



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under GA No 101004730.

I.FAST P2 Review WP3 report

M. Morandin for the WP3 group

15 July 2024



I.FAST WP3 "Industry engagement"

- The primary mission of Work Package 3 in I.FAST is to increase the **Industry involvement** in R&D and technical development activities, maximizing mutual benefits.
 - WP3.1: [led by Mauro Morandin (INFN)]: Explore and leverage the **potential and original contributions of industry** in I.FAST, particularly SMEs
 - WP3.2 [led by Djamschid Safi and Soerne Moeller (DESY)] : Stimulate the **development of the Knowledge Transfer potential** in I.FAST activities and promote its exploitation
 - WP3.3 [led by Jose M. Perez (CIEMAT)] : **Extend the involvement** of industry, favoring early engagement in R&D activities
- All WP3 partners **have actively participated** in planning and monitoring the activities
- Specific contributions:
 - WP3.1 activities: INFN
 - WP3.2 activities: DESY, CERN, UKRI
 - WP3.3 activities: CIEMAT, INEUSTAR, CDTI, CEA

WP3 Milestones and deliverables

- by the P1 review in Feb. '23 all WP3 milestones were achieved
- by this P2 review all WP3 deliverables have been produced too

Table 3.3: List of milestones

Milestone n°	Milestone name	Related work package	Duration (months)	Means of verification
MS8	Industry Advisory Board launch	3.3	10	Kick-off meeting report
MS9	IFAST KT Report ready	3.3	10	Report
MS10	Collection of feedback from industrial partners participating in IFAST	3.3	20	Report

Deliverables related to WP3	
D3.1: Industry Workshop Report <i>Report to document the outcome of the workshop</i>	M26
D3.2: Business development case report <i>Description of the activities carried out and of the results obtained</i>	M36
D3.3: Report on extended industrial contributions in R&D activities <i>Guidelines to improve the participation of private companies in R&D activities</i>	M36

WP3.1

- Main activities in P2
 - **Coordinating** the WP
 - Supporting the activity of the I.FAST **Industry Advisory Board (IAB)**
 - Fostering the collaboration with industry
 - in addition to the first Industry Workshop organized in 2022, two **thematic Industry workshops** were organized in 2023 and 2024, as follow-up to the feedback received from the IAB
 - not originally planned in the I.FAST proposal
 - creation and launch of the activities of the **Accelerator-Industry Permanent Forum (AIPF)** in collaboration with WP3.3
 - implemented a new initiative that emerged in the context of the first activities carried out by the IAPF: an **industry-driven session** at the IFAST general meeting
 - Addressing the industry-related issues raised by the **Scientific Advisory Board**
 - new **Innovation and TT survey** carried out at the end of 2023, including also the IIF projects

HTS Industry workshop - 18/4/23

- **Goals:**

- examine the challenges and opportunities to strengthen the cooperation on High Temperature Superconductivity with industry in Europe
- discuss the possibilities of developing initiatives that can make such collaboration most successful, with beneficial effects for our community and for society at large.

- **Very interesting** presentations and discussions

- talks are available at Indico: <https://indico.cern.ch/event/1264051/>

- two important initiatives were presented and discussed:

- short-term: a **possible project proposal on HTS developments** to be submitted to the 2024 INFRA-TECH call
- a longer-term: **Superconductivity Global Alliance initiative (ScGA)** to promote the definition and implementation of an **aggressive roadmap** to exploit the disruptive potential of SC application for tackling some of the **most important societal challenges**: energy, transportation, computing, medical diagnostics and therapy,...

- general comments from participants had been very positive although some indicated that we should have had **more time** for further interactions and exchanges



Cryogenics workshop

- **proposed by the I.FAST Industry Advisory Board** in May '23
- held in Paris, just before the I.FAST annual meeting
 - Tue. 16/4/24 afternoon, Wed. 17/4/24 morning
- organized by I.FAST WP3 with contributions from AIDA-INNOVA and LEAPS-INNOV
- goal was to present and discuss **ongoing technological developments in cryogenics for accelerators and related fields**
 - being pursued either in laboratories or in Industry
 - in particular to improve sustainability and efficiency.
- also an opportunity
 - to examine the **emerging business opportunities for European industry**,
 - to identify possible **collaborative interactions and initiatives** to develop the cryogenics European market in our research field
 - several 1-to-1 meetings between Industry and RI representatives took place.



M. Morandin - 15 July 2024



INDUSTRY WORKSHOP ON CRYOGENICS IN BIG SCIENCE

Organised and supported by I.FAST, AIDAInnova and LEAPS-INNOV, the European INFRA-INNOV projects for particle accelerators, detectors and photon science

Paris, 16 - 17 April 2024

Program Committee

- Johan Bremer (CERN)
- David Grillot (ITER)
- Javier Munilla (CIEMAT)
- Ruggero Pengo (INFN)
- Giovanni Calderini (LPNHE / AIDA-INNOVA)
- Rita Pinho (CERN / AIDA-INNOVA)
- Marie-Emmanuelle Couprie (SOLEIL / LEAPS-INNOV)
- Ziad Melhem (Oxford Quantum Solutions)
- Erik Fernandez (Ineustar)
- Friedrich Haug (CERN ILO / DESY-PT)
- Mauro Morandin (INFN)
- Enrico Maria Franchin (INFN)
- Elena Colombo (INFN Secretariat)



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Fondation Biermans-Lapôte
Cité Internationale Universitaire de Paris

<https://indico.cern.ch/e/CryoWS2024>



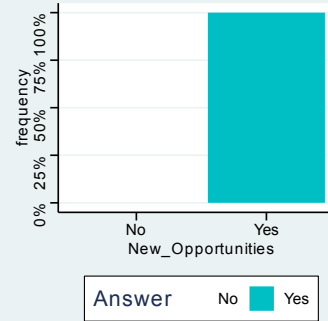
I.FAST, AIDAInnova and LEAPS-INNOV have received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement No 101004730, 101004761, 101004728, respectively.



Good participation of companies and post-event feedback

- **21 industry representatives** registered
- very positive outcome from the survey carried out after the event
- all respondents confirmed that the workshop have given them a chance **to establish new contacts** and to open up new **collaborations and business opportunities**

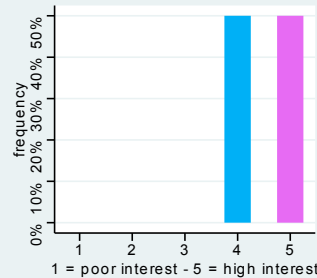
Do you think the Industry Workshop has given you the opportunity to open up new business and collaboration opportunities?



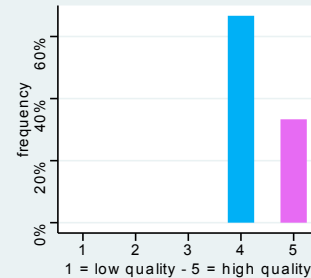
Do you think the Industry Workshop has given you the opportunity to establish new contacts?



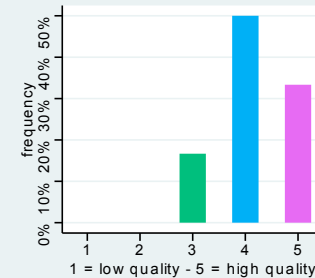
interest on the topics covered during the Industry Workshop



quality of the information conveyed during the Industry Workshop, based on the presentations shown

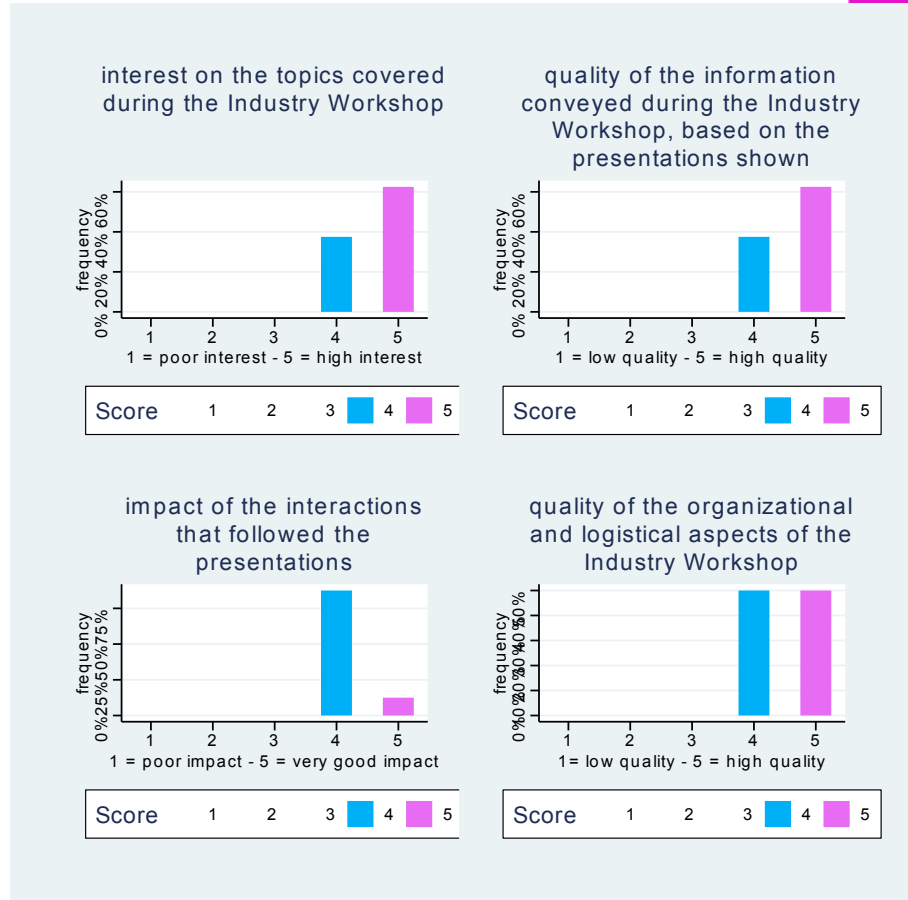
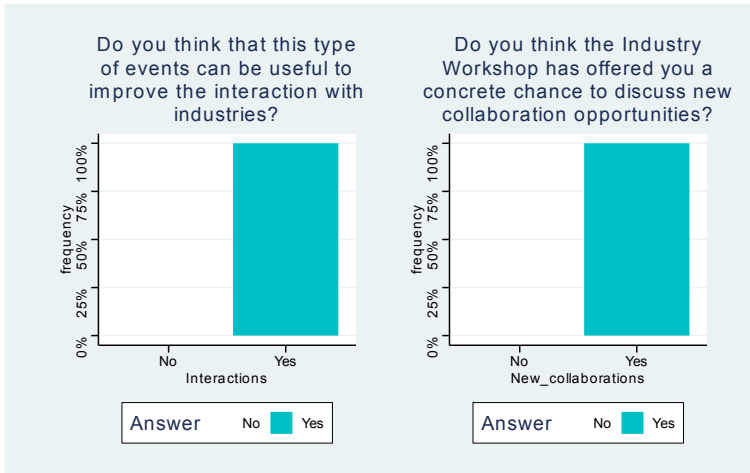


quality of the organizational and logistical aspects of the Industry Workshop



Good feedback also from R.I. representative

- > 50 participants registered
 - even from IHEP - Beijing
- similar outcome
- respondents indicated that the workshop offered concrete chances of discussing new collaboration opportunities



Accelerator Industry permanent forum (AIPF): the follow up

- Idea was brought up in the discussions with industry at the first Industry Workshop in 2022
- discussed during the **2022 BSBF in Granada** (October 2022) with some representatives of the I.FAST IAB and WP3 members.
- Proposal submitted to the **TIARA Collaboration Council** on 2022-10-18. Very well received
- **Forum Terms of Reference** was drafted, discussed with the I.FAST IAB, and finally approved by the TIARA collaboration
- The ASc&T Industry Permanent Forum was endorsed by the TIARA Governing Council on February 21, 2023

AIPF Terms of Reference: goals and activities

- **general**

- Establish a long-term **co-innovation strategical cooperation between industry and research institutions**, beyond the **scope and time frame of specific projects**.

- **ad hoc activities:**

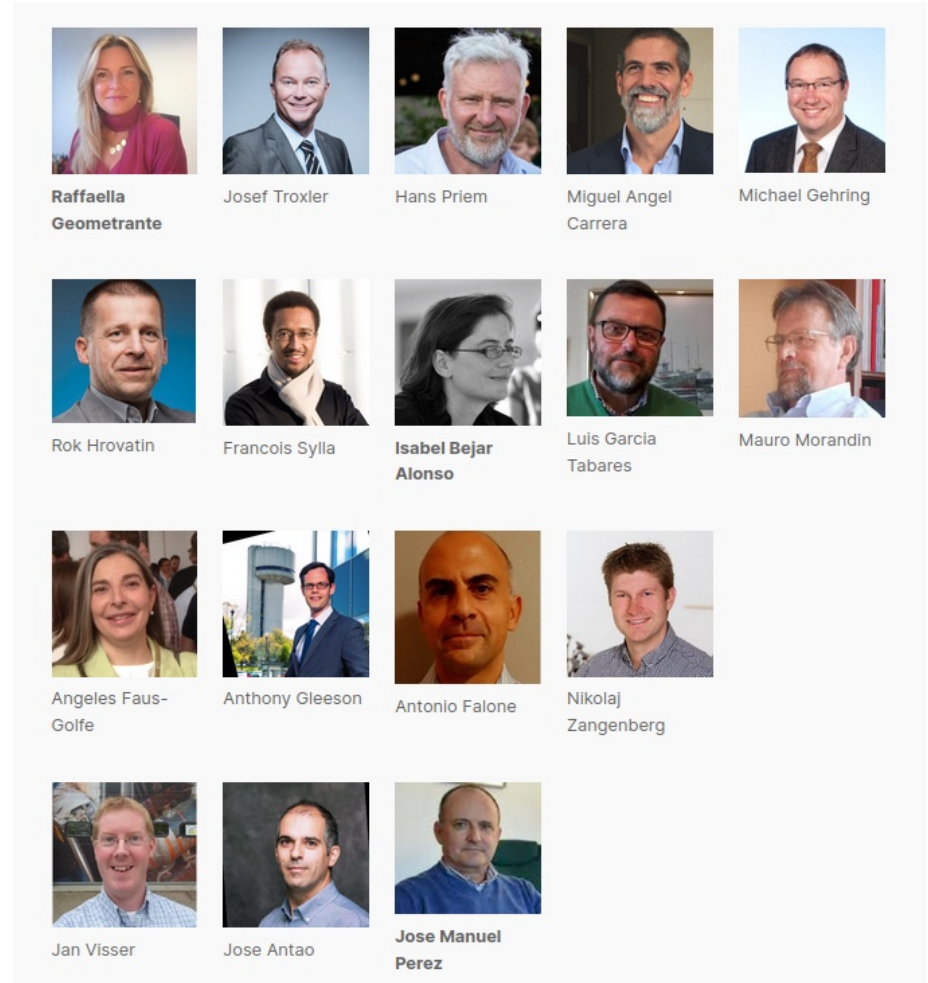
- Provide support for the **definition of the accelerator Science and Technology road-maps**, following an integrated approach that takes into account the resources and the capabilities available, or to be developed, at both Research Institutions and Technological Infrastructures (RI&TI) **and Industry**.

- **continuing effort:**

- 1) Outline strategies to **remove obstacles** that limit the optimal exploitation of the synergistic cooperation between industry and RI&TI.
- 2) Indicate possible actions to **fully develop the European industrial potential and respond to possible specific industry needs**
- 3) provide **support to Accelerator-related European projects** in setting up and coordinating their industrial liaison of advisory bodies

AIPF composition

- The is composed by:
 - 7 representatives of the industrial partners
 - 7 representatives of the ASc&T European Centers and Institutions
 - 2 representatives of governmental agencies working as Industry Liason Officers
 - The TIARA coordinator as an ex-officio member of the Forum
- co-chaired by **Raffaella Geometrante** (Kyma) and **Isabel Bejar Alonso** (CERN)



Innovation survey

- Scientific Advisory Committee expressed some suggestions in May '23:
 - **I.FAST technologies should be critically assessed** with regards to a realistic pathway to identified markets and the time scales required.
 - For each technology, it would be good **to get idea of technology readiness level (TRL)** as not all developments seem to have the same level of market-readiness.
 - It was not always made clear enough **which developments are happening because of I.FAST**
- we decided to provide some feedback to the SAC by carrying out a new survey throughout I.FAST

II Survey

- Extends the first survey by
 - including 10 new tasks that had not participated in the first survey;
 - including the new Internal Innovation Fund (IIF) projects started in 2024;
- Updates the assessments for the tasks involved with the first survey.
- Questionnaires were therefore distributed to the coordinators of
 - 24 task-related activities (10 new)
 - 8 new IIF projects.
- Feedback from
 - twenty activities (83 %)
 - seven out of eight IIF Projects (88%)
- Results of first preliminary analysis sent to SAC and discussed in the IAB



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[I.FAST II Innovation and KT survey]

[WP3]

DATE: 10.04.2024

ABSTRACT

This report contains the results of an initial analysis of the results obtained from the second reconnaissance on innovation and technology transfer potential of the R&D activities of the I.FAST project.

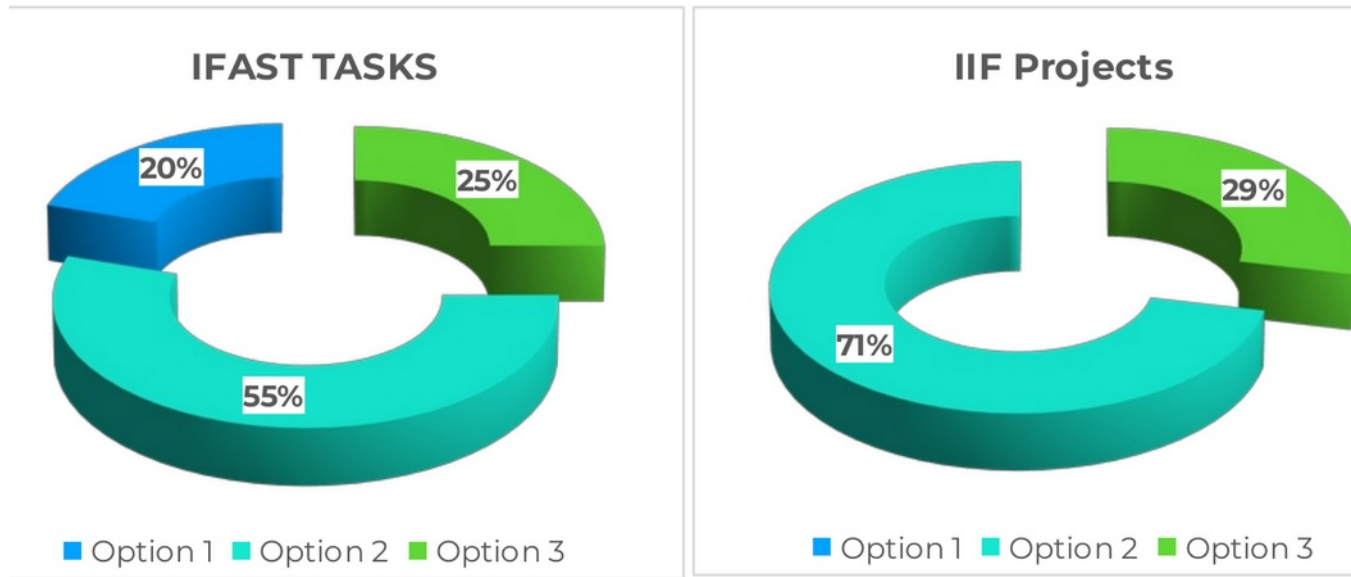
Projects receiving funding from the Internal Innovation Fund were also included in this reconnaissance, and issues identified as priorities by the Scientific Advisory Committee in 2023 were specifically considered.

I.FAST Consortium, 2024

For more information on I.FAST, its partners and contributors please see <https://ifast-project.eu/>

First question

What kind of innovation is it expected to be generated by your R&D activity?



- Option 1: ... **spillover to industrial partners is expected to be limited** ...
- Option 2: ... **significant innovation to industrial products and/or processes**
- Option 3: ... **industrial innovation is definitely an expected outcome.**

Industry driven session

- proposal triggered by the first discussions within the newly created **Accelerator Industry Permanent Forum**
- the idea is to **give the floor to Industry** to present their views on
 - how to **make the collaboration with research institutions more effective**, especially in terms of **improving the commercial exploitation** of technology developments.
- European companies working in the accelerator field have be invited to propose **15-20 minutes talks**
- Response from industry **has been good** as it appears from the agenda



Industrial technologies for the production of advanced ceramics and composites for Big Science facilities Speaker: Sergio Rivera Nanoker_2024_ifast...	15m
Eliminating risks by stern integration of control systems Speaker: Rok Hrovatin (COSYLAB) CSL_FAST_Elimina... CSL_FAST_Elimina...	15m
From science requirements to applications in industry Speaker: Michael Pekeler (RI Research Instruments GmbH) 2024-03-17-IFAST-P...	15m
Lessons learned and perspectives for a more effective exploitation of the industrial potential in Accelerator Magnet projects Speaker: Wolfgang Walter (Bilfinger Noell GmbH) Walter W Lessons A... Walter W Lessons A...	15m
The win-win benefit of industry-academia collaborations in new solution and product development Speaker: Etienne TOUZAIN The win-win benefit ... The win-win benefit ...	15m
Accelerating science to market Speaker: Hans Priem VDL ETG - IFAST an...	15m
Towards energy efficient accelerator magnets: Development of commercial large-scale production of filamentary HTS tapes Speaker: Anders C. Wulff (Subra) SUBRA_IFAST_2024...	15m

WP 3.2: Knowledge Transfer and Business Opportunities in Accelerator R&D

- Objectives
 - **Foster the Knowledge Transfer (KT)** to industry
 - Stimulate the build-up of **added industrial value in terms of creating new IP**
 - Establishing new activities for existing companies, and **facilitating the creation of spin-offs**
 - Support the beneficiaries in achieving an **optimal exploitation of the KT originated by I.FAST**

WP3.2 - Phase II

- during P1 assessment of the **knowledge transfer and innovation potential** of I.FAS activities was performed,
- in P2 the aim of the task was to identify activities that could profit from a closer investigation of this potential and that could be supported for pursuing the definition of a **possible business case**
- project funded by the I.FAST Internal Innovation Fund (IIF) were finally identified as the most promising for this investigation
 - this was confirmed by the second survey of the Innovation potential carried out in 2023 and previously mentioned
- The in-depth analysis of one specific IIF project was then started, to study the possible business case through an interview and further interactions
 - in close coordination with the WP4 responsible for the IIF projects.
- The results were collected in a report that
 - **outlines the approach followed**, which can now be applied also to the other projects
 - illustrates the outcome of the preliminary analysis carried out and **defines a roadmap** towards the development of the business case.
- An important aspect of this work was to understand, whether the activities have ongoing and sufficient support from the home Institution's KT/TT offices, to professionally further facilitate the achievement of the relevant objectives.
- In the last year of the WP3.2 task activities, this analysis is being carried out for other IIF projects and then the progress is going to be periodically monitored



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Horizon 2020 Research Infrastructures GA n° 101004730

DELIVERABLE REPORT

Business Development Case Report

DELIVERABLE: D3.2

Document identifier:	IFAST-D3.2
Due date of deliverable:	End of Month 36 (30.04.2024)
Report release date:	xx/xx/2024
Work package:	WP3.2: Knowledge Transfer and Business Opportunities
Lead beneficiary:	DESY
Document status:	Draft

ABSTRACT

The task 3.2 in Work Package 3, "Industry Engagement", aims to optimize the industrial innovation and knowledge transfer potential of IFAST R&D activities. This report summarizes the approach and exemplary results from analysing the IFAST Internal Innovation Fund (IIF) projects with respect to their business case potential. Together with a case framework suited to these projects, prior information was connected with results from surveys and interviews to form a starting point for an evolving business case, which can be refined through continuous engagement with the projects, industry partners and stakeholders.

WP3.2: TT support initiatives

- Based on the results and responses of the initial Knowledge Transfer and Innovation potential survey (whose results are summarized in the Milestone MS9 report), IP workshops were coordinated between WP3.2 and LEAPS-INNOV
 - Most requested support coming from I.FAST activities was related to the assessment of commercial potentials and consultancies regarding IP and licenses.
- Following the two workshops executed and shared with the I.FAST activities in Period 1:
 - one workshop on reading and understanding **inventions and patents** was repeated in Period 2,
 - a fourth workshop on exploitation/utilization of research software was held on May 15, 2024.
 - It gave a basic overview about **utilization of research software**, starting with the evaluation of the exploitation potential of research software, through clarification of the legal conditions, to the identification of suitable transfer paths and design of the respective business models, up to the creation and negotiation of license agreements.
- More opportunities of exploiting common initiatives with the other projects will be pursued in the coming months

WP3.3: Actions and final objective

- Main planned actions:
 - Perform a survey among the companies to identify **possible ways of extending the industrial contributions** to the R&D activities
 - Collect the feedback from RIs/TIs on the **conditions that should be fulfilled to make the extended contributions possible**
 - **Compile and analyze** the collected material
 - Discuss and propose **specific recommendations**

WP3.3 in P2

- The work carried out in the preceding phase produced a long **list of issues** deemed critical for achieving **a more advanced research infrastructure-industry approach** at **early stages** of the R&D process **and low TRL** (see MS10 report)
- we then made an evaluation about the **best approach to be adopted for addressing** them
 - The study was conducted by CIEMAT, with support from INFN, an industry association (INEUSTAR) and a public agency supporting industrial development (CDTI).
- At the end of the work it was then decided to act on two fronts:
 - start tackling one of the main issues that had emerged earlier, with the involvement of an external specialized company
 - study about the **level of adoption and exploitation** by I.FAST Research Institutions of procurement procedures to **foster innovation**
 - at the same time, **involve industry** in discussing and planning the other possible actions
 - but with a new approach based on **an organic and not episodic interaction** and exploiting the concept of the **permanent forum**
- As a result, we acted to
 - Establish the **framework and the context** for the creation of Accelerator Industry Permanent Forum (**AIPF**);
 - promote the **launch of its activities**;
 - identify the **priorities** in collaboration with the AIPF;
 - elaborate of the final list of **recommendations and conclusions**.

WP3.3: Innovative Procurement

- the study was based on the detailed analysis of recent experiences by Research Institutions involved in accelerator R&D, from Spain, Italy, France, the UK and Sweden.
 - a total of **22 purchasing procedures** were examined in detail
- the outcome included a global assessment that turned out to be encouraging, since it revealed that in many cases, despite different rules and practices being followed, **there is a sufficient level of flexibility** that is generally applied in procurement by Science Organization involved with Accelerator R&D
- at the same time, the need of a **more widely and uniformly adoption of best practices** have also emerged from the study.

The key ingredients identified were the following:

- **functional specifications** combined with **multiple step procedures**, allowing adjustments and revisions throughout the execution process
- differentiation of award criteria for **tenders with negotiation or competitive dialogue** from those used for open tenders
- use of contractual **performance incentives**
- valorization of **proposed approaches and processes**, rather than just technical solutions, in the best-value-for-money adjudication criteria
- admission of **variants, options and contractual modifications**
- adoption of **flexible intermediate milestones** related more to deliverables than to deadlines
- **seamless communication** among the involved parties to identify potential risks, develop timely mitigation strategies, and enhance risk management.



WP3.3 in P2

- Summary of the other steps we went through:
 - **Creation of the Accelerator Industry Permanent Forum (AIPF)**, to provide a act as an industry consultancy board for the accelerator field.
 - In June 2023, the AIPF was created with the mission of bringing together Industry and the Accelerator Science and Technology community beyond specific projects.
 - **Prioritization of the actions with the support of the AIPF industry board**
 - A questionnaire was submitted to the corresponding board members subgroups (industry and RIs) of the AIPF. Two online meetings made it possible to discuss the outcome of the survey and agree on the final priorities.
 - **Elaboration of the final list of recommendations and conclusions**, with a final table of prioritized proposed actions.
- All this work has been documented in the report submitted as deliverable D3.3.



M. Morandin - 15 July 2024



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Innovation Fostering in Accelerator Science and Technology
Horizon 2020 Research Infrastructures GA n° 101004730

DELIVERABLE REPORT

Report on extended industrial contributions in R&D activities

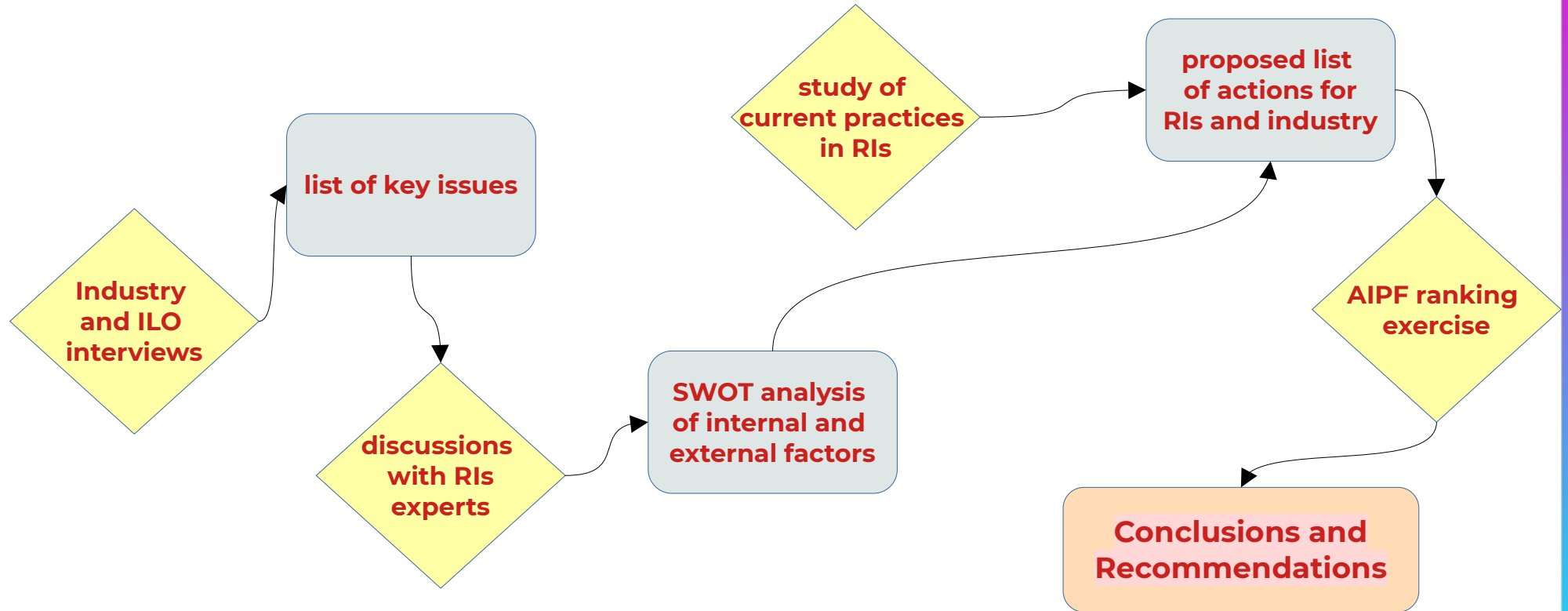
DELIVERABLE: D3.3

Document identifier:	IFAST-D3.3
Due date of deliverable:	End of Month 36 (April 2024)
Report release date:	16/02/2024
Work package:	WP3: Industry Engagement
Lead beneficiary:	CIEMAT
Document status:	Final

ABSTRACT

The fundamental goal of the Task 3 of WP3 of IFAST (WP3.3) is to identify how the accelerator science and technology community can improve the effectiveness of industry-research institution collaboration at early stages. In this deliverable report, the workplan of WP3.3 is described, together with the collection of feedback both from industrial partners and research institutions to the central issue addressed. An effort has been made to guarantee a representative contact with the industrial sector. The analysis developed has been discussed in a second iteration with industry and research institutions and their feedback are compiled. The conclusions obtained provide a number of topics to address. None of them are simple, nor implementable at a short-range without a strong commitment of the whole community. Some of them may be controversial, since they can affect to the internal strategy of research institutions and may represent an effort difficult to accomplish without implementing specific plans that will demand funds and resources. In this context, the ideas collected and discussed in this work with the industry and the research institutions may represent a valuable reference for incoming initiatives, both for specific developments and for wider roadmaps of the accelerator science and technology community.

Process flow



WP3.3 report highlights

- The report provide a **comprehensive description of the issues** that need to be addressed and the **possible actions to be taken** as perceived by the involved parties.
- It can represents a **valuable reference for future initiatives**, both for specific developments and for broader road-maps of the accelerator Sc&T community.
- However, the study also highlighted the fact that **no actions are easy or quick to implement without a strong commitment** from the entire community.
- Some of them may be controversial, as they in some cases may affect the internal strategy of research institutions and, in other cases, may require **specific planning with associated funds and resources**.
- Therefore it was felt most useful to distill a limited number of **higher priority and broad recommendations** that are finally proposed for the attention of the Accelerator Sc&T community

Recommendations

- 1) To make progress in the right direction it's important that, wherever possible, both the RIs and industry succeed in **bringing out the clear positions of their respective sides**, so that they can then be discussed in **a context of mutual understanding** and lead to **shared initiatives**
Continuity of this process is essential, so a relevant effort must be carried out to create **a permanent and effective ASc&T-Industry forum** and **secure the resources needed for supporting its activities**
 - the newly created **AIPF** is a first attempt in this direction
- 2) An objective on which there is already a broad consensus is the **wider adoption of best practices and tools for innovation procurement** to facilitate business participation in development activities.
 - to be taken into account also in future project proposals
- 3) Contractual aspects that are deemed most critical for engaging SME in R&D activities (e.g.: liability terms, guarantees, terms of payment) should be analyzed to find possible ways of **mitigating their negative impact**
- 4) Explore and promote the development of **accelerator industrial applications beyond basic Science**.
- 5) Implement a longer-term strategy and coherent planning for **addressing the list of actions** that have already been identified as most promising.

Relevance of WP3 objectives and impact

- WP3 activities **have been carried out as originally planned** for all tasks, with some minor delays
- they have confirmed the importance of the WP3 commitment of **consolidating the collaboration with Industry** by implementing a real co-innovation paradigm
- the **response from Industry and the I.FAST collaborators** to the initiatives carried out by WP3 aimed at implementing this approach **has been good**
- in the remaining part of the project we will work to consolidate the work done so far