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Collaboration**

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**Deliverable Report:**

**D3.2 Strategy for innovation and industry-RI cooperation**

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## List of Abbreviations

ENRIITC	European Network of Research Infrastructure and Industry for Collaboration
ESFRI	European Strategy Forum on Research Infrastructures
ICO	Industry Contact Officer
ILO	Industrial Liaisons Officer
RI	Research Infrastructure
RTO	Research and Technology Organisation
PERIIA	Pan-European Research Infrastructure ILOs Association

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## Report on Implementation Process and Status of Deliverable

### Executive Summary

This report presents strategies and recommendations that may be adopted by Research Infrastructures and other stakeholders in order to nourish industrial innovation.

Companies and the RIs themselves may benefit from the interaction in areas such as industrial supplies to RIs, usage of the RIs facilities and knowledge, co-development, innovation activities, joint advocacy, etc. ILOs acting as intermediaries between national companies and RIs are important especially for the RI to reach out to supplier industry and for co-development. Inside the RIs, the function of ICO is a key role in many of the proposed strategic recommendations.

The information has been collected from both desktop analysis and direct engagement with stakeholders from RIs and from other entities working in the innovation ecosystem, such as Research and Technology Organisations (RTOs), universities, ministries, companies and regional business associations. The ENRIITC survey (D2.1) gave input on the most relevant topics for treatment and discussion. The main input was extracted from the break-out session discussion at the ENRIITC networking meeting (Oct 15-16, 2020), sessions in the ENRIITC Focus Groups (Spring 2021) and topical ENRIITC-your-coffee sessions.

We arrive at 17 recommendations under four themes which cover both the internal organisation and priorities within the RI, and strategies and tools for engaging with companies and ecosystems surrounding the RI:

1. Develop a strategy for innovation with industry
  - measures concerning the RI internal structure and prioritisation of resources
2. Engaging the innovation ecosystem:
  - important points regarding the interaction with stakeholders in the innovation ecosystem surrounding the RI.
3. Industry collaboration models:
  - options and perspectives on how to set up collaboration
4. Funding structures for increased industry collaboration:
  - strategies for pursuing supplementary funding for innovation activities in collaboration with companies.

The 17 strategic recommendation areas are listed in Fig. 1.

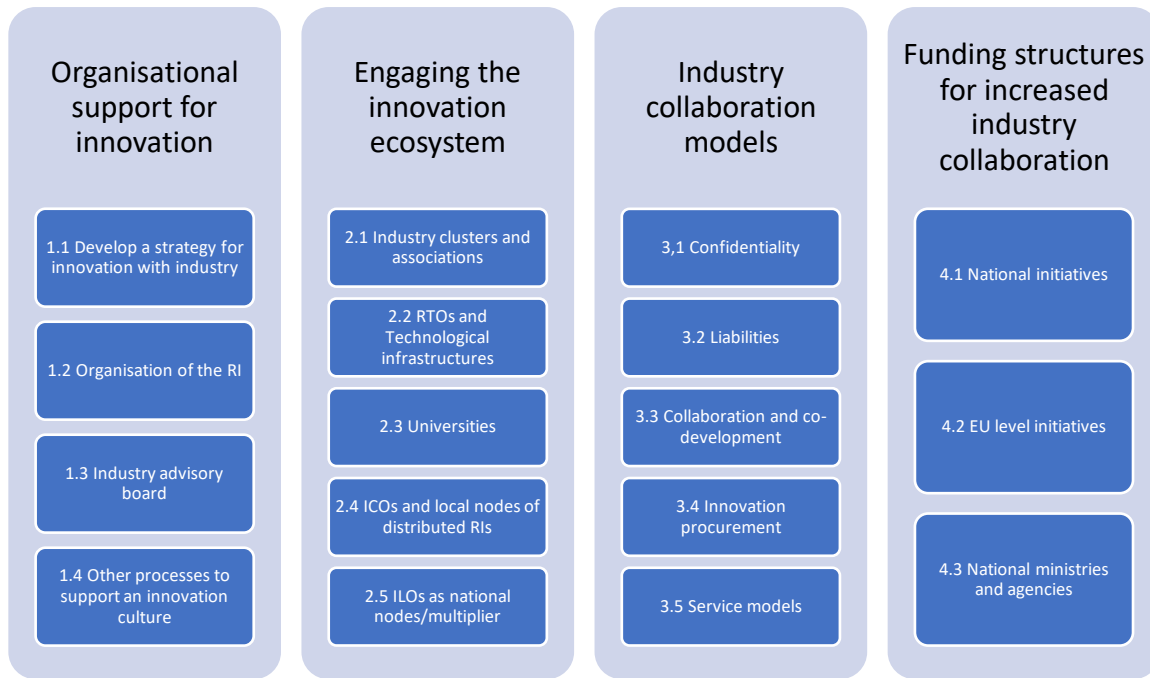


Figure 1: The 17 recommendation areas in 4 topics

The discussions in the different fora clearly demonstrates that no “one-size fits all” strategy for the RI engagement with industry can be envisioned. This is mainly due to the huge differences between the purpose, structure and operation of RIs, the difference between ILOs and ICOs, and the diverse modes of RI operation, partly due to the distinction between single-sited and distributed RIs.

Thus, the proposed strategic actions should be evaluated by the owners and management of the RI with respect to what is relevant in the specific context of the particular RI. It is, however, a clear recommendation that ALL the proposed activities are carefully considered and evaluated by each RI.



## Introduction

This report presents strategies and recommendations that may be adopted by Research Infrastructures and other stakeholders in order to nourish industrial innovation. It has been prepared as part of Task 3.1 “Development of strategy and best practices for exploiting the innovation potential of RIs” and follows the ENRIITC report D3.1 “Strategy to exploit the innovation potential of RIs”, that offers a helicopter perspective on the structure of the RI-industry relationship and includes five overarching strategic initiatives for RIs. In contrast, this report focus on the activities and topics each individual RI must consider in order to improve their relationship with industry. Some topics of D3.1 and D3.2 will, thus, have a strong overlap and are mentioned in both reports.

The role of ICO is defined as a function or person employed in the RI to work with industry relations<sup>1</sup> and it is a key role in many of the proposed strategic recommendations. Also, in the ESFRI “Physics and Engineering Science” domain, the ILOs are key figures. The definition and job description of both ICOs and ILOs may be found in ENRIITC D3.3 “Strategy for training of ILOs/ICOs and outreach towards industry”.

RIs are established with a focus on providing support for research, but it is generally recognized that companies (and the RIs themselves) may benefit from the interaction between companies and RIs in areas such as:

- a. industrial supplies to RIs,
- b. usage of the RIs facilities and knowledge by the public and private sector
- c. co-development, joint advocacy and innovation activities.

For most RIs, however, the interaction between the companies and RIs is not systematic and sometimes left to chance and pioneers inside the RI. This is especially true for activities relating to category c.

Since RIs serve primarily the ambitions of scientists, the innovation eco-system in which they work, is inherently science-driven to begin with. To push the boundaries of fundamental scientific knowledge, new technological solutions and instrumentation breakthroughs for the RIs have to be achieved, spanning from low TRL to high TRL. Thus, the industry innovation perspective in the context of developing this solutions and instrumentation has to be long-term and based on continuity. Often, both the long-term perspective and continuity in these collaborations are missing which leads to fragmented innovation pathways and high risks for companies (especially SME) to engage in complex RI technology developments. This requires a management focus and strategy, and also available funding mechanisms, at a national and/or international level, to support the activities. This report aims to offer a systematic listing and discussion of different activities that an RI may adopt in order to unlock the innovation potential from the RI. A particular focus will be on activities in the area of co-development and innovation activities (category c. in the list).

As was evident from the ENRIITC survey presented in D2.1, there is no “one size fits all” for RIs since there is huge variations in structure, maturity and potential for interaction with industry. For example, for some RIs, establishing a data portal for users from industry will be an effective way to engage with companies. Other RIs may collaborate with companies on an ad-hoc basis and a portal would not make

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<sup>1</sup> Some ambiguity exists and, in some RIs, the ICO-role is actually designated “ILO”. For consistency, we will only use the term “ICO” and restrict the usage of “ILO” for dealing with suppliers to RIs.

sense. Thus, the proposed strategic actions should be evaluated by the ‘owners’ or RI management with respect to what is relevant in the specific context of the particular RI. It is, however, a clear recommendation that ALL the proposed activity lines are carefully considered and evaluated.

In the ENRIITC project, stakeholders from inside the RIs (e.g. ICOs) and national nodes for supplier companies (ILOs) were surveyed about the interaction between companies and RIs (see ENRIITC Deliverable 2.1) – these findings are used as the starting point for making recommendations for the industry-RI cooperation.

Previous findings from other studies have been taken into consideration and reference is given where appropriate. The sources are listed in Appendix 1.

Certain topics are treated in separate ENRIITC deliverables. They are listed below and will also be referenced, where they are relevant:

- “Strategy to exploit the innovation potential of RIs” (Deliverable 3.1) – this includes recommendations on the internal organisation of the RI to accommodate innovation processes and includes the proposal for a central resource (hub) to support the engagement for RIs with industry.
- “Training of ICOs/ILOs and industry outreach” (Deliverable 3.3) – includes profile descriptions, training strategies and tools to increase industry engagement for two important roles in the RI-industry connection: ICOs (employed by the facilities to promote interactions with industry) and the ILOs (appointed by the RI member countries to represent their supplier industry).
- “Organising brokerage events for industry” (Deliverable 3.4) – a step-by-step guide on the practice of organising events with companies.
- “Defining KPIs for ICOs and ILOs” (Deliverable 3.5) – (due June 2022) will elaborate on the metrics to gauge if the outreach activities of the RI are successful.

## Methodology

Information has been collected from both desktop analysis and direct engagement with stakeholders from RIs and from other entities working in the innovation ecosystem, such as RTOs, universities, ministries, companies and regional business associations.

The main sources of input includes:

- ENRIITC ICO survey (Deliverable 2.1): Employees at RIs responsible for either general industry interactions, procurement or general management was surveyed on their collaboration with industry and on the measures in place at the RI to support industry interactions.
- ENRIITC ILO survey (Deliverable 2.1): Persons working as ILOs most often relating to RIs in the ESFRI domain of Physical Sciences and Engineering were asked about their function as ILOs and their proposals for improvements.
- Parts of ESFRI reports reg. industry interactions (see Appendix 1)
- ENRIITC Networking Event Oct 15-16, 2020: Particularly the break-out rooms 3.1 and 3.2 with the theme: “How do we unlock the innovation potential of Research Infrastructures for the benefit of industry”.
- ENRIITC Focus Group 2 “Research Infrastructures in the innovation landscape/ecosystem”: This group consisted of persons from RIs, ILOs, persons from RTOs and local industry associations and, thus, formed very diverse groups of persons from the innovation ecosystems.

- ENRIITCyourcoffee, season 1-3: Short presentations and discussions on individual topics such as “mediators”, “innovation procurement” and others.

## Discussions and recommendations

The discussions in the different fora and represented in the ENRIITC survey (D2.1) clearly demonstrates that no “one-size fits all” strategy for the RI engagement with industry can be envisioned. This is mainly due to the huge differences between the purpose, structure and operation of ILOs and ICOs, and due to the operation of different RIs. Especially striking is the difference between single-sited RIs and distributed RIs where the former has larger in-house budgets and operates as an entity whereas the distributed facilities most often need to align their activities with “nodes” that are not only RIs, but also universities.

Therefore, the strategic recommendations listed below should be carefully considered by the RI management / ICOs in the context of the specific RI. For distributed facilities, the ENRIITC survey revealed significant differences and from the list below, we have extracted the most relevant activities into Appendix 2.

From the data collected, several points emerged that were extremely useful as guiding principles for structuring the RI-industry collaboration. The following sections detail the strategic measures that are relevant for nurturing innovation in collaborations between industry and RIs. They are divided into four main headlines described below:

1. Develop a strategy for innovation with industry
  - measures concerning the RI internal structure and prioritisation of resources (see also ENRIITC D3.1)
2. Engaging the innovation ecosystem:
  - important points regarding the interaction with stakeholders in the innovation ecosystem surrounding the RI.
3. Industry collaboration models:
  - options and perspectives on how to set up collaboration
4. Funding structures for increased industry collaboration:
  - strategies for pursuing supplementary funding for innovation activities in collaboration with companies.

### **1. Organisational support for innovation**

This section focuses on how the RI management internally can support increased interaction between the RI and industry.

#### **1.1 Develop a strategy for innovation with industry**

The ENRIITC survey revealed that 64% of the RIs have a strategy for industry engagement and only 35% have an industry advisory board (or similar). We consider both of these to be crucial for the collaboration with industry.

In many cases, even if an RI does not have a formal strategy, there is knowledge and experience nested in the employees working with industry. Management must first appoint the primary responsible person at the RI to run the process of developing a strategy – typically, this will be either someone from management, procurement or, if available, the ICO. The aim of the strategy process is to collect the different pieces of information and formulate the ambitions of the RI in this area.

Points to consider when formulating the RI strategy for industry engagement towards innovation

- An industry strategy should start from a knowledge of the primary interest from industry – suppliers, users, co-developers and/or tech-transfer partners.
- The strategy should include relevant KPIs (e.g. recorded revenues from industry collaborations or industrial users) that may easily be collected so that the progress may be monitored.
- The strategy should be clear on the benefits for both the RI and the companies (and other stakeholders).
- Are there requirements from the RI owners or member states on, e.g., geographical distribution of companies, international collaborations, focus on SMEs, support Green Deal, etc.?
- The amount of processes/bureaucracy should be carefully aligned with the available resources for following-up on the strategy.

The internal stakeholders relevant for the execution of the strategy must also be identified by answering:

- who should contribute to the strategy?
- who approves and “owns” the strategy?
- how is the follow-up process for the strategy?
- how are nodes engaged (in the case of distributed facilities)?

It is important to recognise that a strategy for industry engagement cannot only rely on an inside-out approach (i.e. one that only focus on the RI and the strengths and offers). We recommend that the strategy is “pressure tested” with the relevant companies from either suppliers, users or collaborators (see item 1.3 “Industry Advisory Board”) and ILOs networks.

The strategy must be discussed and, potentially, revised at least once a year.

### **1.2 Organisation of the RI**

Industry interaction is desirable from a political, economic and societal perspective. If an RI has significant procurement activities, a dedicated procurement group must be established since several rules for public procurement should be understood and respected. Distributed RIs may, however, choose to outsource this function to the nodes or parent entity, typically a university.

Regarding industrial usage and tech-transfer, the interaction between the RI and companies may hardly generate a profit and may even fail to return the RI investment of resources in the process. Therefore, industry engagement is a matter of resource prioritisation, which should penetrate both the associated management decisions and operational processes.

We recommend operating with full transparency towards all internal stakeholders to prevent frustrations and confusions over priorities. Most importantly will be the decision whether or not to employ a full-time contact point for industry (ICO) and describe this person’s job functions:

- What are the expectations for industry contact/engagement?
- What are the expectations for revenue streams?
- Is it expected that the person brings home EC projects?
- Will the person also have a political role to represent the RI for EC, national governments and other stakeholders?

The employment of a communications officer or including industry and innovation communications as a part of the job description will also to help spread knowledge about the RI engagement with

industry and, thus, market the offers to new companies. An added advantage would be if the communication officer has experience from the private sector. Part of the communication effort should also be to operate an industry landing webpage designed to provide companies with:

- general information designed to match the company's point of view,
- promotion of previous success stories from industry collaborations,
- catalogue of services and collaboration models, including IPR models (see area 3).

Further details on the organisation may be found in ENRIITC D3.1 "Strategy to exploit the innovation potential of RIs". The KPIs of ICOs will be discussed in ENRIITC D3.5 "Policy recommendations for the optimisation of ILO/ICO performance".

### **1.3 Industry advisory board**

An advisory board with industrial representation is a good place to test ideas and initiatives either before the RI invest a lot of resources into the work or in order to tune the current methods of interaction with industry. This feedback may be collected ad-hoc from individual companies, via events or through collaboration with project consortia. The use of intermediaries, e.g. industry associations, ILOs networks, should be considered since they are able to represent several companies and understand the industrial mindset. We encourage the use of an advisory board consisting of both persons from companies and other stakeholders from the innovation ecosystem. As reported in the ENRIITC ICO survey, only 35% of RIs currently use an advisory board with industry representation.

This approach has challenges that were discussed at ENRIITC stakeholder meetings and includes motivating industry to join and spend time on this. However, a point was also made, that the new ways of working post-COVID-19 actually makes it easier to assemble persons from different companies and regions for online sessions. At the meetings, the RI can present the ideas, ambitions and KPIs from their strategy as well as ask for opinions on new or existing initiatives for the board to comment and make recommendations.

### **1.4 Other processes to support an innovation culture**

Some RIs have successfully managed to create a huge impact by facilitating spin-out start-ups based on knowledge or technology from the RI. The spin-outs are global players and generate important benefits even outside the RI host region. Examples include Swiss Neutronics (PSI spin-off), Dectris (PSI license), Leosphere (LSCE), Soltecture (Helmholtz-Zentrum Berlin), Electrospinning Company (RAL), Novitom (ESRF), Kyma (Elettra), Instrumentation technologies (Elettra, Jefferson Lab & PSI). Typically, 90% of the turnover in these companies come from international sales. Furthermore, the spin-offs maintain the engagement with the RI and, thus, benefit the strategic R&D partnerships and international knowledge interactions and spill-overs between industry and the RI<sup>2</sup>. This could be further explored and discussed with other stakeholders such as universities, technology brokers and venture capitalists.

## **2. Engaging the innovation ecosystem**

When dealing with industry, it is important for an RI to recognize other stakeholders in the innovation ecosystem surrounding them and understand which role to embrace. Before engaging in direct contact with the other stakeholders, RIs are encouraged to have gone through the Innovation Preparedness Roadmap (see ENRIITC D3.1) and to have formed an initial strategy (item 1.1) in order to be able to specify the strategic directions of the RI towards the stakeholders.

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<sup>2</sup> Information extracted from "European Association of National Research Facilities Open to International Access", ERF Workshop: "The Socio-Economic Relevance of Research Infrastructures" (2012.06.01) - Regina Rochow, Elettra.

In several cases, research infrastructures - in particular large-scale facilities - are found as core elements of research and innovation campuses. These campuses may integrate the RIs together with universities, RTOs, TRIs and industry, both large enterprises and small start-up / incubation environments. The exact make-up will depend upon the local flavour, priorities and opportunities afforded to and by such campuses which bring together fundamental, applied and commercial R&D, thereby opening potentially effective pathways toward industry for the RI or RIs implicated. These pathways can be simply to the local ecosystems, but often the campuses have national and international impact and visibility. This is particularly true if the campus is branded and has its own visibility as an integrated campus per se. Examples of these campuses include the Grenoble Innovation Campus "GIANT" (including the international ESRF and ILL RIs), the Harwell campus near to Oxford (including the national DLS and ISIS RIs), Saclay Campus near to Paris (including the national SOLEIL RI) and the emerging campus Science Village Scandinavia in Lund (including the international ESS and national MAX-IV RIs).

### **2.1 Industry clusters and associations**

Most companies are part of some kind of local network or organisation of companies and these often act as significant intermediaries in the contact with companies, especially SMEs. The clusters may offer an RI in-depth knowledge about their member and activities, which will benefit the RI outreach in the following ways:

- tuning of the offer from an RI to hit needs in industry
- filter relevant companies that are open to innovative approaches in the field of the RI
- offer infrastructure for outreach (e.g., newsletters, events) that has better outreach than what the RI can achieve

Since clusters are financed differently, they also operate in different ways and with a different focus. Most often, the scope of the cluster includes some element of innovation or technology scouting for the member companies. The two main types of financing are public or membership, but everything in between also exist. Below are some common attributes together with recommendations for how an RI should engage with them:

**Member-financed clusters:** These are very focused on the needs and immediate request from their members. Innovation is not necessarily part of the scope and if the content offered by the RI is considered academic, the interest will quickly fade. They are, however, excellent representatives for their members and will be critical about what value the RI may offer the companies. Seen from the bright side, this is a good help for learning which selling points offered by the RI that will resonate with the companies in the cluster.

**Publicly financed clusters:** These are financed by national or regional grants where there typically a requirement for a high innovation content. Since these often also are obliged to host events where new technology is demonstrated for the members, these cluster are generally very interested in co-hosting events for their members. They are also generally open for partnerships for innovation grants.

Clusters may also be leaning towards technology or market, which also impacts how an RI should approach them:

**Technology clusters:** This type of clusters are often driven by technical experts from the companies without any financing or via modest contributions to a paid secretary. The clusters seek a high level of innovation and will, in general, be very interested in RI activities that fit into the technology area. One

example is the UK Magnetic Society<sup>3</sup>, which has a single person staff and is financed by memberships and sponsorships. A board will typically decide on events and activities and getting a board member interested and engaged is a strong way to start working with the cluster.

Market targeted clusters: Companies participate in these clusters in order to network with suppliers/customers and to stay tuned on latest market and technology development. These clusters may also include a political or lobbying element. The associations may also be international and take a lobbying role towards EU. It may be a challenge to find the right contact person who is dealing with innovation since the cluster activities have a wide span including, e.g., also legal work. However, the clusters are very knowledgeable about market needs and future development, and may be strong partners for an RI. One example is Wind Denmark<sup>4</sup>, which is almost entirely financed by memberships and income from events. Hydrogen Europe<sup>5</sup> is an example of an international network which is financed by both company fees and European funding.

Besides knowing to which of the above categories a cluster belongs, it is also important before approaching the cluster to have an idea about how the cluster (not only the members) may potentially benefit from the collaboration.

## 2.2 RTOs and Technological infrastructures

Europe has a wide web of ca. 350 Research and Technology Organisations (RTOs) that operate in the space between the academic world and companies. The RTOs may be very different; some run a sustainable business primarily based on commercial work (e.g. testing, certification and consultancy) for companies or public institutions while others perform R&D supported by public or regional funding. Most have a bit of both and the most well-known include Fraunhofer (DE), TNO (NL) and VTT (FIN). Many RTOs are members of the EARTO network<sup>6</sup>, which lobbies for RTOs at the European level. The term “Technological Infrastructures” have recently been introduced to describe the lab and testing facilities used by companies – most often placed at RTOs.

A company with a need for an analysis, measurement or knowledge will often start by consulting a local RTO. For this reason, the RTOs may represent an interesting multiplier function where an RI can, in fact, access several companies via the RTO either by referral or by the RTO using the RI to offer services to companies. An example are the intermediaries for synchrotron measurements, where the RTOs DTI (DK) and RISE (SE) offer measurement and analysis services to companies based on synchrotron beamlines<sup>7</sup>. Several national RIs have a close relation with a national RTO, e.g. the synchrotron SOLEIL as placed next to CEA in Saclay, France.

An RI should map out the following:

- Which European RTOs operate in the technical field of the RI?
- Which European RTOs operate in the industrial segments relevant for the RI?
- Are relevant RTOs present in close proximity to the RI?

It is recommended for the RI to establish a relationship with a few relevant RTOs where at least one of the above questions are answered “yes”. This could be done by co-hosting events, signing a MoU or offering sports on advisory boards.

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<sup>3</sup> <https://ukmagsoc.org/>

<sup>4</sup> <https://en.winddenmark.dk/>

<sup>5</sup> <https://www.hydrogeneurope.eu/>

<sup>6</sup> Homepage: <https://www.earto.eu/>

<sup>7</sup> The intermediaries (both RTOs and small service providers) have the network MIXN: <https://www.mixn.org/>

It should also be highlighted, that the collaboration will only be sustainable if both the RTO and RI obtain an advantage from the partnership, so both sides must be able to recognize the advantage of the collaboration.

### **2.3 Universities**

Most RIs have a strong relation with researchers at universities using the RI for their scientific investigations. This relation can be used to strengthen the RI-industry collaboration. The RI can engage the researchers to establish who is working with companies and use the relation to gain insight into the industrial value and depth of the collaboration. This should result in case-stories documenting the societal impact of the RI, which may in turn inspire other companies to engage with the university or RI.

The collaboration should be investigated by the RI for both usage and co-development. Especially for co-development, the perspectives for collaboration with industry may not even be seen by the university researcher who is focussed only on the research and not on the innovation potential from, e.g., instrument development.

Universities also play an important role in the training of students to prepare them for a job in industry. Here, the RI can be a strong partner that can offer work in a leading scientific environment. If this path is prioritised by the RI, MoUs or agreements should be negotiated with the universities and published to relevant companies. As an example, consider the InnovaXN programme offered by the RIs ESRF and ILL where the RIs team up with a university and a company to offer PhD programmes<sup>8</sup>.

### **2.4 ICOs and local nodes of distributed RIs**

For distributed facilities, it may be a challenge to make the distributed centres/nodes collaborate and share knowledge regarding industrial users of the services from the RI. Nodes are most often also part of a university and, in some cases, the industry collaboration takes place between the university and the company – and it is not always known to the central hub of the distributed RI that local collaboration is ongoing.

It is important that the ICO (or similar) from the central hub of the RI maintains a close contact to the persons at the nodes engaged with industry. This is mainly to document the RI societal impact, and find best practices and examples of the industrial usage of the RI that may inspire other companies to engage.

### **2.5 ILOs as national nodes/multiplier**

ILOs are appointed to represent the companies in a member country's that supply components and services to an RI. This system intrinsically gives the RI a potential for a quite unique outreach channel to industry in all the member countries which could solve the challenge that many of the companies with which an RI is interacting, are local or in the same country as the central hub of the RI. However, this is currently restricted to suppliers and, according the ENRTIIC ILO survey, the primary focus is on georeturn for the member state.

The ILOs respond that knowledge / technology transfer and the promotion of industry-RI-university collaborations is much more important, but this is not prioritized by their employers. In fact, these two aspects were much less prioritised when the employers are governmental agencies, compared to ILOs employed by public research institutes. Until now, it is an open discussion for Big Science RIs which employ ILOs (e.g., CERN, ESO), if their strategy should also define how ILOs can collaborate on involving industry other than in the supplier side.

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<sup>8</sup> <https://www.innovaxn.eu/> (accessed August 2021)



Therefore, ENRIITC recommends that each member state, together with the relevant RIs, consider the potential benefits of an extended mandate of the ILOs and whether they want to prioritize this in the following areas:

- Suppliers: Matching national supplier companies with the RI opportunities (current role)
- Co-development: Engage with the innovation staff at the RI to match RI-technology needs with companies. Useful tools include Technology Roadmaps from RIs to clarify their needs, and national technology maps/roadmaps to identify national technology strengths of relevance.
- Technology transfer: Engage with the innovation staff at the RI to match technologies from the RI which may be licensed or transferred to national companies.
- Usage: ILOs will act as multipliers of industrial usage of the RI.

It should be noted that the job function involved in areas 3 and 4 are significantly different from what is currently being performed by the ILOs under area 1 (and, in some cases, area 2). Furthermore, the companies relevant under areas 3 and 4 differ from those relevant for areas 1 and 2. In all areas, the ILOs should engage national universities where relevant to further stimulate the innovation.

Area 4 is particularly interesting since this could solve a challenge identified by ICOs and RIs, namely, how to identify and reach out efficiently to companies that could potentially use the RI across Europe. We encourage to use the existing RI ILO infrastructure. But we recognise, that the additional work required from the ILO would need to be financed by each member state individually according to the national political prioritisations.

### **3. Industry collaboration models**

As part of the professionalization of the RI-industry engagement, models for collaboration should be defined that are acceptable for both the RI and the company.

This will be very different for users, suppliers or collaborators. For example, in standard supplies (maybe even off-the-shelf) there is limited innovation scope and the collaboration should follow the structures of standard commercial contracts. In some supplies, however, elements need to be developed and optimized and a more complex contract or collaboration model is required. For joint development, tech-transfer licensing and general usage, other collaboration models should also be put in place to help both the company and RI decision process.

#### **3.1 Confidentiality**

Typically, information provided by the company based on their internal know-how must be handled confidentially by the RI. This may even include email correspondences. RIs should consider the following:

- Drafting a standard and short non-disclosure agreement (NDA) and internally discuss which areas are non-negotiable or up for discussion, e.g.:
  - Duration: we recommend 3 years, while most companies want at least 5 years
  - Liabilities: we recommend no liabilities - see below
  - Place and language for legal procedures: either in the RI's country or in English, according to Belgian law (Brussels)
- Setup restricted access areas on servers (potentially at third party provider)
- Include confidentiality clause in RI employee contracts
- Establish a contract system for guests or implement restricted access measures

Companies from areas, such as pharma and security/defence, may have confidentiality requirements that extend beyond what is acceptable for the RI being a public institution. In these cases, a solution that has been seen, is that the company engages with an intermediary company while the intermediary will handle the analytical service and communication with the RI. For synchrotron analysis, the intermediaries in Europe have recently formed a network<sup>9</sup>.

### 3.2 Liabilities

In principle, clauses on confidentiality should be supported by a description of the consequence that will be activated in case of a breach. This liability is most often a fine that is calculated based on a financial loss at one of the parties, but a company may also request a fixed amount for just leaking information, no matter the consequence.

We recommend that no liabilities between the parties in the contract are included. The consequence of a breach in this case will be the termination of the contract under some terms and conditions. If liabilities are required from the company, it is important that the RI beforehand has made a management decision whether financial liabilities, in general, are acceptable. If the RI accepts liability, we recommend that it is linked to a direct loss that can be documented. In this case, it is particularly important that the legal actions will take place in a language and place convenient for the RI.

### 3.3 Collaboration and co-development

In joint innovation collaborations (e.g., EC projects), both the RI and companies (and, potentially, other partners) will bring their own knowledge and technology into the collaboration. We recommend using the DESCA<sup>10</sup> model, developed by the EC, as a balanced co-development starting point for a contract.

It must be recognized that the solution to be developed may have a mixed ownership since both the RI background knowhow, the company background knowhow and joint development foreground may constitute the solution. In this case, the following must be discussed:

- How does the RI ensure that they can use the solution themselves? E.g., if a project/collaboration leads to a software solution that the RI want to use but which the company refuses to give full access to.
- Can the RI do further development of the solution – potentially with another company?
- How does the company ensure that they maintain their know-how as a business secret and are not forced to hand it over to the RI that may distribute it to competitors?

These situations are often encountered concerning advanced supplier contracts on the Big Science market (cases: ITER grants, ESA, CERN). A few relevant collaboration models are also described in Deliverable 3.2 of the EUCALL EU-project<sup>11</sup>.

### 3.4 Innovation procurement

An RI may need a product or solution that does not exist on the market and which requires an unknown amount of resources for a company to develop and manufacture. For a supplier company, this is a huge risk and they would respond to a tender procedure with a high price to cover this risk. Often, useful knowledge about the technical solution will even be nested in the RI but since tendering

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<sup>9</sup> <https://mixn.org/>

<sup>10</sup> <https://www.desca-agreement.eu/desca-model-consortium-agreement/>

<sup>11</sup>

[https://www.eucall.eu/sites/sites\\_custom/site\\_eucall/content/e21597/e25317/e66313/EUCALL\\_WP3\\_Synergy\\_Deliverable\\_3\\_2\\_D20\\_31\\_03\\_2018.pdf?preview=preview](https://www.eucall.eu/sites/sites_custom/site_eucall/content/e21597/e25317/e66313/EUCALL_WP3_Synergy_Deliverable_3_2_D20_31_03_2018.pdf?preview=preview) (accessed August 2021)

is a very strict official procedure, the possibility to engage the interested companies in discussions are limited.

In these cases, the RI should consider the process we will call “innovation procurement”, which is a recent term to describe a procurement process that can encompass the uncertainty and risk of an innovative solution<sup>12</sup>. Similar processes are being used by the European Space Agency, where companies are invited to submit offers on how they will solve specific technical developments that benefit the European space industry.

Innovation procurement has high societal impact since the innovation becomes nested at the company who can exploit the technology or solution across market sectors. The RI should ensure that they maintain some rights to use the solution and further develop it with another partner at a later stage, while the company should be offered rights or a license to further develop the solution into other market sectors.

### 3.5 Service models

Regarding industrial users of RIs, it is the RI that is providing a service to a company. Normally these contracts will include confidentiality clauses (see section 9). The RI should establish “standard contracts” for particular services that are often requested by companies and the rates for manpower and access should be decided on an annual basis and approved both by the RI management and the member states or stakeholders. Since RIs are public bodies, they are often under strict rules on, e.g.:

- Selling services that are also offered by commercial entities, e.g. consultants (non-competition)
- Personal rates (EUR/hour) may not be lower than market cost (price dumping)
- Subsidies to companies are prohibited, i.e. deficits on RI services to companies is not accepted
- No member state may be given any preference
- No profit can be made on the services

Not all these restrictions are in place for all RIs, but it is important that the RI operates with transparency and consult their legal departments and member states to make sure the rules are followed. More interesting discussions on the services offered by light sources may be found in the aforementioned EUCALL Deliverable 3.2<sup>13</sup>.

## 4. Funding structures for collaborations

Collaboration with companies that leads to innovation and new developments at the companies will often be eligible to receive public support via national or European funding schemes such as, e.g., Horizon Europe or EUROSTARS. Most of these grants are designed to benefit innovation in the companies but they may also support the establishing of competences and equipment at RIs that companies can benefit from.

### 4.1 National initiatives

Each country in Europe (and often elsewhere as well) has several support mechanisms meant to facilitate innovation in their national companies with the goal of increasing competitiveness on the

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<sup>12</sup> See for example: Sonia Utermann, M.Sc. thesis: “Fostering innovation through Big Science procurement”, Wilhelm Büchner University, October, 2020.

<sup>13</sup>

[https://www.eucall.eu/sites/sites\\_custom/site\\_eucall/content/e21597/e25317/e66313/EUCALL\\_WP3\\_Synergy\\_Deliverable\\_3\\_2\\_D20\\_31\\_03\\_2018.pdf?preview=preview](https://www.eucall.eu/sites/sites_custom/site_eucall/content/e21597/e25317/e66313/EUCALL_WP3_Synergy_Deliverable_3_2_D20_31_03_2018.pdf?preview=preview) (accessed August 2021)

global market, creating more jobs, or improve society by, e.g., reducing CO2 emissions, pushing the green transition, etc.

Most mechanisms offer co-financing that either goes to the company itself, local partners (for example, universities or RTOs) or expenses to third parties, which could be payment for beamtime or similar.

The maximum allowed co-financing rate is determined at EU-level. For industrial development at companies, it is typically in the range 25-50 % depending on whether the company is an SME or a larger enterprise.

It is practically impossible for an RI to keep track of funding initiatives in individual countries since these open and close and have different restrictions. We recommend setting up collaborations with national contacts that can advise the RI on possible support mechanisms that may be relevant for companies originating from that country that may wish to work with the RI. The ILOs could play a role in this function, in particular, if they are employed by the same government agencies managing the funding instruments, such as, e.g., CDTI in Spain, who is the public agency, or if the ILOs are in a position to get involved in the grants directly, such as, e.g., DTI in Denmark, which is an RTO operating the Danish ILO-roles.

#### 4.2 EU level initiatives

The European Commission also has several funding mechanisms in place to support innovation. The Horizon 2020 programme in 2014-2020 administered a budget of 75 B-EUR that was granted to European public and private entities to facilitate new developments. The new Horizon Europe programme in 2021-27 will distribute 96 B-EUR. Under the former EC Research Framework Programmes, the RIs could typically count on dedicated call topics to apply for, while this is no longer the case in Horizon Europe for established RIs. Instead, we recommend the RIs to seek collaborations with companies, universities and RTOs and respond to more mission-oriented EC topics.

It would be also beneficial for innovation involving RIs if EC increased the number of collaborative initiatives such as, e.g., [ATTRACT](https://attract-eu.com/)<sup>14</sup> in which six of Europe's leading RIs including CERN and ESRF have joined forces with industry and experts in business and entrepreneurship to develop next-generation scientific tools and co-create new products, companies and jobs.

It is advised that the RI engage with the universities and RTOs that are writing the proposals and take on non-coordinator roles within a given consortium. In some situations, it may be worth considering hiring external support in proposal writing, which can extend from an expert review of a proposal to preparing the entire proposal.

Apart from the big Horizon programmes, the EC also have programmes specifically targeted SMEs. The most well-known are EUROSTARS, where a minimum of three partners from a minimum of two different countries join forces to develop a particular solution. The programmes for individual SMEs under the European Innovation Council (EIC) are called EIC Pathfinder, EIC Transition and EIC Accelerator. These may also be relevant for RIs working with SMEs and we refer to the relevant EC homepages for the latest information<sup>15</sup>.

Finally, we encourage the RIs to engage with the European Open Science Cloud activities on industry (EOSC-DIH), since both direct support and supporting data infrastructures may become available to

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<sup>14</sup> <https://attract-eu.com/>

<sup>15</sup> [https://eic.ec.europa.eu/index\\_en](https://eic.ec.europa.eu/index_en)

facilitate improved RI-industry collaboration on innovation. For further information, please consult the rules of participation and sustainability published by the EC<sup>16</sup>.

### 4.3 National ministries and agencies

In some cases, the national agency in charge of the membership of an RI may wish to make a special effort to get national companies to engage more with the RI, and increase, in this way, the national return on knowledge and innovation from the membership.

Potential grants in this area rarely go directly to the company, but instead to universities supporting industry. We recommend that the RIs keep a close engagement with their member states and encourage the agencies to make supporting grants available for increased industrial collaboration.

## Conclusions

The report has presented best practices and strategic recommendations that should be used by RIs seeking an improved relationship with industry. We have focussed on four themes which cover both the internal organisation and priorities within the RI, and strategies and tools for engaging with companies and ecosystems surrounding the RI:

- Organisational support for innovation (4 sub-areas)

Most important is to develop a strategy for the long-term collaboration with industry and get by-in from both management and owners of the RI – as well as the individuals working with industry at the RIs. The internal organization must support the strategy, and, most importantly, define the role and expectations to an ICO, if this role is prioritized by the RI. We also recommend setting up an industry advisory board and looking into other processes inside the RI for supporting innovation, e.g., if an incentive structure for creating spin-out companies should be developed.

- Engaging the innovation ecosystem (5 sub-areas)

When it comes to industry collaborations and innovation, RIs must recognize that they only represent part of the innovation landscape. Instead of investing huge efforts into building new portals and structures for industry engagement, it is considered more cost-effective to engage with the innovation eco-systems already in place. Industry clusters (including ILO clusters), RTOs and universities represent the main actors and every RI should work out a plan for collaborations -especially for local systems. Distributed facilities must also align expectations with their nodes on how to handle industrial collaborations. Special recommendations have also been made on how to further exploit the already existing ILO-networks.

- Industry collaboration models (5 sub-areas)

Several pitfalls concerning making contracts with industry have been identified, the most significant being confidentiality and liabilities. For collaborations such as co-development/collaboration, innovation procurement and service models, we encourage the RI to setup standard formats with an (internal) clarity on what are ultimate requirements and what is up for negotiation.

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<sup>16</sup> Rules of Participation (RoP): <https://op.europa.eu/en/publication-detail/-/publication/d96b59b8-70fd-11eb-9ac9-01aa75ed71a1/language-en/format-PDF/source-191673829>; Solutions for a sustainable EOSC: <https://op.europa.eu/en/publication-detail/-/publication/581d82a4-2ed6-11eb-b27b-01aa75ed71a1/language-en/format-PDF/source-175468053>

- Funding structures for increased industry collaboration (3 sub-areas)

Additional public funding to support innovation and collaboration with companies should be pursued by the RIs. It is important to be aware of both national and European initiatives that support especially SMEs in the interaction with RIs.

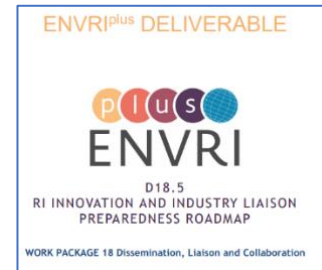
For now, the individual RIs must decide which of the above measures to implement. But we encourage both the RI management and the owners of the RI to carefully examine each point in the list and make an active choice on which items to focus.

## Appendix 1: Other relevant studies.

### ENVRIplus project, Deliverable 18.5

[http://www.envriplus.eu/wp-content/uploads/2019/07/D18.5-RI-Innovation-Roadmap\\_V2.pdf](http://www.envriplus.eu/wp-content/uploads/2019/07/D18.5-RI-Innovation-Roadmap_V2.pdf)

The domain cluster project ENVRIplus, developed a pilot of an “RI Innovation-Readiness Roadmap” that should help management and staff RIs from the “Environment” ESFRI domain become more innovation-savvy and interact more effectively with the private sector.



Screenshot 1: ENVRIplus project, Deliverable 18.5

### ESFRI Scripta Vol2: Long-Term Sustainability of Research Infrastructures (01.10.2017)

[https://www.esfri.eu/sites/default/files/ESFRI\\_SCRIPTA\\_SINGLE\\_PAGE\\_19102017\\_0.pdf](https://www.esfri.eu/sites/default/files/ESFRI_SCRIPTA_SINGLE_PAGE_19102017_0.pdf)

The second volume of the ESFRI Scripta series is dedicated to the outcomes of the ad hoc Working (WG) Group on Long-Term Sustainability (LTS) of Research Infrastructures. ESFRI has previously developed its concept of lifecycle of the Research Infrastructures in the framework of the Roadmap evaluation exercise, and at all stages of the lifecycle different aspects of sustainability were identified. The LTS WG has analysed the Long-Term Sustainability of Research Infrastructures from a broad perspective taking the ESFRI viewpoint well beyond the mere economical analysis.



Screenshot 2: ESFRI Scripta Vol2: Long-Term Sustainability of Research Infrastructures (01.10.2017)

### ESFRI Scripta Vol3: Innovation oriented Cooperation of Research Infrastructures (01.01.2018)

[https://www.esfri.eu/sites/default/files/ESFRI\\_SCRIPTA\\_VOL3\\_INNO\\_single\\_page.pdf](https://www.esfri.eu/sites/default/files/ESFRI_SCRIPTA_VOL3_INNO_single_page.pdf)

The third volume of the ESFRI Scripta series is built on the outcomes of the ad hoc Working Group on Innovation as approved by the Forum in March 2016. This ESFRI Scripta volume 'Innovation-oriented cooperation of Research Infrastructures' describes the different forms of industry and Research Infrastructure collaboration that generate innovation: industry as supplier for the construction / upgrade of the RIs, being instructed and guided in developing new technologies or production protocols; industry as partner of RIs and industry as user exploiting the specific dedicated access modes as well as through the academic access supported by research grants.



Screenshot 3: ESFRI Scripta Vol3: Innovation oriented Cooperation of Research Infrastructures (01.01.2018)

**Working Group on Innovation, Report to ESFRI, FI16-56-05 (March 2016)**  
[https://www.esfri.eu/sites/default/files/wginno\\_final\\_report\\_032016.pdf](https://www.esfri.eu/sites/default/files/wginno_final_report_032016.pdf)

The purpose was to contribute to the development of a strategy aimed to strengthen and improve the relations between Research Infrastructures and Industry and to promote the potential for innovation of Research Infrastructures in all its aspects. A set of conclusions and recommendations were drawn to the attention of Research Infrastructures managers and ESFRI in the perspective of the further implementation of the ESFRI Roadmap. These conclusions was used as input for the strategy discussions in ENRIITC.



Screenshot 4: Working Group on Innovation, Report to ESFRI, FI16-56-05 (March 2016)

**EUCALL project, Deliverable 3.2**

[https://www.eucall.eu/sites/sites\\_custom/site\\_eucall/content/e21597/e25317/e66313/EUCALL\\_WP3\\_Synergy\\_Deliverable\\_3\\_2\\_D20\\_31\\_03\\_2018.pdf?preview=preview](https://www.eucall.eu/sites/sites_custom/site_eucall/content/e21597/e25317/e66313/EUCALL_WP3_Synergy_Deliverable_3_2_D20_31_03_2018.pdf?preview=preview)

The EUCALL involved light source RIs from around Europe and presented an interesting discussion in Deliverable 3.2 on innovation potential. The work included sections on: Joint development of technology, Protection and commercialization of intellectual property and Commercial access to advanced laser light sources. Interesting discussions on innovation using technology transfer and the potential for creating spin-off activities.



Screenshot 5: EUCALL project website

**ERF Workshop: “The Socio-Economic Relevance of Research Infrastructures” (2012.06.01)**  
 “European Association of National Research Facilities Open to International Access”

<https://indico.desy.de/event/5340/overview>

Summary of main conclusions:

*A) Best practices in S&T Parks – The Grenoble Area – Impact on large-scale RIs – Amal Chabli, CEA-LETI*

Large-scale RIs are essential components in the landscape of the innovation cycles and industrial R&D (access for industrial applications, collaboration on technical developments and devices).

Limitations – Technical level: shutdown of regularly used beamlines, link between demand and supply (how the needs of industry are taken into account) – Requirements of industrial development cycle: speed and frequency of access – Specific constraints of industry competitiveness: IP management and confidentiality – Cost of beam time.

Need for a technological interface for industry users (“retrievers” are needed).

*B) EIRISS – Supporting cohesion between RIs and industry, finding effective measures to support European Industry for RI instrumentation development – Rachael Jack, STFC, UK*



The value of RI industry interaction is recognised by both parties (solutions showstopper technologies, new technologies to market, credibility, know-how and expertise) – Barriers: visibility of new opportunities in case of well-established relations with specific companies, new RIs have no industry forum, future technology requirements not mapped – Interaction barriers: culture (in-house development, R&D partnerships not part of the RI core mission, high risks of long-term development projects, no awareness of respective capabilities, administrative barriers (capacity to tender, public procurement rules – Knowledge transfer: few patents are granted

*C) Spin-offs from European Research Infrastructures – Some examples – Regina Rochow, Elettra.*

Spin-off companies as a good way to disseminate results for RIs.

Examples: Swiss Neutronics (PSI spin-off), Dectris (PSI license), Leosphere (LSCE), Soltecture (Helmholtz-Zentrum Berlin), Electrospinning Company (RAL), Novitom (ESRF), Kyma (Elettra), Instrumentation technologies (Elettra, Jefferson Lab & PSI). Typically 90% of turnover from international sales. Benefits: Strategic R&D partnerships & International knowledge interactions and spill-overs. RI spin-offs are global players and generate important benefits even outside the RI host region.

*D) Use of facilities by industry – Light sources as an example – Katja Kroschewski, DESY*

Industry access: Fast and easy access to industry customers – Study customer needs – Modular fine tuned services, full services, standardisation and reliability – Networking and partnerships – Suitable marketing mix.

Flexible access and support from synchrotron staff empowers even SMEs to use synchrotrons. Rapid access for short periods, flexible contractual procedures, liaison office and networking. Interaction with the industry is a people to people matter – Key account managers – Individual information and close personal contacts.