in Sweden, which is run as a PhD program to use neutrons in collaboration with ESS and several Swedish universities. Extending this kind of initiative to industry PhD programs is also an alternative.

Another example comes from the SSH cluster, where a joint DARIAH and CLARIN Working Group monitors emerging job profiles in the industry to help DH programme coordinators enhance their curricula and identify efficient strategies for collaborating with non-academic organisations and private companies to increase the employability prospects of Digital Humanities graduates. In this context, the RIs act as a bridge between the academic programmes and the non-academic sector.

4.3 Case Study - EATRIS

This section concludes with a case study showing how the **European Infrastructure for Translational Medicine (EATRIS)** developed and implemented a successful strategy for engaging with the industry by offering a broad range of specialized services. The case study demonstrates that various types of relationships are possible, ranging from single-site, single-study contract research—which respects the academic right to publish—to long-term, multi-site partnerships with a rolling portfolio.
The European Infrastructure for Translational Medicine (EATRIS) unites resources and expertise from over 155 leading academic medical centres and research institutions across Europe to advance scientific discoveries into patient benefits. EATRIS focuses on optimizing preclinical and early clinical development of drugs, vaccines, and diagnostics, while addressing barriers to health innovation. It provides diverse research services for academia and industry and collaborates with public funders, charities, and policymakers to enhance the translational research ecosystem.
EATRIS initially faced challenges in engaging industry partners due to:

- A lack of awareness about its capabilities and services within the industry.
- Scepticism from industry partners about the feasibility of collaborating with academic institutions.
- Limited frameworks for handling intellectual property (IP), confidentiality, and contract negotiations.
- The slower pace of academic processes compared to those in the private sector
- Insufficient alignment of academic offerings with the needs and expectations of industry stakeholders.

EATRIS conducted extensive consultations with industry representatives and academic stakeholders to identify gaps in the translational research process. This analysis revealed the demand for:

- Streamlined access to scientific expertise and state-of-the-art technologies.
- Support in regulatory processes and health technology assessments.
- Flexible collaboration models that address the diverse needs of industry partners.

Following this analysis, EATRIS specialized into managing public private partnerships by acting as a single point of contact for industry partners; offering legal and administrative support for project negotiations; monitoring ongoing projects to ensure successful collaboration. In parallel, EATRIS developed a comprehensive service portfolio to address industry needs and enhance public-private collaborations:

[23] https://www.innovaxn.eu/
[24] https://www.swedness.se/w/sw

- **Fee-for-service research services**: Direct access to biomedical research capabilities and technologies.
- **Consortium building for joint fundraising**: Facilitating partnerships to access public and private funding opportunities.
- **Expert support services**: Providing high-value advice on regulatory requirements, translational assessments, and intellectual property.

The specific services offered include:

1. Fostering Industry-Academia Collaborations

To facilitate academic collaborations with industry, EATRIS offers research services tailored to biotech SMEs and pharmaceutical companies[25]. These include:

- Identifying scientific and medical expertise within EATRIS' 150+ biomedical research institutes.
- Providing access to advanced technologies and core facilities through specialized platforms.
- Acting as a single point of contact, offering legal support, and negotiating agreements.
- Monitoring project execution to ensure smooth collaboration.

2. Innovative Training Workshop and Curriculum

EATRIS organizes an annual two-day workshop, "Best Practices in Public-Private Collaboration"[26], which:

- Provides hands-on skills and theoretical knowledge for effective academic-industry partnerships.
- Targets researchers, early-career scientists, and academic staff such as technology transfer officers.
- Focuses on the life sciences domain to develop cross-trained teams with strong industrial collaboration skills.

3. Innovation Services

- **Exploitation and sustainability:** To identify key exploitable results and intellectual property (IP) protection required for the advancement of the project along the Research and Development path and prioritization of outputs to be transferred in translational medicine processes towards the development of novel products and services and opportunity to reaching the market, according to the following criteria: intellectual property, market analysis, unmet need verification, regulatory feasibility and likelihood to have the product reimbursed in standard of care.
- **Translational Assessment**: The Translational Assessment is a unique service in Europe. With this service, EATRIS assesses the translational feasibility of projects based on various elements such as the unmet medical need, the intellectual property at play, the regulatory context, and the end-product definition. This service is paid by funders and provided to researchers applying to a particular funding call.
- **Mentoring**: Mentoring is a new service complementary to the translational assessment. It was designed to offer expert guidance to Principal Investigators (PIs) during proposal development or project execution. This allows for tailored feedback at the most critical moments in proposal or project development.
- **Regulatory Support:** EATRIS offers early assessment of the regulatory requirements needed for successful translational projects. The regulatory experts working with EATRIS provide a range of services, including facilitating early dialogue with the European Medicines Agency (EMA) or National Competent Authorities (NCA), Orphan Drug Designation applications, Scientific Advice and more.

[25] https://eatris.eu/services/collaborationswithacademia/

[26] https://projects.research-and-innovation.ec.europa.eu/en/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/repository/eatriss-innovative-training-workshop-curriculum

- **(early) Health Technology Assessment:** Through the early Health Technology Assessment (HTA), a multidimensional analysis is performed to provide information on the 9 domains considered in a HTA analysis based on the data available at the actual stage of development of the technology. It allows to understand the main strengths and limits of the technology, and to address research activities on the topics and issues that lacks evidence.

4. Innovation Helpdesk

The EATRIS Innovation Helpdesk helps life science researchers access real-time legal support and partnering advice from the EATRIS community. Our Helpdesk service acts as an expertise centre that provides access to essential tools and resources for collaboration such as guidelines on intellectual property rights, open innovation and legal agreement templates.

5. Mentoring for Rare Disease Researchers

In collaboration with the European Joint Programme on Rare Diseases (EJP RD), EATRIS supports researchers by:

- Offering expertise in regulatory requirements, therapy development, and manufacturing.
- Reducing failure rates in advancing promising technologies and therapies towards clinical application.

6. EATRIS public-private innovation hub

In June 2018, EATRIS and GlaxoSmithKline (GSK) launched an innovation hub to develop innovative imaging methods for inflammatory diseases. This partnership aims to enhance drug development by optimizing existing imaging technologies like MRI and PET, and by translating emerging imaging probes into clinical settings. The initiative connects GSK's clinical imaging scientists with five leading European research institutes within the EATRIS network, facilitating efficient project execution through EATRIS's role as portfolio manager playing a key role in developing and administering the legal framework and operations, for optimal speed and efficiency. EATRIS facilitates initiation of both independent and collaborative transnational projects under a master framework, with up-front auditing and quality agreements.

Notably, the European Commission has selected the EATRIS public-private innovation hub[27] and the EATRIS's innovative training workshop & curriculum[28] as best practice examples to feature on the EU Knowledge Valorisation Platform[29].
As a result from these efforts, EATRIS has significantly increased its engagement with industry partners, establishing multiple collaborations and accelerating the translation of scientific discoveries into clinical applications, addressing unmet medical needs in areas such as rare diseases and precision medicine, and strengthening Europe's position as a global leader in translational research. The key lessons learned from EATRIS' approach include the importance of tailoring services to industry needs, building trust through flexible collaboration models, investing in capacity-building initiatives, demonstrating value through societal impact, and ensuring sustainability through clear strategies for IP management and regulatory support. EATRIS' strategic approach serves as a model for other research infrastructures seeking to enhance private-sector collaboration and drive innovation in their fields.

[27] https://ec.europa.eu/research-and-innovation/en/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/repository/eatris-public-private-innovation-hub
[28] https://ec.europa.eu/research-and-innovation/en/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/repository/eatriss-innovative-training-workshop-curriculum
[29] https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform_en

5. Operational recommendations

5.1. Develop a Catalogue of Services targeted at the private sector

One of the most relevant efforts within ENVRI-FAIR for the scope of this document has been put into the creation of a report on the recommendations for the **development of an RI catalogue of services designed specifically for private sector users**.[30] This catalogue, as detailed in the project's deliverables, provides a comprehensive listing of the services offered by the participating RIs, tailored to meet the needs of industry partners. The catalogue not only enhances visibility but also simplifies access to these services, thereby promoting the uptake of FAIR-compliant data and tools by the private sector.
The catalogue should be a dynamic, continuously updated resource that reflects the evolving capabilities and services of RIs. It is recommended that RIs actively participate in the maintenance and dissemination of this catalogue, ensuring it remains a relevant and useful tool for industry stakeholders. By providing detailed service descriptions, access modalities, and contact information, the catalogue serves as a bridge between RIs and potential industry collaborators.

5.2. Implement FAIR Data principles

The core point to enhance accessibility to the data and services offered by the RIs is to ensure that data and services provided by RIs adhere to FAIR principles. In order for the RIs to effectively engage with the private sector, they then must prioritize the implementation of these principles across all data services. This includes making data findable through standardized metadata, ensuring accessibility via open data platforms, promoting interoperability through shared standards, and encouraging reusability by providing clear licensing terms. The private sector, in turn, could work closely with the RIs to further develop these standards, facilitating easy data sharing and co-creating value for society. Best practices in this area include:

- **Centralized Data Portals**: create centralized data portals where all users, including industry, can easily search for and access relevant data sets. These portals should be user-friendly and provide tools for data visualization and analysis.
- **Interoperability standards**: adopt and promote industry-standard protocols for data interoperability, enabling seamless integration of RI data with industry systems.
- **Open access policies**: encourage open access to data wherever possible, balancing this with the need to protect intellectual property and commercial interests when necessary.

5.3. Enhance training and Knowledge Transfer initiatives

Training and knowledge transfer are critical components of effective RI-industry collaboration. The importance of providing training services that help industry partners leverage the data and tools available through Ris should not be underestimated. These training programs should be designed to meet the specific needs of industry professionals, focusing on practical applications and the integration of RI data into their workflows. Specific actions to clarify the value-added of the RIs' data for the industry should be undertaken.
Best practices include:

- **Custom Training Programs**: develop and offer customized training programs that address the specific needs of different industry sectors and/or companies. These programs can cover topics such as data management, environmental monitoring, and the use of specific RI tools, data and platforms.

[30] https://zenodo.org/records/6532029#.YpiF56hByUk

- **Workshops and webinars**: regularly organize workshops and webinars that bring together RI researchers and industry professionals. These events should focus on real-world applications of RI services and foster a collaborative learning environment. In-person events, in particular, are highly effective in creating fruitful relationships based on mutual trust.
- **Joint research projects**: encourage joint research projects that involve both RI staff and industry partners. These projects not only facilitate knowledge transfer but also strengthen the collaborative relationship between RIs and industry.

5.4. Develop and promote Innovation Services

RIs should position themselves as key players in the innovation ecosystem by offering services that support the development of new technologies, products, and services. This involves not only providing access to research data but also offering **consultancy services, prototyping facilities, testing services and collaborative innovation projects**.
Key actions include:

- **Innovation hubs**: establish innovation hubs within RIs that focus on co-creation and co-design with the industry. These hubs can provide the physical and intellectual resources necessary for developing new technologies and solutions.
- **Prototyping and testing services**: offer prototyping and testing services that allow industry partners to validate their innovations in a controlled environment. Such services can include access to specialized equipment, facilities, and expertise.
- **Intellectual Property (IP) support**: provide support for managing intellectual property issues, including copyright, patenting, licensing, and commercialization strategies. This helps ensure that both RIs and industry partners benefit from the outcomes of their collaboration.

5.5. Continuous improvement and feedback mechanisms

Finally, RIs should establish continuous improvement processes to refine their industry engagement strategies over time. It is recommended that RIs regularly collect feedback from industry partners to understand their evolving needs, satisfaction and expectations. This feedback should be used to update and improve the services offered, ensuring they remain relevant and valuable to the private sector. Best practices for continuous improvement include:

- **Regular surveys and assessments**: conduct regular surveys and assessments to gauge industry satisfaction with RI services. Use the results to identify areas for improvement and to adjust service offerings accordingly.
- **Performance metrics**: develop performance metrics to track the effectiveness of RI-industry collaborations. These metrics can include measures such as the number of industry partnerships, the volume of data accessed, and the outcomes of joint projects.
- **Iterative service development**: adopt an iterative approach to service development, where feedback is continuously incorporated into the design and delivery of services. This ensures that RIs remain agile and responsive to industry needs.

The recommendations outlined in this chapter provide a robust framework for RIs to prepare themselves for successful engagements with the private sector. The adoption of these best practices can significantly enhance the relationships with the industry not only facilitating more effective collaborations but also positioning RIs as integral players in the broader innovation ecosystem. In this sense, RIs must remain proactive in implementing these actions, ensuring that they continue to meet the needs of industry partners and contribute to the advancement of environmental research and innovation.

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Finally, these practices aim not only to improve the operational efficiency of RIs towards the industry but also to ensure they play a pivotal role in contributing to the broader European economy and society.
As a side note, the establishment of a pan-European network of ICOs and ILOs, like the ENRIITC Network, adopting essential competencies, reviewing and implementing key actions, building strategic alliances, and developing a comprehensive innovation strategy seems at the moment central for the progress in the relationships among RIs and the private sector on a large scale. RIs can prepare themselves to collaborate effectively with industry but there is widespread recognition for a European Central Hub able to support them in this endeavour, like the ENVRINNOV DIH, seems to be commonly recognised. Very often indeed, RIs do not have a budget for hiring an ICO or having an Industry Contact Office which brings to a lack of resources to actively cultivate relationships with the industry on a permanent basis.

CORBEL Industry Collaboration Best Practice Guide (zenodo.org)

5.6 Monitoring and Evaluation

Performance Metrics

The ERIC Forum has raised the question of using metrics and KPIs earlier and also done some work in the area. As government-funded organisations, the European Research Infrastructure Consortia (ERICs) have a moral, and in many cases also legal, obligation to report on their performance to relevant stakeholders, funding bodies, and the public.[31]

The ESFRI monitoring report for RIs[32] is one way of setting up metrics and KPIs to try and follow a standard and be able and compare between ERICS. It is important to try and follow some standard in setting up metrics and see what other actors in the same area are using.

Evaluation Techniques

How to systematically assess the work and see if it had any impact is done by using criteria governed by a set of standards. The criteria go back to what metrics and KPIs were used. The way of working with KPIs needs to be made free from letting the KPIs lead the result but the result leading the KPIs. It is very easy to let the tail wag the dog when working with these kinds of metrics especially if the load of different metrics become too many. The quality of data to build the material for the metrics is vital. The evaluation needs to scrutinize the programs critically but based on correct data. Each year the evaluation should lead to an assessment if any changes should be made to the way of working.

When doing the scientific evaluation this should cover the technology, methodology, quality of services, cost model, access procedures, scientific impact of supported projects, socio-economic impact, as well as the organization and its national nodes if distributed. The scientific evaluation is important to do parallel to the evaluation of innovation programs.

Reporting and Dissemination of Results

Reporting is very important and should follow the internal needs of each ERIC. The chosen metrics and KPIs are the basis on how to structure reporting. This might need to be adapted to different stakeholders that can make best use of the information and at the same time make it possible to make dissemination easy.

The results need to be shared and made available to relevant people and public to be able and show impact and benefit for society. Two main goals for sharing results are to increase the uptake of research and innovation in the EU and to demonstrate the impact of ERICs that are publicly funded. Dissemination helps to explain the wider relevance of collaboration and industry use of RI to ensure and build support for research and innovation funding in the future. There is lots of help and support in the EU system to guide, train and create strategies for both reporting and dissemination[33].

[31] https://www.eric-forum.eu/toolkit/impact-evaluation/key-performance-indicators-2/
[32] https://www.esfri.eu/sites/default/files/ESFRI_WG_Monitoring_Report.pdf
[33] https://research-and-innovation.ec.europa.eu/strategy/dissemination-and-exploitation-research-results_en

5.7 Additional References

Additional reading and references

Petzold, A., Hienola, A., Ewbank, J., Tedds, J., Lamanna, G., Bird, I., Gotz, A., Bodera, J., de Jong, F., & Wolff-Boenisch, B. (2024). Science Clusters: Position statement on operational commitment to EOSC and Open Research. Zenodo. https://doi.org/10.5281/zenodo.10732049

6. Outline of the Toolbox for Public-Private Collaboration in Research Infrastructures

6.1. Introduction

Purpose and objectives

This section provides a structured framework to enhance partnerships between Research Infrastructures (RIs) and the industrial sector. This toolbox serves as a practical guide, offering strategies and best practices to facilitate effective collaboration. In particular, this toolbox aims to:

- Establish a unified approach and actionable plan for RIs to actively engage in and bolster innovation collaborations with the industrial sector
- Expand access to environmental research and innovation for a broader audience, triple helix industry-academia-RI
- Find, develop and incorporate new technologies and solutions.

Importance of public-private collaboration in research infrastructure

Engaging with industry is crucial from political, economic and societal perspectives. ForRIs with significant procurement activities, it is essential to establish a dedicated procurement group to ensure compliance with public procurement rules. However, distributed RIs might choose to outsource this function to their nodes or parent entities, typically universities.

Regarding industrial usage and knowledge transfer, the interaction between RIs and companies often do not generate profit and may even fail to recover the resources invested by the RI. Therefore, industry engagement requires careful resource prioritization, which should be embedded in both management decisions and operational processes.

The ability of RIs to attract private sector users heavily depends on their efforts in disseminating and promoting their services. It is vital to make the offerings of RIs accessible and comprehensible not only to industry but also to non-traditional end-users. Building mutual awareness and understanding between RIs and the private sector is essential for successful collaboration.

Encouraging interaction and the exchange of ideas among different RIs is also beneficial, fostering a collaborative environment that can enhance innovation and shared learning.

6.2. Frameworks and Models

6.2.1 Types of collaborations

Crafting a **European Research and Knowledge Exchange Strategy** adapted for RIs. This will include an annual training plan and talent-attraction exchange model program between RI, industry and academia.

Own organization model – this is needed to develop and evolve the RI in a more traditional way via advanced procurement and innovation procurement. For some areas, this is the best and most efficient way of collaborating. One good example is the **knowledge transfer model that CERN**[34]**,** has developed.

The EATRIS public-private innovation hub - The best practice provides an example of a novel and multilateral collaborating model for academia and industry, which facilitates long-term public-private partnerships for the benefit of patients and citizens. Public-Private Innovation Hub is a long-term, academia industry alliance for research and development that facilitates multidisciplinary collaboration, development, validation, and implementation of new clinical and translational research tools. The model is flexible and can be tailored to its partners with the capacity to be implemented in a wider scope and different fields, not only in biomedical research.
Partnerships - Setting up a public-private program to create an environment and platforms for triple helix collaborations where industry is the driver and set the scene for focus and what challenges to solve. The consortia are set up according to interests and are most valid for specific projects already on a TRL scale above 5.

Multistakeholder – Open and exploring, testing and experimenting where the question to explore is challenging and unknown. The need for cross-disciplinary sectors is vital. In this case the **LIEPT model** can be used to develop collaborations with open innovation and include all kind of different stakeholders.

6.2.2 Benefits and challenges of each model

It all depends on what kind of system and needs that are relevant when choosing a model for innovation work. Is the ecosystem driven by research, business, entrepreneurs, public office or any other part of the economy/society decides what model is best. It can also be that you use different models for different phases in the innovation work. Therefore, the mapping and analysis of the innovation environment for the ERIC is important and vital. What is often found is that the collaboration very often is more complex and involves more actors than historically.

Therefore, each model needs to be scrutinized and analyzed carefully to understand what is needed. ERIC's are by way of collaborating infrastructures more into partnerships and multistakeholder models. Sometimes it is necessary to be able to give advice to different partners on what they need and therefore it is important to have this knowledge built-in to the structure in each ERIC.
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6.3. Legal and Regulatory Considerations

The Toolbox has mostly focused on different models and competences needed to develop collaborations with industry. There are of course many other aspects to consider setting up collaborations. One aspect that needs to be analyzed deeply and where special competence is needed to make the right decisions is legal and regulatory. Research Infrastructures need to navigate a range of legal and regulatory frameworks to ensure compliance, security, and ethical standards in their operations. These frameworks vary depending on the region, types of research conducted, and institutional policies. The area is big enough for its own report, in this part this is only a first try to list the most common and obvious areas to consider.

[34] https://kt.cern/

A notable area of focus is the increasing impact of artificial intelligence, which has introduced new legal considerations.

Below is an overview of the main legal and regulatory areas that RIs need to take into consideration. This is not an exhaustive list but it is an attempt to show the most common and to underline the importance of analyzing what is recommended, relevant and even enforceable for the collaboration and/or sector in question. Please note that there can be other legal and regulatory considerations to take into account so do not take this as final.

1. EU legislation on research and innovation[35]
    a. The management of intellectual property by universities and public research organisations[36]
    b. Open data and the reuse of public-sector information
        i. Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information (recast)[37]
        ii. Commission Implementing Regulation (EU) 2023/138 of 21 December 2022 laying down a list of specific high-value datasets and the arrangements for their publication and re-use (Text with EEA relevance)[38]
    c. Council Decision (EU) 2021/764 of 10 May 2021 establishing the Specific Programme implementing Horizon Europe – the Framework Programme for Research and Innovation, and repealing Decision 2013/743/EU (Text with EEA relevance)[39]
    d. EU global approach to research and innovation[40]
    e. European metrology programme for innovation and research (EMPIR)[41]
    f. EU High-Performance Computing Joint Undertaking[42]
2. Intellectual Property Rights (IPR) and Data Protection
    a. Copyright Law Overview by CLARIN[43] (international sources, EU sources, National laws in EU member states)
    b. Licensing practice - overview by CLARIN[44]
    c. Personal Data Protection (overview by CLARIN)[45]
    d. GDPR[46]
    e. AI Act[47]
    f. Algorithmic transparency[48]

[35] https://eur-lex.europa.eu/summary/chapter/research_innovation.html?root_default=SUM_1_CODED=27
[36] https://eur-lex.europa.eu/EN/legal-content/summary/the-management-of-intellectual-property-by-universities-and-public-research-organisations.html
[37] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019L1024
[38] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2023.019.01.0043.01.ENG
[39] https://eur-lex.europa.eu/eli/dec/2021/764/oj
[40] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2021%3A252%3AFIN
[41] https://www.euramet.org/research-innovation/research-empir/#:~:text=The%20European%20Metrology%20Programme%20for%20Innovation%20and%20Research,and%20developing%20the%20SI%20system%20of%20measurement%20units.
[42] https://eurohpc-ju.europa.eu/index_en#:~:text=The%20European%20High%20Performance%20Computing%20Joint%20Undertaking%20%28EuroHPC,develop%20a%20World%20Class%20Supercomputing%20Ecosystem%20in%20Europe.
[43] https://www.clarin.eu/content/copyright-law-overview
[44] https://www.clarin.eu/content/licensing-practice
[45] https://www.clarin.eu/content/personal-data-protection
[46] https://gdpr-info.eu/
[47] https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai
[48] https://algorithmic-transparency.ec.europa.eu/index_en

g. Biometric recognition[49]
h. Non-discrimination and fairness[50]
i. Liability and accountability[51]
j. Cybersecurity requirements[52]
k. Consumer protection[53]

3. Standards[54]
4. Patents[55]
5. Technology transfer[56]
6. Innovation-friendly legislation[57]

The exponential growth of Artificial Intelligence, Deep Machine Learning and Large Language Models (LLMs) are transforming research across all domains and clusters by revolutionising research methodologies and enabling more sophisticated data analysis and automated workflows. While AI drives innovation, it also comes with important issues that researchers and RI managers need to be aware of, e.g. legal and ethical issues surrounding data privacy and copyright issues when collecting data to build and train AI models.

Data Governance Act (DGA)[58]
AI Act[59]

- *The purpose of this Regulation is to improve the functioning of the internal market and promote the uptake of human centric and trustworthy AI, while ensuring a high level of protection of health, safety, fundamental rights, ... including democracy, rule of law and environmental protection against harmful effects of AI systems in the Union and supporting innovation.*

The legal framework for setting up an ERIC is always a base for the work and gives a good framework and guidance in areas such as; scientific evaluation, dissemination, IPR, procurement and data policy.

One example of best practice of IP policy is given by the ERIC Forum[60].

6.4. Funding and Financing

Sources of funding
There is both soft and hard funding to find. Making all parties in a collaboration pay into the work is important to create full involvement. This can be both cash and in-kind. For mediator needs it can be good to find public funding in different

[49] https://www.edpb.europa.eu/news/news/2024/facial-recognition-airports-individuals-should-have-maximum-control-over-biometric_en
[50] https://commission.europa.eu/aid-development-cooperation-fundamental-rights/your-fundamental-rights-eu/know-your-rights/equality/non-discrimination_en
[51] https://www.consilium.europa.eu/en/topics/consumer-protection/
[52] https://digital-strategy.ec.europa.eu/en/policies/cybersecurity-policies
[53] https://commission.europa.eu/law/law-topic/consumer-protection-law_en
[54] https://research-and-innovation.ec.europa.eu/law-and-regulations/standards_en
[55] https://research-and-innovation.ec.europa.eu/law-and-regulations/patents_en
[56] https://research-and-innovation.ec.europa.eu/law-and-regulations/technology-transfer_en
[57] https://research-and-innovation.ec.europa.eu/law-and-regulations/ensuring-eu-legislation-supports-innovation_en
[58] https://digital-strategy.ec.europa.eu/en/policies/data-governance-act-explained
[59] https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai
[60] https://www.eric-forum.eu/toolkit/administration/ip/

available programs, both at regional, national and EU level. In some cases it is also good to map ongoing programs or see what different actors in the area are doing. It can be a good idea to reach out to other initiatives. The different programs and projects funded by the EU is a good source to map and analyze. There are programs on all levels, both regional, national and EU level that can be of interest. There are also a number of different national programs in each country supporting the collaboration with industry.

Financial planning and budgeting

A project budget is not just a ledger of costs and revenues; it's a strategic tool that aligns the financial resources with project goals. It guides project execution, facilitates stakeholder communication, measures performance, and manages risks. However, many project managers treat the budget as a static document, failing to adapt it to changing circumstances. A truly effective budget plan should be as agile as the project itself, evolving while maintaining fiscal discipline. To create an effective budget plan, a multifaceted approach is required. Before diving into the numbers, it's crucial to define the project's scope and objectives clearly. This involves conducting a value stream mapping exercise, performing a stakeholder value analysis, and implementing a scope-to-budget matrix to ensure alignment between the budget and the project's strategic goals.

Next, identifying all potential costs is key to creating a comprehensive budget. Utilizing AI-powered cost prediction tools, holding cross-functional cost identification workshops, and developing a cost risk register can help uncover hidden or non-obvious expenses. Accurately estimating resource requirements, through methods like parametric modeling and skills-based resource allocation, is also essential. Doing all this together with all stakeholders involved is vital to make collaboration real and sustainable.

Programs and funding in the EU

There are many different programs within the EU system that can be used for setting up projects and get started with the work. Some of the most common are ERDF[61], Horizon Europe, and Interreg. There are also different kinds of more long-term initiatives within EIT, like the KICs that can be relevant as they hold both public organizations and industry.

More information on different funding through the EU system is available on the website[62].

6.5. Case Studies

Here are two examples of successful collaborations (short descriptions):

6.5.1 Euro-BioImaging ERIC and Industry Collaboration

Euro-BioImaging ERIC is a cutting-edge research infrastructure offering access to advanced biological and biomedical imaging services across Europe. Established in 2019, it supports life science research by providing state-of-the-art technologies, training, data services to scientists in academia and industries. With distributed facilities across 18 countries and European Molecular Biology Laboratory, it promotes open science and innovation while enabling researchers to achieve high-quality imaging outcomes.

Euro-BioImaging ERIC provides access to over 120 cutting-edge biological and biomedical imaging technologies across all scales, from atoms to imaging of whole organisms. These resources are available through open access to researchers from both academia and industry, and can be broadly applied to a wide range of specific research contexts ranging from biotechnology and pharmacy to biomaterials and agroecology research.

Euro-BioImaging facilitates collaborations for technology and methods development. Companies seeking competent partners for imaging projects can engage with Euro-BioImaging to identify suitable experts and facilities, and also establish

[61] https://ec.europa.eu/regional_policy/funding/erdf_en

[62] https://european-union.europa.eu/live-work-study/funding-grants-subsidies_en

collaborative projects. Such projects can involve longer-term access to imaging capacity and expert services for ongoing validation or for parts of a product pipeline or can involve co-development of imaging tools and applications for the specific contexts required by the industry partners.

Euro-BioImaging's engagement with industry can be very diverse due to the scope of activities and capacities offered. As an example, Euro-BioImaging has collaborated with industry on:
Collaboration on Imaging Biomarkers: Developing and validating advanced imaging biomarkers for diagnostics and therapeutic monitoring.
Support for Drug Discovery and Therapy Research: Assisting in drug discovery processes and advancing innovative therapies using cutting-edge imaging technologies.
AI-based Tools Development: Creating AI-driven tools for analyzing complex imaging datasets, enhancing research capabilities.
Sector-Specific Research: Providing imaging support for industries involved in environmental research, materials science, and digital agriculture.
Consultations and Matchmaking: Offering tailored consultations and matchmaking services to connect industrial partners with Euro-BioImaging's expertise and infrastructure.
These broad range of collaboration opportunities also include joint participation in national or European funding programs. To support its industry related activities and open its services to innovative SMEs and start-ups, Euro-BioImaging has established a partnership with the EIC, offering services through the EIC service catalogue. EIC awardees and Seal of Excellence holders have access to Euro-BioImaging's imaging technologies and consultancy services, with potential EIC financial support of up to €60,000 to reimburse costs associated with accessing these services. A similar approach has been developed also with the EIT, and is in planning with local innovation ecosystems.
Euro-BioImaging offers fully confidential consultations with technology experts to understand and address the unique needs of industrial users. This personalised approach ensures that the imaging, image analysis, and non-technical services provided are aligned with the specific objectives of each company. Legal and contractual documents are in place to facilitate our engagement with industry. These consultation processes can be long-running and multi-stage, particularly with larger companies. For example, Euro-BioImaging has successfully engaged with a large multinational company in the pharma and agriculture sector in an ongoing year-long process including consultation meetings with various departments and teams within the company. This consultation and matchmaking process has already led to two specific projects where the company is collaborating with Euro-BioImaging facilities. At the same time, we are valorising the initial successfully established projects for further contacts and visibility of our services within the company's other branches focussed on different research topics.

For over 10 years, Euro-BioImaging has also been engaging with industry through its Industry Board. The Euro-BioImaging Industry Board (EBIB) facilitates collaboration between imaging companies and the research community to advance life sciences. It supports technology development, training, and innovation by aligning industry offerings with researchers' needs. EBIB organizes knowledge-sharing, promotes imaging in science policy, and fosters partnerships for novel imaging tools and methodologies.
The successful collaboration between Euro-BioImaging and industry relies on structured frameworks and tools to enhance collaboration with industry. Such structures are key enablers and facilitate our engagement. They can be categorised as follows:
Access to technologies, applications and data services: centralized access point and personalized consultation by access managers to offer streamlined entry for industry users.
Legal and Contractual Tools: templates for service agreements and IP protection.
Innovation Services: support for joint research and technology development projects and industry-driven innovation.
Knowledge Transfer: tailored training programs and workshops for industrial partners and RI staff.
Dedicated staff: dedicated personnel working on business development and industry relations, including the dedicated work with the Euro-BioImaging Industry Board.

Through strategically defined actions and leveraged tools, Euro-BioImaging ERIC fosters engagement between academic research and industry, promoting innovation and technological advancement. Euro-BioImaging provides industry partners with unparalleled access to cutting-edge imaging services and expertise.

6.5.2 SASTA - Advancing Speech Therapy through Language Technology

In the health sector, the SASTA[63] (Dutch acronym for Semi-Automatic Analysis of Spontaneous Language) application illustrates CLARIN's wider impact beyond research. The web application, developed at Utrecht

University, part of CLARIN-NL, is instrumental in diagnosing and developing treatment plans for speech and language impairments.
SASTA is a tool that partially automates the analysis of Dutch spontaneous speech transcripts, and is used both in applied clinical settings and in research into language development. It was developed in collaboration with the Dutch Association for Clinical Linguists (VKL[64]) and Auris[65], an organisation specialising in hearing and speech therapy. Auris is working to expand SASTA's use in a variety of educational settings, demonstrating how automation can scale up the application of speech analysis methods significantly.
Jan Odijk, professor emeritus of language and speech technology at Utrecht University, has been involved with the development of the system for several years. He says: 'SASTA is not only interesting for linguistic research, but is also useful in clinical practice, and it is therefore not without reason that SASTA was developed in close collaboration with and with co-financing from the Association for Clinical Linguistics. Organisations such as Auris, Kentalis, and NSDSK are very interested in SASTA and are already experimenting with it, and we are investigating with a number of organisations how SASTA can be combined with speech recognition and tools for analysing multiple SASTA results.'

How SASTA Works

SASTA analyses transcripts grammatically using Alpino[66], an automatic utterance parser for Dutch, and can recognise a significant number of forms of deviant language use and analyse them correctly. The system supports multiple established assessment methods available for Dutch, such as TARSP[67] (for children aged 1-4), STAP[68] (for children aged 4-8), and ASTA[69] (for adults suffering from aphasia, a language disorder that affects how you communicate.).
SASTA generates as output a method-specific 'Profile Chart' and an annotated transcript. The generated transcript can be corrected by a linguist, if needed, and re-uploaded into SASTA, after which SASTA generates an adapted Profile Chart. Overall, SASTA achieves a F1-score between 84% and 95% on training data, and between 83% and 95% on independent test data. Transcripts are accompanied by an interpretation, which significantly improves results.
Following the transcript analysis using Alpino, SASTA then uses specially constructed (XPath) queries for all measures defined within the assessment method to count the frequencies of linguistic phenomena in the spontaneous language sample.

Early Beginnings

The project arose when colleagues at Utrecht university began to explore the possibility of (partially) automating the TARSP method using Natural Language Processing (NLP). The analysis of a spontaneous language sample is very important for assessing language development disorders and proposing a treatment plan. However, making an analysis with the

[63] https://sasta.hum.uu.nl/
[64] https://klinischelinguistiek.nl/
[65] https://auris.nl/
[66] https://www.let.rug.nl/vannoord/alp/Alpino/
[67] https://www.pearsonclinical.nl/tarsp
[68] https://www.hetwap.nl/wp-content/uploads/2018/04/2008-STAP-HANDLEIDING.pdf
[69] https://klinischelinguistiek.nl/uploads/201307asta4eversie.pdf

TARSP method requires excellent linguistic knowledge, and takes a lot of time. Automating this, even if only partially, could make its use in clinics more widespread.
After conducting a few successful initial experiments, Jan Odijk, professor emeritus of language and speech technology at Utrecht University, secured funding for further development (VKL, CLARIAH-PLUS Societal Impact Call, Utrecht University). Auris saw opportunities for automating their assessment methods, by using automatic speech recognition for transcription, SASTA for grammatical analysis, and the Auris-developed tool Stamper for analysing a collection of TARSP-results, and sought cooperation on this with UU, HU, and a company called ITSLanguage. Based on this, Auris made available some funding for further development of SASTA. This cooperation is ongoing. So far, the work has led to improvements of the individual tools, and adaptations to make them work together seamlessly. However, it has not yet resulted in an integrated processing chain.

Leveraging CLARIN's Expertise

For this project, CLARIN provided the following areas of expertise: 1) methodologies, technologies and facilities for running LLMs, or fine-tuning models on small datasets for specific applications/application areas, 2) legal and regulatory know-how, 3) education and training in using AI/LLMs/NLP, and 4) ethical and societal impact). Specifically for the development of SASTA, CLARIN provided excellent grammatical knowledge of the Dutch language, familiarity with standard NLP techniques, excellent knowledge of the structures and properties of Alpino-parses, excellent programming skills, and familiarity with infrastructure around programming, as well as some familiarity with large language models.'
In addition, the collaborating partners expected professional planning for and execution of the agreed work. Jan Odijk said: 'Our partners expected a good and realistic plan for a project, so that they are confident that the money they provide is well-spent. And they want to monitor the project on a regular basis (2-3 times a year). In all cases, they appointed contact persons that could provide input, for example on the data used or decisions that have to be made.'

Future Plans

Further development of SASTA is ongoing, in close collaboration with researchers in language development and with linguists in clinics.
The collaborating team is working on several improvements of the current system. One that is currently in progress is a 'spelling corrector' for children's language, for which a first working version is already available. It has been found to lead to significant improvement, but still requires testing on a larger set of data, with the possible addition of a children-specific error model.
Odijk notes that the most important addition would be a SASTA self-assessment module: 'SASTA is not perfect and will never be 100% correct. It would be good if SASTA could point out in which utterances or it is less sure of its analysis. I see several possibilities to do that, but whether it works needs to be investigated, and for that we need time and money.'
In addition, some other methods for language assessment are under development, which could also perhaps be automated.
Extending SASTA or similar systems to languages other than Dutch (e.g. LARSP for English, F-Larsp for French) would also be of interest, but this would be a major project.
Finally, reliable automatic speech recognition for young children should become available, and if that happens, SASTA will undoubtedly have to be adapted to deal with the surely imperfect output of the ASR-system.

Investment

SASTA benefitted from the financial support of the CLARIAH-PLUS project, as well as from the VKL, Stichting Taaltechnologie, Utrecht University and Auris.

Useful Links:

Documentation on how to use SASTA can be found on Github[70] (Dutch only).

[70] https://uudigitalhumanitieslab.github.io/sasta/

SASTA's code is available on Github[71], where it is accompanied by more context and technical documentation.
SASTA is based on a Python package called sastadev in the backend. This package, developed by the SASTA team, is freely available on Github[72]; development documentation[73] is available.

Testimonies

'Collaborating with Utrecht University on the SASTA project has been a tremendous experience. The academic insights and cutting-edge research they provided were invaluable in creating an effective speech and language diagnostic tool. This collaboration makes our transcription tool even more valuable to speech therapists due to the robust grammar analysis it offers.'

Kees van den Broek, ITSLanguage

6.6. Checklist

Checklists for collaboration setup

- Formulate a strategy for industry and innovation engagement starting with the primary interest of industry.
- Establish a multi-disciplinary, gender-balanced Industry Advisory Board
- Hire a full-time Innovation/Industry Contact officer
- Hire a Communications Office with commercial experience
- adapt language to business
- Map and discuss with the innovation ecosystem around the RI to find partners caring for the results in start-ups etc. Being an active partner in the ecosystem is important for the RI
- Map the intermediaries (clusters, RTOs) relevant to the RI and set up WoW, including tuning the offer, filter companies and outreach activities.
- Set a target for how much cooperation with the industry should ideally contribute to RI annual revenues
- Make the analysis if the LIEPT Model is relevant to use, if so, decide on scope, stakeholders and KPIs.
- Set up a part/link web page designed to provide general information for industry and meet their special needs, promote success stories, give a catalogue of services and collaboration models
- Set up an innovation helpdesk to act as an expertise center providing access to essential tools for collaboration, such as guidelines on IP rights, open innovation and legal agreement templates.

7. Summary and Conclusion

It is crucial for ERICs to take a more active role in Europe's innovation ecosystem and strengthen their collaboration with industry. All actors within this system need to be prepared to adapt their methods of operation and establish new collaborations. One goal is to improve the efficiency of knowledge transfer and sharing between stakeholders. Another objective is to use resources more efficiently. Today the landscape is fragmented and the research infrastructures within the ERIC network operate too independently within the ecosystem. Without closer collaboration, it will be challenging to address the scientific, technological and societal challenges that Europe faces today.

[71] https://github.com/UUDigitalHumanitieslab/sasta
[72] https://github.com/UUDigitalHumanitieslab/sastadev
[73] https://sastadev.readthedocs.io/en/latest/index.html

This report evaluates and consolidates previous efforts in this area, providing strategic and operational recommendations alongside a practical toolbox. This includes how to foster an innovative culture within the organizations, establish strategic partnerships with industry, identify appropriate collaboration models and implement measures to track progress. The toolbox offers guidance on the necessary steps and functions to achieve results, including legal, financial and sector-specific considerations ERICS must consider. Measuring progress is emphasized as a critical component for continuous improvement, supported by feedback mechanisms. A significant focus of this report has been to compile existing knowledge from numerous EU-funded projects. This report shows that most knowledge is already available and can be used directly to establish effective models for engaging ERICs more actively in Europe's innovation ecosystems.
While not every research infrastructure may find this relevant, many more than currently engaged could benefit from these approaches. In some areas, industry is more advanced than academia and can form strong alliances to remain at the forefront of technological and scientific innovation.

Collaboration is key to securing Europe's position as a global leader and addressing future societal challenges. ERICs must embrace more efficient partnerships with industry and leverage the wealth of existing knowledge to achieve this. The new upcoming policy from the Commission is pointing at the same direction and therefore it is time to reconsider and time to change. The working group hopes that this report will serve as a valuable resource to initiate and guide these efforts.

Abbreviations and Definitions

AI - Artificial Intelligence
BEERi - Board of European Environmental Research Infrastructures to ENVRIplus
BMS RI - Biological and Medical Sciences Research Infrastructures
CLARIN - Common Language Resources and Technology Infrastructure
EBIB - Euro-Bioimaging Industry Board
EDIH - EU Digital Innovation Hubs Network
EMSO - European Multidisciplinary Seafloor and Walter Column Observatory
ENRIITC - European Network of Research Infrastructures & IndusTry for Collaboration
ENVRIPlus - Environmental Research Infrastructures Providing Shared Solutions for Science and Society
ENVRI-fair - ENVironmental Research Infrastructures building Fair services Accessible for society, Innovation and Research
ERIC - European Research Infrastructure Consortia
ESCAPE - The European Science Cluster of Astronomy & Particle Physics
ESFRI – European Strategy for Research Infrastructure
FAIR - Findable, accessible, interoperable and reusable data
GDPR - General Data Protection Regulation
H2020 - Horizon 2020 European Commission
ICO – Industry Contact Officer
ILO – Industrial Liaison Officer
IPR - Intellectual Property Rights
KPI - Key performance indicator
LDS - European Language Data Space
LIEPT - Lund Innovation Ecosystem Portfolio Tracking
LLM - Large Language Model
PaNOSC - The Photon and Neutron Open Science Cluster
RI – Research Infrastructure
RTO – Research and Technology Organisation
SME - Small and middle-sized enterprises
SSHOC - Social Sciences and Humanities Open Cloud
WoW - Way of Working