ESFRI European Strategy Forum on Research Infrastructures

Cooperation of ESFRI Research Infrastructures (Landmarks) with Industry

Report 2023

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ESFRI European Strategy Forum on Research Infrastructures

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1. Introduction

Cooperation with industry, where industry representatives act as either users or collaborators of Research Infrastructures (RIs), is one of the missions of ESFRI RIs. The ESFRI drafting group on Industrial Co-operation was set up with the purpose of getting a better understanding of the collaborative relationships between RIs and industry[1] (as RI user, collaborator or component provider), and to identify the areas where RI need further support in developing relevant guidance documents that would further enhance collaboration with industry. The work of the group goes in line with the December 2022 the Council of the European Union conclusions on RIs, which are one of the cornerstones in the development of the European Research Area (ERA). The following is stated in the Council Conclusions on Research Infrastructures and the New European Innovation Agenda of relevance to the topic of industry-RI cooperation.

The Council Conclusions on Research Infrastructures adopted in December 2022[2]:

"3. UNDERLINES benefits and impacts of public investments in RIs on industries, small and medium-sized enterprises (SMEs) and other relevant actors, through the activities such as proprietary access to RIs, contractual research, joint R&I, training and industrial supply of top-class products and services to RIs; EMPHASIZES the importance of further development of capacities and services of RIs addressing private sector needs in order to strengthen European competitiveness;

9. ACKNOWLEDGES that both RIs and technology infrastructures (TIs) are a part of the same infrastructure ecosystem; UNDERLINES that mapping users' needs for TIs, taking into account relevant work of ESFRI, is one of the prerequisites for the identification of a way forward for the implementation of the TI concept within the ERA Policy Agenda and a starting point for any future strategies and activities."

The Council Conclusions on the New European Innovation Agenda adopted in November 2022[3]:

"23. ACKNOWLEDGES the vital role of research infrastructures, technology infrastructures and testing and experimentation facilities as regional competence hubs, including the network of European Digital Innovation Hubs, which attract and integrate a broad range of R&I stakeholders in a solution-oriented and multidisciplinary way, facilitate acquisition of new knowledge, accelerate the uptake of new technologies by companies, and function as a catalyst for place-based innovation;

26. HIGHLIGHTS the essential role of regulatory sandboxes and testing and experimentation facilities, such as test beds, demonstrators, living labs and digital innovation hubs, for testing, demonstrating and upscaling innovative solutions, and for their translation from laboratory to industry through experimental activities carried out in a time-bound, controlled real-world environment and overseen by a regulatory authority; in this context STRESSES the role and functions of HEIs and research organisations and SUGGESTS a better promotion of their existing provision of safe environments for developing new technologies and for checking compliance of innovation with the regulatory environment and societal norms; WELCOMES the fact that the

[1] To describe industry in this report the terms 'business', 'company', 'organisation' are used interchangeably.
[2] COUNCIL CONCLUSIONS on Research Infrastructures, Brussels, 2 December 2022; 13921/22, https://www.consilium.europa.eu/en/press/press-releases/2022/12/02/research-infrastructures-council-adopts-conclusions/
[3] COUNCIL CONCLUSIONS on the New European Innovation Agenda, Brussels, 17 November 2022; 14421/22, https://www.consilium.europa.eu/en/press/press-releases/2022/12/02/new-innovation-agenda-council-adopts-conclusions/

revised State Aid Framework for Research and Development and Innovation will allow aid to be granted for the construction and upgrading of testing and experimentation infrastructures."

To support the work of the drafting group, an online survey was conducted to help ESFRI and the European Commission to (1) gain a deeper understanding of the scope and size of the collaborative relationships between industry and RIs; and (2) indicate future direction and support required for Research Infrastructures to best assist and engage with industry.

The survey was sent on 5th December 2022 (with a reminder in January 2023) through two channels:

1. the ESFRI secretariat via the ESFRI Monitoring System (MOS) to the coordinators of 41 Landmarks in ESFRI Roadmap asking them to circulate a survey on collaboration of industry with RIs among their respective industrial partners;
2. via the ENRIITC Industry Contact Officers/Industry Liaison Officers (ICO/ILO) network to ICO/ILO contacts with the request to share the survey link with their industrial partners.

In total 157 respondents participated in the survey, but only 89 (c.57%) of those completed the full questionnaire. For context the original survey questions have been added in the annex.

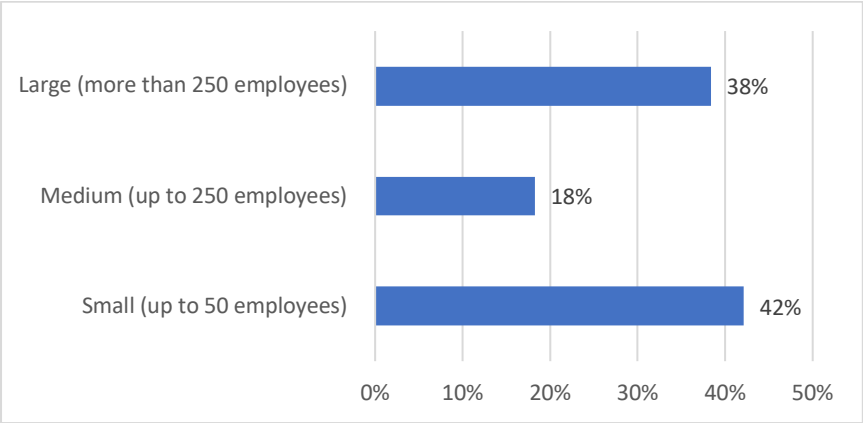
This survey of industry reported in this document complements the survey of the ESFRI Research Infrastructures (Landmarks) conducted in 2022.[4] One of the recommendations made in the earlier report was to explore how industrial partners see cooperation with research infrastructures, which was the focus of the work presented in the current document.

2. Introducing businesses and their cooperation with Research Infrastructures

A solid representation of small (67/42%) and large (61/38%) scale businesses participated in the survey with 29 (18%) of medium sized enterprises making up a smaller proportion see Figure 1. A considerable proportion of the respondents (145/92%) stated that they cooperate with Research Infrastructures and, as illustrated in Table 1, most of these RIs belong to the Physical Sciences and Engineering domain with all other ESFRI domains also being accounted for. A small proportion of respondents were unable to align the use of facilities with an ESFRI domain and instead stated that the RI they have cooperated with belongs to other (non-ESFRI) domains including: life sciences research, pharma & biotech, consumer goods, semiconductors, production/industrial, and the chemical industry.

[4] Bučar, M., Gerdina, O., and Brečko, B. (2023) Cooperation of ESFRI Research Infrastructure (Landmarks) with industry, https://zenodo.org/record/8178551

Figure 1: Size of the organisation completing the survey



Question: What is the size of your organisation? (n = 157)

Table 1: ESFRI domain of cooperating RI

ESFRI domain	n	%
Physical Sciences and Engineering	70	63%
Environment	18	16%
Health and Food	18	16%
Data, Computing and Digital Research Infrastructures	17	15%
Energy	14	13%
Other (non-ESFRI) domain (please specify)	8	7%
Social and Cultural Innovation	6	5%
Don't know	3	3%

Question: Which of the following ESFRI domains does the cooperating Research Infrastructure belong to? (Multiple answers were possible)

Questions were posed to better ascertain the level of knowledge from companies about the RIs and their subsequent engagement. The two most common forms of cooperation noted by the respondents were either as:

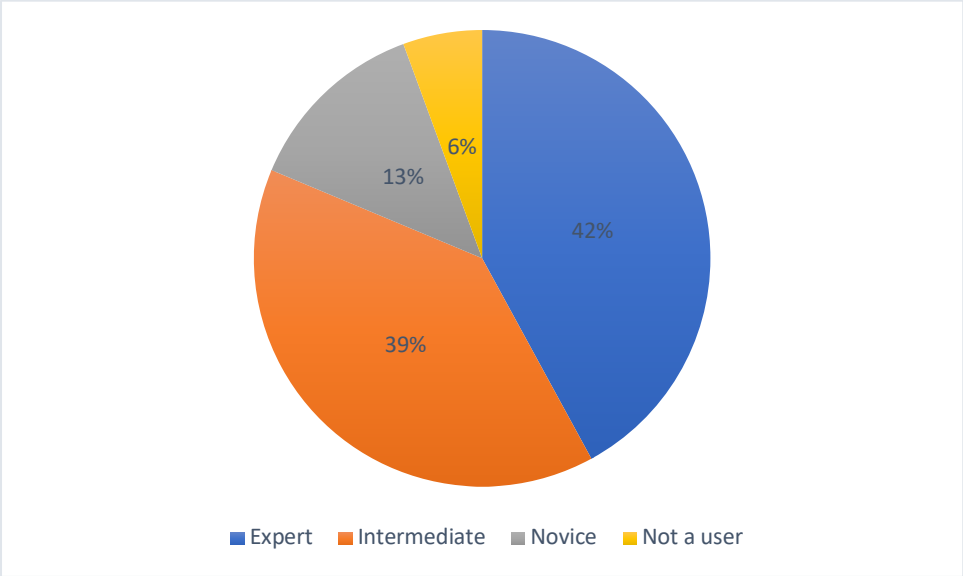
- a part of their in-house research projects (49 responses, or 43%)
- or an EU-funded research project they were involved in (47 responses, or 42%).

Approximately one third of users indicated that cooperation was required to accelerate their business and deliver on their strategy whereas a quarter stated that cooperation with RIs was not strategically planned and was *ad hoc* when the need for specific services required the RI use. Some other responses for engagement included, for example, invitations to collaborate and supporting basic research in providing measurement platforms.

As shown in Figure 2, most of the organisations consider themselves as either expert users (45 responses, or 42%) or intermediate users (42 responses, or 39%) of Research infrastructures. It is important to note that of the total number of 157 respondents, only 107 participants answered this question. Of those answered, only 6% of respondents identified themselves as 'non-users'. Some of the explanations offered by these 'non-users' included: the company being a supplier of technology for an RI, or delivering know-how, goods or R&D services and components to RIs.

When preparing the survey one assumption was that a company can be an expert or an intermediate user of an RI because of their involvement at a decision-making or advisory level with a particular RI. These could be a company representative being a member of the RI Executive Board, Industry Board, User Board, Scientific of Technology Advisory Board or other. However, a considerable proportion of respondents (75% or 79 people out of 105 who responded to this question) indicated that they did not hold a decision-making role within the RI.

Figure 2: Organisations identifying their experience of using Research Infrastructures



Question: Do you consider your organisation as an expert, intermediate or novice user of Research Infrastructures? (n = 107)

2. Type and mode of cooperation with Research Infrastructures

The most common types of cooperation between industry and RIs are:

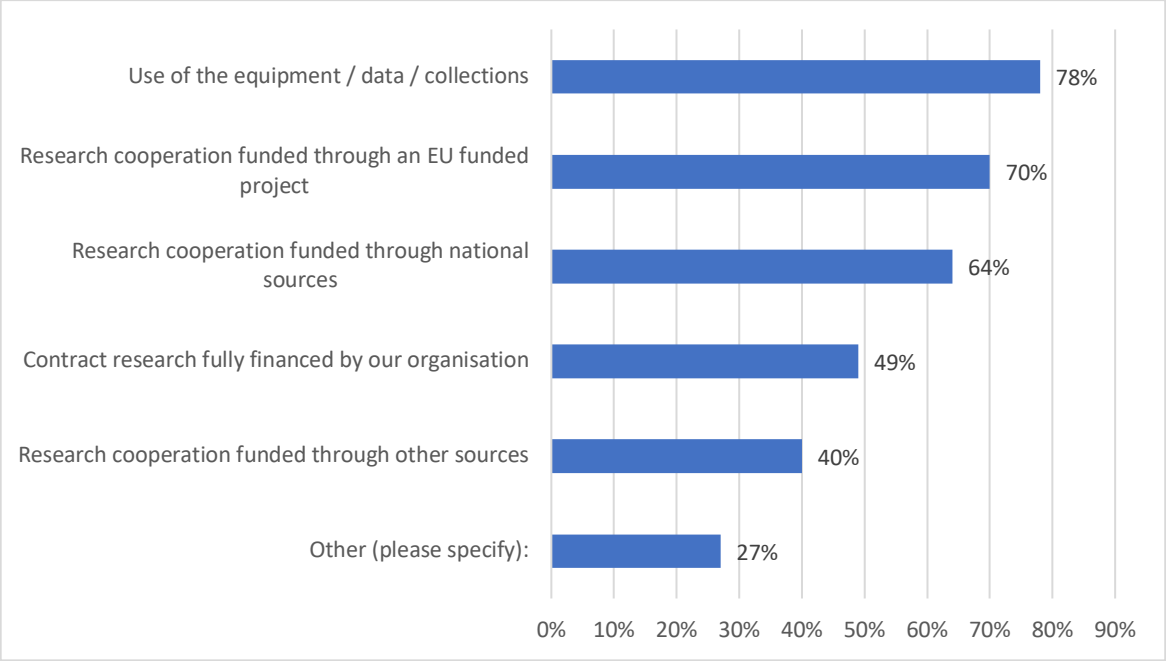
1. Research cooperation through an EU-funded project (62 responses)

2. Industry use of the equipment, data or collections (57 responses)[5]
3. Research cooperation funded through national sources.

In addition to the types of cooperation listed above two further options offered in the questionnaire were contract research fully financed by industry partners and research cooperation funded through sources other than the EU programmes or national sources.

A majority of respondents stated that they themselves initiated cooperation with the RI while a small proportion of respondents indicated that the approach was mutually led. This does raise a question as to whether RIs themselves are doing enough to promote engagement with the private sector.

Figure 3: Type of cooperation between businesses and RIs



Question: What type of cooperation does your organisation have with Research Infrastructures? (Multiple answers were possible)

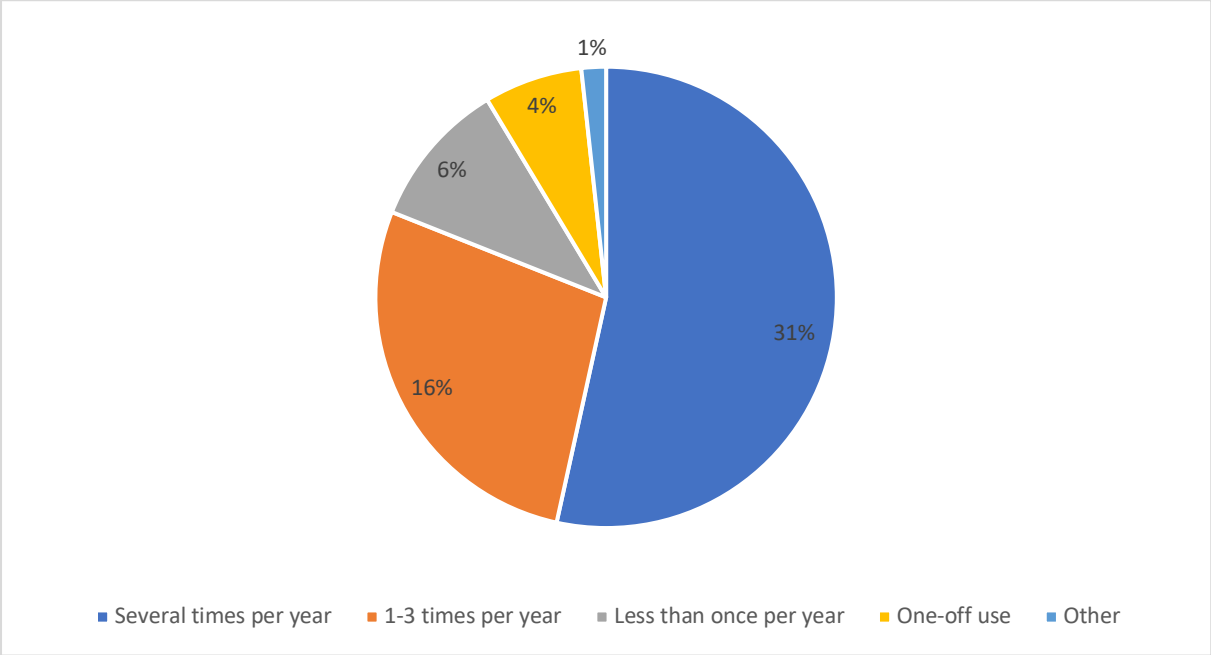
Most of the cooperation takes place either on-site (69 responses, 48%) or is virtual/remote (65 responses, 45%). Only nine respondents (6%) mentioned cooperation taking place through a facilitating or intermediary organisation. Several respondents offered further insights into the type of cooperation. For example, one start-up works with different entities for different projects as they need lots of research to be done and across multiple disciplines. In another

[5] Respondents were not asked to explain if this use was free of charge or for a fee and if the latter, how it was covered.

case, a company agreed on the measurements, sent their samples to the RI and the measurements were done by the RI staff.

On the frequency of cooperation, the majority of the respondents (53% of the total 93 responses to this question) stated that they cooperate with RIs several times per year (see Figure 4) with only six participants indicating a one-off use. The two respondents who chose 'other' refer to the fact that one of them only started cooperating with RIs two years ago and are still developing their cooperation; and another one cooperates with RIs on a case-by-case basis.

Figure 4 Frequency of cooperation between businesses and RIs



Question: How frequently does your organisation cooperate with Research Infrastructures? (n = 93)

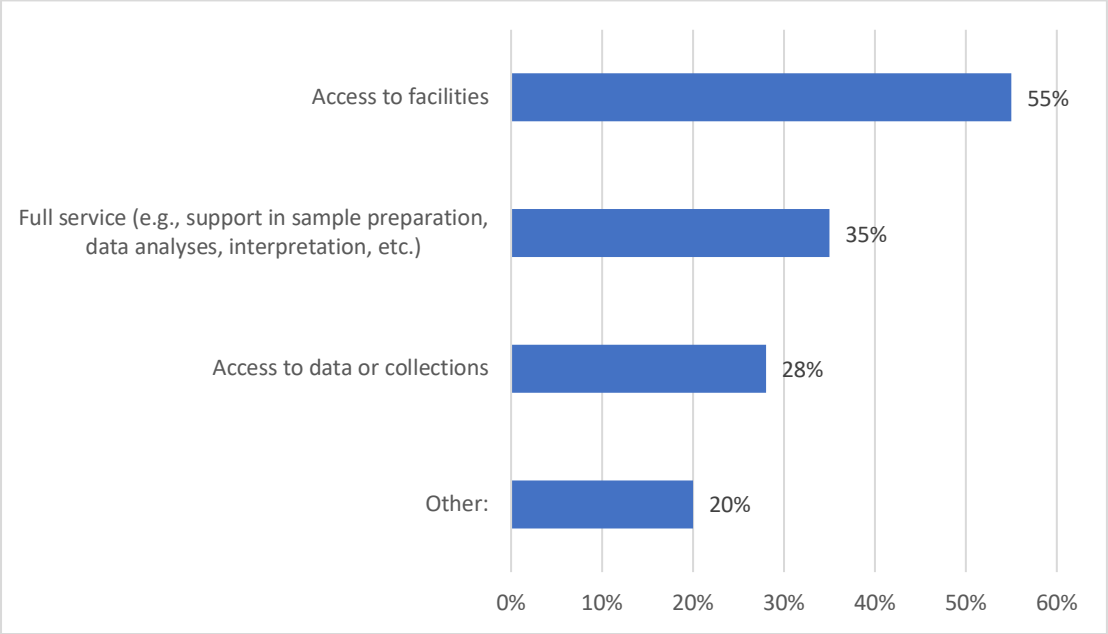
3. Services offered to and needed by businesses and main barriers

Research Infrastructures offer various services to their scientific and industrial users, and the users (depending on their needs) can use multiple services. Access to facilities was the most frequently identified type of service at Research Infrastructures that companies mentioned in the survey (see

Figure **5**) with almost 50 respondents (or 55%) mentioning it. Full service (e.g. support in sample preparation, data analyses, interpretation, etc.) were chosen by 31 respondents (or 35%) and nearly a quarter of respondents (25 / 28%) identified access to data or collection as an offered service. Two examples were provided regarding specificities of access - one company shared that due to a long-standing cooperation with RI they manage sample preparation and data treatment in-house.

Several respondents (18 / 20%) gave other examples of services, including data analysis and interpretation; development support; manufacturing of equipment for RIs; public relations; know-how; support in specific activities regarding the object of the project; engineering, manufacturing, assembly; access to expertise and sharing of technical insights; user experience with products manufactured by the company; feedback and application information. At least three respondents stated that it was the company themselves offering a service to RI (e.g. being a subcontractor and delivering metal parts, or company offering their own infrastructure).

Figure 5: Services offered by RIs to organisations



Question: What services do Research Infrastructures offer to your organisation? (n = 89)

(multiple answers were possible)

When asked whether services were currently lacking at RIs a majority of respondents considered that the services they receive are satisfactory. There was a small proportion that provided some insights into how things could be done better. As shown in

Table **2**, some organisations considered that certain services and actions could be developed further.

Table 2: Companies' views on which services / activities are currently lacking at Research Infrastructures[6]

Technical / scientific services / capabilities	Operational capabilities (incl. possible strategic considerations)	Administrative / funding related matters
AI capabilities	Pre- and post-project collaboration support to nurture long-term collaborations	Simpler tender procedures at some RIs
Prototype development	Faster response and reaction time	Funding rules that are easy to understand and adaption to common corporate controlling processes and data
High throughput data collection	More meetings planned during the development of projects	Fully funded short-term scientific missions (not just travel), and especially for junior researchers
Specific sample environment for SAXS/WAXS beamline (e.g. maintaining sample in vacuum during SAXS/WAXS data collection)	Interest to work with industry	More active in the promotion of projects, i.e. initiation of projects with industry
Standardised procedures for macro developments, for in-situ devices, for fast tomographies		
Continuous-field, low-noise high magnetic field facilities		
Help for data exploitation and analysis		
Broader expertise to meet different research areas		

Question: Have you identified any services that are currently lacking at Research Infrastructures? For "Yes", please specify. (n = 87)

Industry partners co-investing in RIs is nothing new, however the frequency and type of co-investment can vary. Most of the companies which participated in this survey (59%) indicated that they do not co-invest in research equipment at a Research Infrastructure facility. On the other hand some of the companies indicated more than one way of co-investing - 27% (23 responses) indicated that they co-invest as suppliers of equipment; 24% (21 responses) co-invest as providers of expertise; and 6% (5 responses) co-invest in other forms, such as through development projects; co-financing of R&D projects; co-financing of beamline; EU-funded

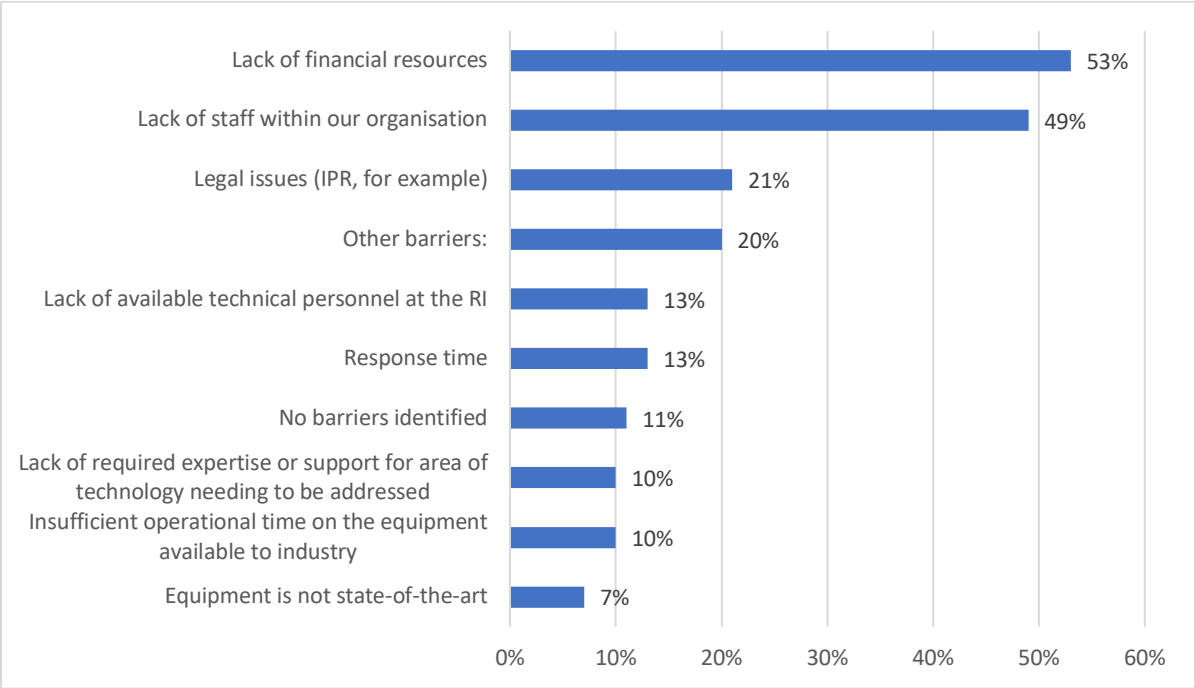
[6] The views listed are as received directly from respondents through the survey. Groupings into 'technical / scientific services / capabilities' and 'Operational capabilities/strategic considerations' was done by the authors. However, grouping into three categories (columns) was done by the author.

projects; or as co-investment from the academic side, not the industrial access to the infrastructure. It is important to note that some companies co-invest in multiple ways mentioned above.

In terms of identified barriers for cooperation with Research Infrastructures, only 10 (or 11 %) of the respondents stated that there were no barriers (see

Figure **6**). Nearly half of the respondents highlighted a lack of financial resources (47 responses, or 53%) and a lack of staff on the company side (44 responses, or 49%) as the main barriers. Other barriers include legal issues (e.g. IPR), response time, and lack of available technical personnel at the RI.

Figure 6: Barriers in industry-RI cooperation



Question: Where do you see the main barriers to cooperation with Research Infrastructures? (Multiple answers were possible) (n = 89)

As presented in **Error! Reference source not found.**, some additional barriers were listed.

Table 3: Additional barriers for industry-RI cooperation

Technical / scientific aspects
not enough data
lack of data analysis from the RI
advanced characterisation of companies' materials does not always give an answer to their complex questions, i.e. designing meaningful experiments and interpreting the data is not straight-forward which makes the justification of the time and money invested difficult
obtaining relevant sample, well prepared for experiment requires a lot of time before doing experiment with RI
Operational aspects
tools for sample declaration and shipment too much complicated and with many bugs
long-term collaboration should not be on a project-by-project basis but has to be designed as a programme
Administrative aspects
lack of feedback to the companies which present their expertise and would like to be involved in innovation projects
tendering processes and throughput time in decision-making
funding and tendering rules make it difficult to plan and commit
in high tech programs, the current tender processes do not fit
administrative burden for funding applications and processes
Financial aspects
limitations on the RI's side to take material expenses within their budgets resulting in a budget overload on industrial partners

too much on price instead of total cost of operation and quality. politics behind the screens
funding is waisted for features of equipment which could be used in the future (or not) instead of investing in easy to use equipment (at lower cost) for current needs
incomprehensible funding rules
price pressure from other countries
Value for Money
funding for short-term access (TNA...) involves a lot of paperwork and the funds are not received fast enough (waiting for 1.5 years).
Communication aspects
lack of information on what RIs offer and types of cooperation possible
Cultural aspects
too little recognition for industry; RIs seldomly treat industrial partners as equals
motivation of research infrastructures to work with industry
Legal aspects
IP is the main hurdle
legislation

Question: Where do you see the main barriers to cooperation with Research Infrastructures? (multiple answers were possible)

Note: authors interpretation based on the survey results

4. Insights into the future of industry-RI cooperation

Of the 87 respondents who reached the final questions of the survey, 68 (or 78%) stated that they do plan to cooperate further with Research Infrastructures. Only one responded negatively to this question. The remaining 18 organisations (or 21%) did not know about their future plans.

Some respondents offered specific examples on how they view their future collaboration with RIs:

- as member of an industry board, offer trainings for staff and users and/or contributions to training activities;
- development through collaboration and project development;
- long-term collaboration, it is important to efficiently use the project outcomes for a long-term base
- develop biodata management services for SMEs;
- beamtime applications in large facilities;
- application of EU projects for the developments of beamlines;
- ESRF high speed x-ray imaging;
- with ESRF, mainly SAXS/WAXS beamline, and high-resolution x-ray diffraction beamline;
- transfer of knowledge;

- at least as supplier of equipment, probably also on the research side;
- as electronic supplier providing a complete range of high/low voltage power supply systems and front-end/data acquisition modules which meet IEEE standards for nuclear and particle physics;
- expand projects to other technologies, in particular forfurther investigating nanoparticles, including in vitro and in vivo;
- develop new pieces of equipment;
- continued and regular access to state-of-the-art synchrotron data collection;
- software development;
- intensified research programmes and joint investments;
- continuation of the ongoing research;
- research, design and manufacture instrumentation for research institutions;
- continue offering access to our infrastructure;
- improve in CSP technology
- enhancing colaboration
- ACTRIS RI

Several respondents offered additional recommendations for the future, such as for RIs to get a greater understanding of the financial challenges for industry (especially in early stage development); not involving industry if RIs do not fully appreciate what commitment that involvement means to both sides; and availability of public funding to support for RI-industry cooperation.

5. Concluding remarks and recommendations for future work

As noted through this report, there is a healthy level of cooperation between industry and RIs with the majority of collaborations – regardless of company size – being related to research projects (either in-house or EU-funded)., The mode of cooperation is split between on-site and virtual/remote, although the frequency of interaction is, on the main, quite high (in most cases this was several time per year). It is also worth noting that a large proportion of interactions are within the Physical Sciences and Engineering domain. While this latter point may not come as a surprise it would be interesting to investigate this further with an eye on identifying ways to expand the number interactions between industry and other domains including health and social sciences.

Industry chooses to cooperate with RIs because this helps accelerate business and deliver on a set strategy. Sometimes however, cooperation is *ad hoc* when a need for specific services available at RIs arises. In both cases the initiative to start a cooperation mostly comes from industry. While this in of itself may not be surprising more efforts need to be developed for

RIs themselves to become more proactive in engaging with industry, for example through the recruitment of business development personnel to engage closer with external stakeholders.

The range of services provided by industry is very broad, which illustrates the diversity of product offerings available within the RIs:

- access to facilities,
- a full service (incl. support in sample preparation, data analyses, interpretation, etc.)
- access to data / collection,
- development support, manufacturing of equipment for RIs,
- know-how,
- support in specific activities regarding the object of the project,
- engineering research, manufacturing, and assembly,
- access to expertise and sharing of technical insights,
- user experience with products manufactured by the company;
- feedback and application information,
- and public relations.

That being said, some companies did note that further service provision would be welcome, which gives some direction for future development. Coupled with that, certain operational capabilities as well as administrative and funding related matters were raised as existing barriers for cooperation.

With all the above the strong message coming from the survey is that companies plan to cooperate further.

The RI-industry cooperation topic will continue to be on the agenda of various stakeholders. This survey focused on a high-level overview of the topic and brought to the attention many useful angles which would benefit from further exploration and the areas where RIs need further support in developing relevant guidance documents that would further enhance collaboration with industry.

Several topics for future investigation include the following:

- The most common types of cooperation are research cooperation through either an EU-funded project or national funding source, and industry use of the equipment, data or collection and research. For the former it would be benefitial to explore what is included in services for publicly funded projects. For the latter it would be interesting to explore differences between collaborative and contract research and its linked pricing, i.e. what is currently offered as free of charge and what is covered based on contract research.
- One of the observations coming out of the results of this short survey is whether RIs are putting enough efforts to promote engagement with industry and, subsequently, business development. Business development here should be understood as

development of services of interest to industry rather than services desired by the RIs themselves. A question to explore could be to look into the mechanism the RIs uses to establish which services are really needed by industry and how they are linked to the core activities of RIs.

- More detailed investigations would be helpful to unpack the granularity and the magnitude of services offered by Ris. For example, in case a RI performs certain measurements of the samples provided by a company, it is useful to understand who performs data analysis. And in cases where a cooperation takes places through an intermediary organisation, the examples of the exact role of such organisations would be helpful.
- Exploring the funding sources of the various steps of cooperation can be investigated further to understand any differences between the types of the Ris, perhaps scientific domains, or types of services etc.
- Finally, specific examples of existing (and planned) business models of RIs need to be highlighted where possible.. Many observations discovered through the current survey are linked to strategies of RIs and their business models. They cannot be solved continiously on an *ad hoc* basis but require strategic medium- to long-term efforts.

ESFRI European Strategy Forum on Research Infrastructures

ANNEX: Survey on cooperation between industry and Research Infrastructures

Dear Colleague,

This survey aims to gather your views on the cooperation between industry and European Research Infrastructures* (RIs), including those established under the European Strategy Forum on Research Infrastructures (ESFRI) and those categorised as having a legal framework to support their operation such as RIs established as ERICs (European Research Infrastructure Consortium).

Cooperation with industry, where industry representatives act as either users or collaborators of RIs, is one of the missions of ESFRI RIs. This survey will help ESFRI and the European Commission to:

- gain a deeper understanding of the scope and size of the collaborative relationships between industry and RIs;
- indicate future direction and support required for Research Infrastructures to best assist and engage with industry.

We kindly invite you to participate in this anonymous survey, which will take approximately 5 minutes of your time to complete.

If you require additional information or clarification of the questions, please feel free to write to us at esfri@fdv.uni-lj.si. We appreciate your cooperation!

* Research Infrastructures are facilities that provide resources and services for research communities to conduct research and foster innovation. They are major scientific equipment or sets of instruments, collections, archives or scientific data, computing systems and communication networks and any other research and innovation infrastructure of a unique nature and are is open to external users. European research infrastructure is open to attracting users from countries other than where the infrastructure is located. (Source: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/research-infrastructures_ en)

Q1 - What is the size of your organisation?

○ Small (up to 50 employees)

○ Medium (up to 250 employees)

○ Large (more than 250 employees)

Q2 - Does your organisation cooperate with Research Infrastructures?

○ Yes

○ No

(1) Q2 = [1]

Q3 - Which of the following ESFRI domains does the cooperating Research Infrastructure belong to?

Multiple answers are possible

☐ Environment

☐ Social and Cultural Innovation

☐ Physical Sciences and Engineering

☐ Data, Computing and Digital Research Infrastructures

☐ Energy

☐ Health and Food

☐ Other (non-ESFRI) domain (please specify)

☐ Don't know

IF (1) Q2 = [1]

Q4 - How did you plan your cooperation with Research Infrastructures?

Multiple answers are possible

☐ It was / is part of our in-house research projects.

☐ It was / is part of the EU-funded research project we are/were involved in.

☐ We felt we needed to cooperate with RIs to accelerate our business and deliver on our strategy.

☐ It was not strategically planned. It was ad hoc, the need for specific services required their use.

☐ Other (please specify):

(1) Q2 = [1]

Q5 - Do you consider your organisation as an expert, intermediate or novice user of Research Infrastructures?

○ Expert

○ Intermediate

○ Novice

○ Not a user (you can explain):

IF (1) Q2 = [1]

Q6 - Is your organisation involved at a decision-making or advisory level within a Research Infrastructure (e.g. a representative sits/sat on a RI Board such as the Executive Board, Industry Board, User Board, Scientific/Technology Advisory Board or other)?

○ Yes

○ No

(1) Q2 = [1]

Q7 - What type of cooperation does your organisation have with Research Infrastructures?

	yes	no
Research cooperation funded through an EU funded project	○	○
Research cooperation funded through national sources	○	○
Research cooperation funded through other sources	○	○
Contract research fully financed by our organisation	○	○
Use of the equipment / data / collections	○	○
Other (please specify):	○	○

IF (1) Q2 = [1]

Q8 - Who initiated the cooperation?

○ Our organisation

○ Research Infrastructure

○ Other:

(1) Q2 = [1]

Q9 - How does your organisation cooperate with the Research Infrastructure and access its services?

Multiple answers are possible

☐ On-site

☐ Virtual/remote

☐ Through a facilitating / intermediary organisation

IF (1) Q2 = [1]

Q10 - Further details may be added here:

_____

IF (1) Q2 = [1]

Q11 - How frequently does your organisation cooperate with Research Infrastructures?

○ Several times per year

○ 1-3 times per year

○ Less than once per year

○ One-off use

○ Other (please specify):

(1) Q2 = [1]

Q12 - What services do Research Infrastructures offer to your organisation?

Multiple answers are possible

☐ Full service (e.g., support in sample preparation, data analyses, interpretation, etc.)

☐ Access to facilities

☐ Access to data or collections

☐ Other:

IF (1) Q2 = [1]

Q13 - Further details may be added here:

_____

IF (1) Q2 = [1]

Q14 - Have you identified any services that are currently lacking at Research Infrastructures?

○ Yes

○ No

IF (2) Q14 = [1]

Q15 - Please specify:

_____

(1) Q2 = [1]

Q16 - Do you co-invest in research equipment at a Research Infrastructure facility?

Multiple answers are possible

☐ Yes, as suppliers of equipment

☐ Yes, as providers of expertise

☐ Yes, we co-invest in other forms

☐ No

IF (3) Q16 = [Q16c]

Q17 - Can you please specify:

_____

IF (1) Q2 = [1]

Q18 - Do you plan to cooperate further with Research Infrastructures?

○ Yes

○ No

○ Don't know

IF (4) Q18 = [1, 2]

Q19 - Please specify:

_____

Q20 - Where do you see the main barriers in cooperating with Research Infrastructures?

Multiple answers are possible

☐ Lack of financial resources

☐ Response time

☐ Equipment is not state-of-the-art

☐ Lack of staff within our organisation

☐ Lack of available technical personnel at the RI

☐ Insufficient operational time on the equipment available to industry

☐ Legal issues (IPR, for example)

☐ Lack of required expertise or support for area of technology needing to be addressed

☐ Other barriers:

☐ No barriers identified

Q21 - Further details can be added here:

_____

Q22 - Do you have any other comments or recommendations with regard to industry cooperation with Research Infrastructures?