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1. Introduction

The LEAPS-INNOV partners are working on six collaborative technology projects (work packages WP2-7) selected from the LEAPS Technology Roadmap as based on their innovation potential and their ability to advance and maintain European light source leadership.

The LEAPS-INNOV project is focused in developing the interaction and partnership of the LEAPS facilities with industry in two key aspects:

- Firstly, with industry as a collaborator in technological developments (WP2-7): LEAPS is a very strong and highly innovative partner for high-end technology industry in Europe and worldwide, which are often SMEs, where companies serve as suppliers to the facilities of beyond state-of-the-art technologies they need to stay at the forefront of science (national investments of approximately EUR 2.3 billion for approved and planned upgrades of LEAPS RIs from 2020 to 2030, and additional investments from over 30 non-European facilities). The LEAPS facilities are therefore willing and able to take significant technological risks together with the industrial partners to incorporate cutting-edge technologies into their facility portfolios and to enable the industrial partners to gain an edge in technology supply.

- Secondly, with industry as a user of the facilities (WP8): All facilities strive to have industry exploiting their facilities as users, demonstrating direct economic relevance and support to industry by providing high quality services. SMEs remain under-represented in this aspect and, based upon the successful activities within the Horizon 2020 project CALIPSOplus, a single access portal programme targeting SMEs as users depicts one key part of the industry relations that LEAPS-INNOV is targeting. This development is in line with standardisation and harmonisation of processes at RIs, a key issue for industrial users seeking research infrastructures. In terms of facility use, and where Europe has the world-leading set of light sources, LEAPS-INNOV will build a medium- and long-term perspective on enhanced engagement, using the critical mass of LEAPS and the vast pool of expertise, tools and scientific know-how for supporting industry. This will allow LEAPS to look and act ahead in concrete terms for smarter and deeper connections with the European industry base.
The WP8 has been designed around the specific objective to “Create an innovation ecosystem around light sources” which indeed covers the two aspects mentioned above and even more.

The WP8 role is to coordinate bridging toward industry as a technology collaborator supporting the technology developments WP2-7, as well as facilitating the transfer of LEAPS skills, technology and know-how towards industry (also as technology user) and the economy at an accelerated level via the following Tasks:

- Building partnerships with industry in its role as user, collaborator and supplier of LEAPS facilities across the EU member states, including industry-targeted events
- Exchanging best practices, including IPR rules, and building collaborative and joint approaches towards industry

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- Supporting the activities of the RI Open Innovation Coordination Group of the Innovation Pilots
- Facilitating access for SMEs via a dedicated platform to promote cutting-edge industrial research at LEAPS facilities.

A strategy will be developed on how light sources with their facilities, skills and expertise should best engage with industry in the context of LEAPS as an integrated European cluster of large-scale facilities.

This document is focused on the work done under Task 8.1.1: Light source exploitation and under Task 8.2 Boost innovation in European SMEs. Through these Tasks, involving all LEAPS members, the WP8 representatives are supporting the beneficiaries of those WPs with industry engagement, intellectual property, and/or technology transfer issues to exploit their results in the most appropriate way and will be done in close concert with the WP teams. Task 8.2 will strengthen the bridges between SMEs and light sources through a dedicated programme that will provide subsidised access for SMEs to the facilities.

The document summarises the activities done to support the WPs in their developments and the status of TamaTA-INNOV programme for the reporting period.

2. Task 8.1.1 Light sources technology exploitation

The LEAPS technology-driven work packages (WP2 to WP7) will generate new ideas and technologies, often working with industry as a collaborator, with the aim of transferring the outputs to supplier companies for commercialisation. Each WP presents different scenarios requiring a variety of routes for exploitation, industrialisation and any eventual commercialisation (Table 1). The dissemination and exploitation plan will be evolved during the project based on communicated needs, response by the target groups, and uptake of the provided information, in particular towards industry.

This Task, involving all LEAPS members and as described in each of the proceeding technology WPs, will therefore support the beneficiaries of those WPs with industry engagement, intellectual property, and/or technology transfer issues to exploit their results in the most appropriate way and will be done in close concert with the WP teams.

The following paragraphs describe the methodology used to monitor the status of the activities and the results achieved so far in collaborating with industry for the different WPs.

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Table 1: Exploitation Plan

#WP	Exploitable technology (Deliverable)	Application Sector or end user	Core Exploitation Channel	Expected Impact	IPR Measures	Timeline for Exploitation	Further R&D Needed
WP2 -XAFS -DEF	Multi-Channel Integrated preamplifier (D 2.2)	Detector Industry in Europe	Subcontracting Company	Higher Performance Detector Systems		2 years after end of the project	
	Germanium Detector (D2.4)	Detector Industry and XAFS beamlines worldwide	Production Plan made available to commercial producer, industrial workshop	High throughput and performance of XAFS beamlines worldwide	Licence of Patent	2 years after end of the project	Extension of number of detector channels
WP3 - SUPERFLAT	Metrology Techniques (D3.3)	Optics suppliers and metrology laboratories in Europe	Dissemination to industry and all photon sources (Table 2.2)	Improved optics manufacture	Licence	5-7 years after end of the project	
	Higher Quality Mirrors with improved figure errors (D3.4)	High Performance X-Ray SR and FEL beamlines worldwide	PCP	Higher photon intensities, smaller spatial resolution, reduced wave front perturbation; less dependency on single company worldwide	https://leaps-superflat.eu/pcp-questions-answers/	5-72 years after end of the project	Extension of Processing to larger and/or curved mirrors
WP4 - NeXtgrating	Grating using electron-beam lithography (EBL) fabrication process (D4.4)	Soft X-ray SR and FEL beamlines laser laboratories worldwide	Spin-out and start up	Higher Performance soft X-Ray beamlines	Licence or Patent	5-7 years after end of the project	EBL Processes for large gratings
WP5 - POSIT	Magnetic Levitation stage demonstrator (D 5.5)	Soft X-Ray SR and FEL beamlines laser laboratories worldwide				2 years after end of the project	
	Microfluidic chip (D5.6)	Structural Analysis Beamlines			Licence or Patent	2 years after end of the project	
	Synchronisation demonstrator (D5.7)	Short-pulse SR and FEL beamlines in Europe	Dissemination to industry and all photon sources	Higher Time resolution at short-pulse beamlines	Open Source	2 years after end of the project	
WP6 - LIDs	Measurement benches (D 6.3)	Undulator labs & commercial suppliers in Europe	Dissemination to industry and all photon sources	Higher spectral brilliance in soft and hard X-ray range at SR, FEL and compact sources	Licence or Patent	2 years after end of the project	
	Short Period high field undulators (D6.4)	High Performance X-ray SR and FEL beamlines worldwide			Licence or Patent	5-7 years after end of the project	
	Advanced EPU undulators (D 6.5)				Licence or Patent	5-7 years after end of the project	
WP7 - DATA	Data reduction and compression protocols (D 7.4)	High Performance X-ray SR and FEL beamlines worldwide	Dissemination to industry and all photon sources	More cost effective, resource efficient data treatment	Open Source	2 years after end of the project	

2.1. Monitoring of the Activities

A close monitoring of the activities has been implemented during the reporting period with the aim of supporting the beneficiaries of the technical WPs (WP2-WP7) with industry engagement, intellectual property and/or technology transfer issues.

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To better collect the information a representative of WP8 has been assigned to each WP for the first half of the project (Table 2a) and for the second half of the project (Table 2b)

#	Title	Contact Person
WP2	High throughout X-ray spectroscopy detector system	Stefan Mueller, PSI
WP3	High performance X-ray mirror and grating substrates	Ed Mitchell, ESRF
WP4	Next generation of X-ray diffraction gratings	Elizabeth Shotton, Diamond
WP5	New positioning and scanning systems for speed and accuracy	Alejandro Sanchez, ALBA
WP6	Insertion Devices	Antonio Bonucci, XFEL -Marco Peloi; Elettra
WP7	Data Reduction and Compression	Magnus Larsson; MAXIV

#	Title	Contact Person
WP2	High throughout X-ray spectroscopy detector system	Elizabeth Shotton, PSI
WP3	High performance X-ray mirror and grating substrates	Ed Mitchell, ESRF
WP4	Next generation of X-ray diffraction gratings	Mirko Boin, HZB
WP5	New positioning and scanning systems for speed and accuracy	Alejandro Sanchez, ALBA
WP6	Insertion Devices	Antonio Bonucci, XFEL -Marco Peloi; Elettra
WP7	Data Reduction and Compression	Magnus Larsson; MAXIV

Tables 2a (above) and 2b (below): Representatives of WP8 Assigned to WP 2-7 for the first half of the project (table 2a, above) and for the second half of the project (table 2b, below)

The WP leaders of WP2-7 have been contacted by each representative of WP8 with the request to fill a questionnaire. The request was sent in 2021 and again in December 2022 and January 2023 to collect further updates of the progress of the activities. The questionnaire, developed by ALBA-CELLS and ELETTRA named “Light Sources Exploitation Questionnaire” is composed by a set of questions divided into three main sections (Figure 1).

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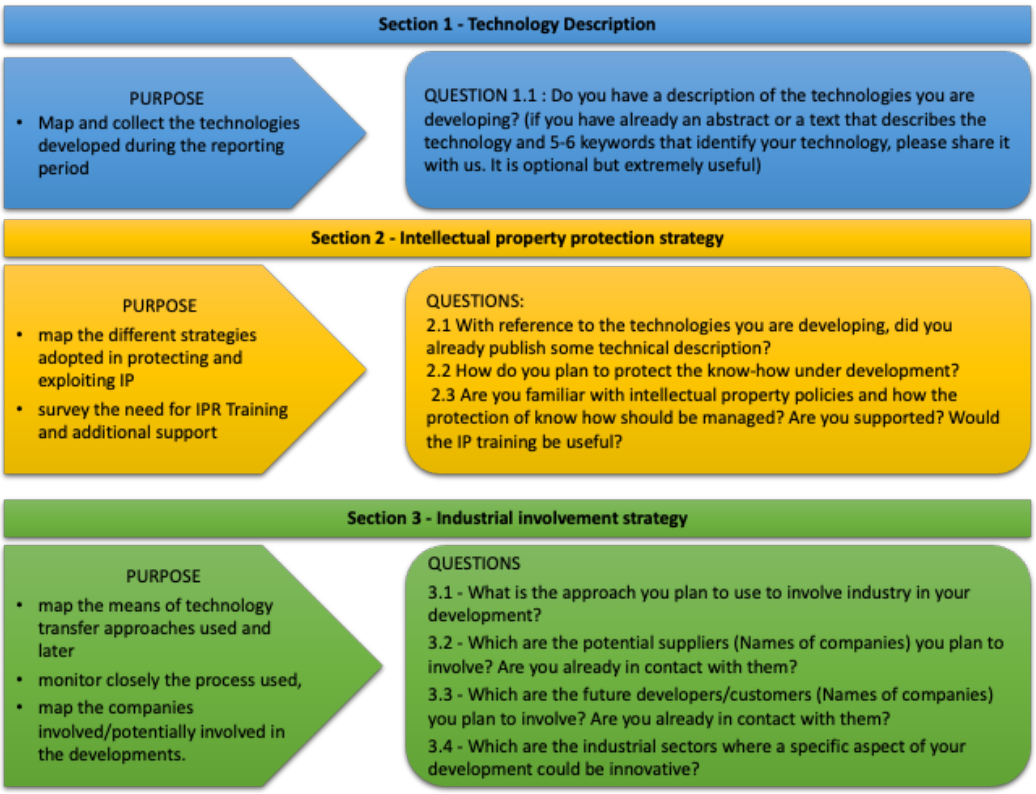

Figure 1: "Light Sources Exploitation Questionnaire"

The WP8 representatives participated in the WP2-7 technical meeting during the LEAPS-INNOV Annual Meeting in Barcelona in May 2022 to gather further information about industrial involvement and know-how development. These has been shared in the WP8 meeting and included in the updates of exploitation for WP2-7. The detailed information is present in the following paragraphs.

2.2. Results

The "Light Sources Exploitation Questionnaire" was completed by the WP leaders of

- WP2- XAFS -DET (High throughout X-ray spectroscopy detector system)
- WP3 - SuperFlat (High performance X-ray mirror and grating substrates)
- WP4 - NeXtgrating (Next generation of X-ray diffraction gratings)
- WP5 - POSIT (New positioning and scanning systems for speed and accuracy)
- WP6 - LIDs (Insertion Devices)
- WP7 - DATA (Data Reduction and Compression)

with the assistance of the representatives of WP8 (PSI, ESRF, DIAMOND, ULUND, ALBA-CELLS, ELETTRA and EuXFEL). Moreover additional meeting with the WP leaders and general meeting for discussion,

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such as the Annual meeting in Barcelona and the Project Review meeting in December 2022 has allowed to collect more information about the status of the activities.

The companies involved in the activities of the WP2-7 are a total of 53 companies of which 42% are SME (see Figure 2). Beside WP7, which has involved only large companies, the other WPs are collaborating with both sizes. The "unknown" category refers to companies that are reported but not named. The data on the size of companies is from their Linkedin page on the web.

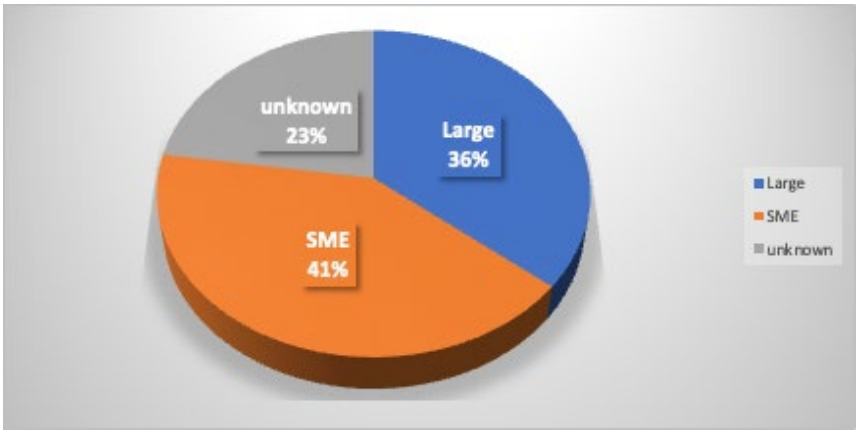

Figure 2: Percentage of companies involved divided by size

In the reporting period WP6 involved the greatest number of companies. Each WP involves at least 2 companies. WP5, which is divided into 4 different workpackages, involves 6 SME in the developments.

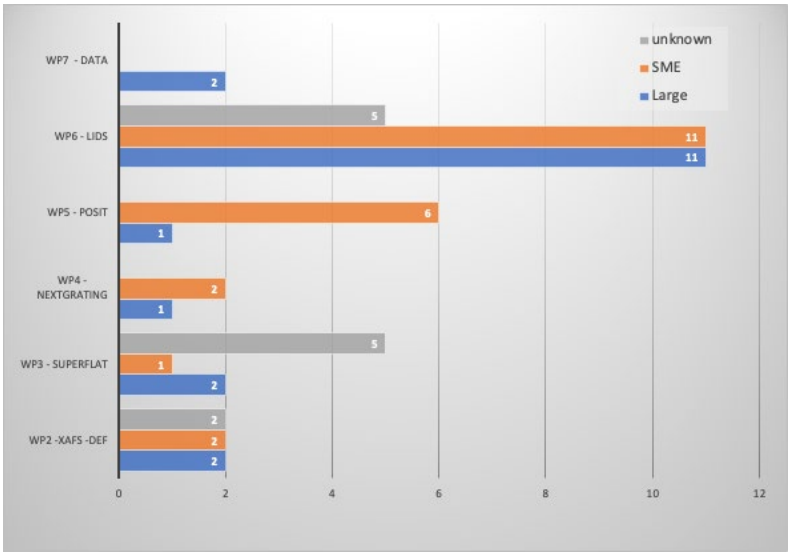

Figure 3: Number and size of companies involved in each WP

The companies have been involved in the activities of WP2-7 in several different ways (see Figure 4) including participation to dedicated workshops (WP6 mainly) and other procurement procedures

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(call for tenders, competitive dialogue and PCP). There are not data reporting specific means of involvement for SME with respect to Large companies. The data shows the desire and interest of industry to be part of the development taking place in LEAPS-INNOV and the ability of facilities to develop profitable relationships with industry.

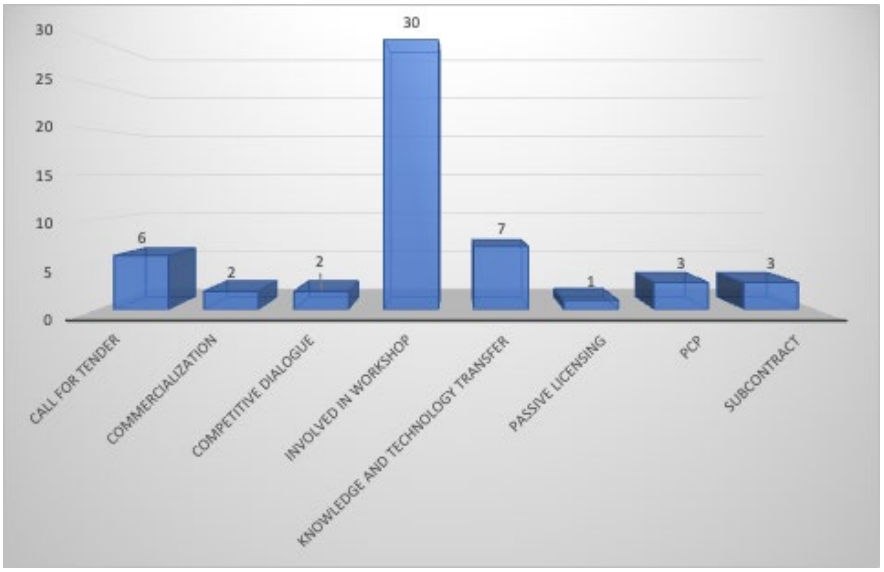

Figure 4: Means of Involvement

In addition to the data collected the qualitative information shows that the technology developments foreseen are ongoing and new know-how has been developed thanks to the project activities.

Each WP had specific objectives concerning the meaning of collaboration with industry, namely the "Core Exploitation Channel" column in Table 1 of this document. In the reporting period the exploitation plan is under development and the means of collaboration with companies are developed following considering additional options. Some delays occurred when dealing with specific purchasing procedures since the subject was new to many purchasing offices. This will result in more "lessons learned" and know-how developed for all the LEAPS partners.

The intellectual property policies applied during the project activities are coherent with the partners' individual policies and the WP Leaders made clear the presence of a strong support from their Technology Transfer offices. The questionnaire developed often allowed the needs to be collected for further training and support on this topic.

In the following paragraphs the current situation of developments and industry involvement is described.

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2.3. WP2 "XAFS-DET - Development of High Throughout X-ray Spectroscopy Detector System"

The WP2 XAFS-DET was developed under Objective 2 "Beamline Technology – Detectors" with Ambition to have a "Joint development of novel prototypes detectors for X-ray Spectroscopy".
In the past years with continuous improvements of photon sources and X-ray beamlines, detectors have been a limiting factor in many experiments and detection technologies beyond current capabilities are essential. The large diversity of techniques performed at SRs and FELs requires development of a number of specialised detectors. However, significant commonality in the components, especially in the back-end electronics and computing systems, will allow standards to be shared by all partners. Such a standardisation will have an enormous synergistic effect for users experimenting at several facilities, and for open use of data.

In this context the WP2 focus is the new generation of germanium detectors for X-ray spectroscopy applications in the energy range of 5-100 keV, to be designed and manufactured with early involvement of industry. It is expected that:

- affordable prototype detectors including new front-end electronics will be delivered with performance well beyond the state-of-the-art: higher throughput per unit area, a smaller pixel size, higher counting rates and an improved stability.
- a production plan will seek to locate a European company to commercialise this new generation of germanium detectors.

The role of the WP8 representatives and team is to support these developments when needed.

In terms of status of the technology developments the WP2 delivered the conceptual design report in September 2021. WP leaders and participants are in regular discussion and recurrent follow up meetings with industrial partners already, who are involved in the realisation of the main high technology detector components.

Given the worldwide situation it was difficult and very restrictive to find an experienced germanium sensor provider, however the procurement of a first set of germanium sensors has been completed. A contract has been launched with Mirion Technologies, while two other potential suppliers while the other two potential suppliers (Jülich and Ametek) have decline for the moment due to different reasons. The procurement plan is now reduced to one manufacturer only, but discussions are still in place with Ametek. This situation was identified as a high-level risk from the beginning of the project. In addition technical information on fabrication process or details on the semiconductor, very useful for the simulations, are not disclosed by the germanium subcontractor.

The electronics chain has been subcontracted: the electronic chain includes new and challenging designs, and additional sets of questions to the call for tender applicants were necessary to check their expertise and technical capacity to complete the contract successfully. From the beginning of the

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project, the strategy was to get one single contract for the whole innovative electronic chain, which is the only way to achieve a full-chain operational and which also requires a management of complex interfaces. A single call for tender was launched in January 2022 (under the responsibility of SOLEIL), and the subcontractor was chosen in June 2022 after iterative steps foreseen by the call for tender. The contract has been signed and the kick-off meeting with the company – Bruker/XGLab – and the WP2 experts was held in September 2022.

The readout system, also known as the digital pulse processor (DPP), have been defined by the consortium early in the project, and after a review of existing commercialised systems, it was decided to purchase a 10-channel modified Xspress4 DPP developed by DIAMOND. Though, Xspress4 is not yet offered as a commercial product and is also critically impacted by global supply-chain delays, it can be made available in a timely manner, when needed to readout the detector, through a collaboration of DIAMOND with the company Quantum Detectors. Licensing issues have delayed the quotation process, but delivery is expected to be in line with project requirements. Quantum Detectors reserves all the rights to use for its commercial and R&D purposes any foreground IP generated within the scope of the contract.

The information collected through the "Light Sources Exploitation Questionnaire" highlighted a strong interaction with companies since the early beginning of the project with a clear strategy of development. Up to seven companies have been involved in the development of the technologies given that only with a strong interaction with industry the design of high-technology components could be completed.

Early discussion began with WP8 to explore potential technology transfer of the whole prototype at the end of the project. The current situation is positive to reach the major objective of setting up a procurement strategy for these special systems.

2.4. WP3 "SuperFlat - The production of high-performance X-ray mirror and grating substrates"

The WP3 SuperFlat was developed under Objective 3 "Beamline Technology – X-ray Optics" with the ambition to "Improve European capabilities for production of high-performance X-ray mirrors". It is known that the quality of optics is a limiting factor for X-ray beamline performance, and this will be further accentuated with both, X-ray FELs and ultra-low emittance storage-ring based sources, moreover particularly challenging are applications in nano-focusing, imaging and coherent scattering. WP3 is expected to develop optical systems capable of optimising the X-ray beam characteristics for the experimental needs whilst preserving the source brilliance and photon beam quality, thus enabling the full potential of finer, brighter and more coherent beams to be exploited. Beyond technological challenges, the LEAPS community needs to overcome the limitation that companies or business units

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which serve this niche market are small in size and very few in number. LEAPS envisions to overcome these difficulties by establishing strategic partnerships with appropriate industries.

In this context the key for improving European capabilities for the production of high-performance X-ray mirror and grating substrates will be progress in deterministic finishing technology and associated metrology methods. The aim is to restore European industry to the forefront of the manufacture of reflective X-ray optics.

The activities of WP3 has been focused on three development activities incorporating the European optics industry:

- PCP (pre-commercial procurement) action to develop pilot processes for industrial production of moderate length flat X-ray mirrors
- Exploration of basic limits of figure correction technologies for X-ray mirrors
- New metrology methods also suitable for industrial environments

Intense interaction with the European optics industry has been facilitated through the pre-commercial procurement (PCP) action. The open market consultation started in November 2021 and showed great interest from the European optics industries. 15 people from 10 European companies, attended the OMC (held as a video conference hosted by the ESRF). It helped to finalise the request for tender document, allowed clarification of the legal framework, the respective durations of the three development phases in the PCP and the technical specifications. The request for tender was made publicly available on 21 January 2022. Interested parties could submit questions regarding the tender until the deadline of March 3. These mainly concerned compatibility with other sources of public financing and intellectual property related issues. It showed that optics manufacturers protect their IP mainly through industrial secrets. Consequently, they were reluctant to grant access to background IP should their PCP results remain unexploited. This could be why some companies finally declined to participate in the PCP.

Three companies, out of six who downloaded the tender documents, submitted. Three companies were granted a contract for project phases 1 and 2: Thales-SESO, Bertin-Winlight and SAFRAN-REOSC

The objective to source a significant part of high-performance reflective X-ray optics from European suppliers has been partially achieved.

The experience gained in setting up and running the PCP procedure has established a wide knowledge base which should assist significantly in the management of any future PCP actions to be launched by LEAPS partners for the engagement of industry partners. In future, many of the document templates used in this PCP action can be made publicly available thus benefitting organisations outside LEAPS.

The information collected through the “Light Sources Exploitation Questionnaire” highlighted the positive progresses of the PCP action since the early beginning of the project with established rules for

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IP management clearly defined in the website dedicated to the PCP action https://leaps-superflat.eu/pcp-questions-answers/.

2.5. WP4 "NeXtgrating - Next generation of X-ray diffraction gratings"

The WP4 NeXtgrating was developed under the Objective 3 – "Beamline Technology: X-ray Optics" with the ambition to develop a "Novel strategy for production of blazed diffraction gratings". Blazed diffraction gratings are key components in the vacuum-ultraviolet (VUV) and soft X-ray range to produce beams with narrow energy distribution or to provide high resolution spectral analysis. Recent advances in accelerator technology, providing smaller beams, open up innovation opportunities using grating technology. Given the only one non-commercial manufacturer in Europe and very limited industrial capabilities worldwide, there is an outstanding opportunity to position Europe as a technology leader in this field.

In this context WP4 has the objective to establish a novel strategy for production of next-generation X-ray diffraction gratings using electron beam lithography (EBL). Prior to the project start PSI filed a patent application "Fabrication of blazed diffractive optics by through-mask oxidation", WO 2021/037549.

The work in WP4 has been pursued by academic partners together with industrial beneficiaries since the beginning who, in addition to the EU contribution, invest own, in-kind contribution for the project, particularly person months, as well. This early involvement of SMEs as full beneficiaries has enhanced the ability to commercialise the production of gratings. The company Raith BV has been involved for the development of custom hard and software solutions for EBL writing of blazed reflection gratings, while NOB – Nano Optics Berlin and XRnanotech for the development of fabrication processes and the commercialisation of NeXtgrating technology.

The information collected through the "Light Sources Exploitation Questionnaire" highlighted the clear strategy in IP management and the rules in the collaboration with the companies involved. Moreover the early involvement of the companies will allow to increase the opportunities of commercialisation of the gratings beyond the scope of LEAPS, for example in context with grating technology for chirped pulse amplification (CPA) in femtosecond laboratory lasers.

2.6. WP5 "POSIT - New positioning and scanning systems for speed and accuracy"

The WP5 POSIT was developed under the Objective 5 "Beamline Technology – Sample Environment and Handling" with the ambition to develop "Efficient sample delivery with higher spatial and time resolution". In fact, the high brilliance and extreme spatial resolution of next-generation photon sources pose unprecedented constraints on sample environments. Nano-beams require dramatically

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improved X-ray beam diagnostics and control, as well as sample positioning with long-term stability and ultra-precise resolution. The technical challenges of time-resolved studies at FELs or strongly focused SR sources often with single-pulse exposures are significant. State-of-the-art sample delivery substantially reduces valuable sample consumption and background scattering while powerful high-repetition rate pump lasers are needed to efficiently start reaction processes or prepare excited states. Major efforts in standardisation and automation with new mechatronics-based concepts and robotics will meet the extreme requirements in sample environment and handling whilst automated data evaluation will allow facilities to reach out to new and wider user communities and industry.

It is expected that WP5 will collaboratively tackle specific challenges in three key areas of sample environments involving capable companies in the challenging technology developments via subcontracts, early interaction and procurement tools to develop:

- a demonstrator using magnetic non-contact guiding and actuation will be designed as proof-of-concept for translation and rotation on the nanometre scale, and high accuracy online metrology will be developed (Task 5.1)
- a protocol for synchronisation between beamline components, from source to detector including metadata, will be defined in a generic fashion throughout LEAPS facilities and implemented as demonstrators at several partner facilities.
- standards for room temperature experiments with microcrystals and liquids will be provided, standardised microfluidic chips to store, handle and transport samples in solution as well as container-less sample delivery will be developed.

The developments planned in WP5 will enhance the competitiveness of European beamlines in the fields of nano-positioning, crystallography on micro-crystals and ultra-fast synchronisation for in situ experiments.
All the Tasks of WP5 are proceeding well. The communication and collaboration within the Tasks and between the Tasks are very good. A special focus lies on the exchange on the different approaches for industry engagement in the Tasks (competitive dialogue, procurement, subcontracting, consulting) and on the technology developments which are shared by the Tasks.

Task 5.1: Translation and rotation on the nanometre scale: The strategy proposed by SOLEIL for this Task is to take advantage of private industry know-how, for the design and construction of a translation and rotation demonstrator, based on magnetic levitation. The demonstrator is expected to be a proof-of-concept for possible future beamline instruments based on magnetic levitation technology. A “competitive dialogue” call for tender, was used to select an expert industrial provider. This procedure gives the opportunity to refine the specifications of the design at each of the steps of the dialogue with the competing candidates. Three iterations were needed to finalise the specifications. This purchasing procedure was new to the SOLEIL teams and challenging to conduct. The competitive dialogue to involve suppliers has shown the advantage of allowing refinement of the specifications in an open dialog with several providers all along the procedure. This has been very useful with new technologies to avoid mismatching specifications and allow to understand the technology related to the functional

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requirement. However at the same time the drawback is that is a complex procedure not necessarily mastered by the SOLEIL commercial department and may need for support from external lawyer firm, in addition the procedure is not necessarily understood by the providers resulting in misunderstandings concerning how and when to share documents. In March 2022, the winner company, MI-Partners, was selected.

Task 5.2: High accuracy online metrology based on interferometry sensors: Within this Task is the development of online metrology systems for ultra-high accuracy experiments to be integrated in demonstrator translation and rotation stages with nanometre positioning resolution. The demonstrator tomography stage is developed in cooperation with Axilon AG

Task 5.3 Synchronisation between beamline component: during the first year of LEAPS-INNOV, the Task was to collect existing solutions and future requirements of LEAPS facilities concerning synchronisation of accelerators and beamline hardware. For this, during our monthly meetings, the topics were presented by members of Task 5.3 and by external guests from academic institutes and the company TXproducts. TXproducts expressed high interest and became a Task 5.3 permanent guest.

Task 5.4: Standards for room temperature experiments with microcrystals and liquids: In Task 5.4, the proposed standard solutions for room temperature experiments with microcrystals and liquids will be refined in collaboration with selected industrial partners in preparation to the milestone

The information collected through the “Light Sources Exploitation Questionnaire” has provided an overview of the different developments taking place as well as the different means of collaboration and Industry involvement, namely:

- Competitive dialogue: MI-Partners, Philipps Innovation Services (5.1)
- Subcontract: Axilon AG (third party, 5.2)
- Procurement: e.g. qutools (5.1, 5.2), Micolight3D (5.4)
- Knowledge/technology transfer: e.g. TXproducts (5.3), qutools (5.2)

2.7. WP6 - “LIDs - LEAPS Insertion Devices”

The WP6 LIDs was developed under the Objective 6 “Photon Sources” with the ambition to develop “Novel insertion devices for higher brilliance photon beams”. The LEAPS RIs are based on electron accelerator driven sources, storage rings and FELs. Whilst SR sources have been established for decades, recent development of so-called multi-bend achromat storage rings allows a dramatic increase of photon beam brilliance and coherence. FELs are complementary to storage rings with the capability to provide extremely intense, coherent photon pulses of femtosecond duration. Key challenges for FELs are better control of spectral and temporal properties to match future experimental requirements for improved energy and time resolution.

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In the longer term, many technologies and research activities at LEAPS facilities, including new compact sources (using plasma wakefield acceleration) will enhance specific capabilities of the current light sources and make them potentially available for specialised industrial, medical and smaller laboratory environments. A main goal of LEAPS is to maintain photon source technology in Europe at the leading edge worldwide and improve the competitiveness of the European accelerator industry though joint research in fields such as magnet systems (e.g. insertion devices), higher brilliance electron beams, laser systems or advanced diagnostics.

To bring forward all photon sources and achieve a high technology transfer impact within the project time, WP6 is expected to focus on one common SR and FEL research area with strong specificity for accelerator-based photon sources: insertion devices (ID - magnet systems for generating the photon beam) for the next generation of intense, high brilliance SR and FEL sources for users.

The main aim of WP6 is to push the limits of present technology towards more compact, more sustainable and cheaper IDs which offer more flexibility and a presently unreachable performance.

Four highly advanced undulator systems and two measurement benches for characterisation of the prototype undulators will be developed within the work package.

The prototypes will go well beyond state-of-the-art and will combine two development goals:

- cutting-edge technologies and
- robust, reliable, cost effective systems.

WP6 aims at an early and continuous involvement of all specialised European suppliers capable of manufacturing these high-tech devices with the goal of preparing a technology transfer model which not only enables European suppliers to produce the new undulator types but also can be a role model for the LEAPS community.

The fulfilled mid-term goals of Task 6.1 focused on boosting interest in intellectual property and technology transfer collaborations between LEAPS facilities and industrial Insertion Device suppliers. The primary activity of WP6 was the organisation of a virtual workshop (organised by EU-XFEL and ELETTRA) on undulator technology in Q3 of 2021, which has seen very strong participation of both, LEAPS representatives (30 participants) and relevant industry partners such as Allectra GmbH, Ansaldo Energia, Arnold Magnetic Technologies AG, AVS - Added Value Solutions, AXILON AG, Bakerhicks, Belcan, Bruker Switzerland, CAN SUPERCONDUCTORS, DECTRIS, Ewcon R&D Sweden AB, Huawei Technologies, KYMA, NEOMAX ENGINEERING Co.,Ltd., MDC Max Daetwyler, RI Research Instruments GmbH, SAES GETTERS S.p.A., SEF, SENIS AG, T.E.E.S. srl, THEVA, UHV Design Ltd, and two participants from Teknologisk Institut, Big Science, Denmark. The workshop received favourable feedback, further shown by interest in future meetings.

Already during the organisation stage, companies expressed interest in understanding the possibilities of commercialisation and fruitful collaboration with the RIs. Many of these companies already have a

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relationship with some LEAPS facilities, but welcomed the option to expand into the LEAPS ecosystem. The companies participating being based in various European countries, the meeting went in line with the European spirit of LEAPS. The workshop opened up a direct and lively dialogue. LEAPS facilities outlined their portfolios, specific needs, as well as planned updates of the facilities and pipeline developments.

Going forward, this Task will continue with workshops of similar scale and scope, as well as bilateral meetings with related transversal project leaders. Further dissemination through external presentations and discussions is expected. Furthermore, leaders of the transversal projects submitted a review of their activities which will be shared externally, which is being collated by the WP leaders (SOLEIL, PSI, ELETTRA). Goals for the next phase include collaboration on a particular technology transfer and possible development of a generic LEAPS technology transfer model, as outlined in the proposal. This activity will remove roadblocks and bottlenecks and enable more efficient component co-innovation.

The collaboration with WP8 and the KTT network has been advantageous and constructive as foreseen, as the overlap of the Tasks provided valuable insights and boosted the participation of the industry. Task 6.1 is therefore well in shape. In this stage of disclosure of the technologies being studied by the WP, only the operators of the Big Science sector have been involved. The search for applications in other sectors will be the subject of further future activities.

The information collected through the “Light Sources Exploitation Questionnaire” has highlighted the need for an IPR training focused on the step between the idea of the invention and the definition of the invention disclosure, as based on patentability criteria.

2.8. WP7 “DATA - Data Reduction and Compression”

The WP7 DATA was developed under Objective 7 “Information Technology” with the ambition to stimulate a “Structured Europe-wide effort to harness data reduction and compression”.
All photon sources are confronted with an exponential growth of data volumes resulting from year-on-year improvements in photon source, beam delivery and detector technology. This creates substantial challenges for the data pipeline from experiment through analysis to scientific results, particularly acute in the field of imaging and serial crystallography. Effective and standardised solutions will increase scientific productivity and open up opportunities to attract new user communities.

The LEAPS partners also recognise the importance of information technology (IT) to enable quality, capability and capacity of scientific output of light sources based on the FAIR principle. IT is a key enabling technology, requiring a major concerted effort to enable new science and to sustain and enhance the quality, capability and capacity of the scientific output of LEAPS facilities.

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WP7 is expected to harness data triage, reduction and compression techniques to address the exploding data volumes at photon sources in particular due to the next generation of detectors. More and more of the science carried out at SRs and FELs is not limited by photon flux, but is instead limited by the data rates and volumes that the experiments can produce. WP7 will address this issue by developing new paradigms in data reduction and compression techniques making experiments more efficient and enabling data analyses which are not possible today. Moreover, new concepts allow the attribution of metadata and therefore storage of data following the FAIR principles. The work package will be complementary to the European Open Science Cloud (EOSC) projects ExPaNDS4 and PaNOSC5. The work, including definition of specifications, algorithm development and testing of technologies, will be tightly coordinated with and supported by industrial experts whilst the acquired knowledge will be transferred to industry to assist in utilisation of commercial detector developments.

The WP7 progresses well with the creation of a wide community. Concerning the contact with industrial partners to ensure that methods developed in this project can be implemented in detector software, and run well on cutting-edge computing hardware, has led to the purchasing of consulting activities for specific implementations within the BLOSC framework paving the way for further collaboration.

More in details PSI agreed to test procedures with detector supplier Dectris for compression methods while PSI and ESRF are working with IBM to make use of OpenCAPI for fast data transfer.
Additionally, a series of regular online seminars on data reduction, open to all the staff at LEAPS facilities started and the plan is to opened the access also to staff of related industry. Certain topics, particularly hardware acceleration, are of interest to other LEAPS-INNOV work packages, and will be advertised within LEAPS appropriately. In the future, the plan is to run online workshops on data processing and reduction, open to academic and industrial partners, which would combine talks on these topics with the opportunity to work with code and harvest advice from experts.

The information collected through the “Light Sources Exploitation Questionnaire” identified the need for IPR training. The team requested a specific IP training focused on intellectual property management for software to better manage the relationship with external companies. The training was led on 31 May 2022: “Basics of intellectual property (IP) rights for software developers and scientists”.

2.9. Task 8.1.1 Conclusions and Next Steps

The LEAPS technology-driven work packages (WP2 to WP7) are generating new technologies in close collaboration with industry. In the reporting period up to 53 companies have been involved in the activities and each WP is working on a variety of routes for exploitation, industrialisation and commercialisation successfully. The experience gained in setting up and running new purchasing

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procedure and joint developments will establish a wide knowledge base which should assist significantly in the management of any future engagement of industry partners.

WP8 will continue to support the beneficiaries of those WPs with industry engagement, intellectual property, and/or technology transfer issues to exploit their results in the most appropriate way in close concert with the WP teams.

3. Task 8.2 Boost Innovation in European SMEs

3.1. Introduction

Boost innovation in European SMEs (Task 8.2), named TamaTA-INNOV, aims to enhance a pre-existing centralised service for SMEs in Europe based on a specific access system, having a procedure as light as possible, and where industry applications for service will be submitted to a central entry point for all the partners and be evaluated remotely and rapidly by an independent selection panel of experts.

The access scheme is based on the previous pilot programme TamaTA developed within the CALIPSOplus European project by updating it with the lessons learnt in that programme.

Deliverable D8.2 will present the procedure established for TamaTA-INNOV programme, the outreach activities to reach out SMEs within the project the status and analysis of the SMEs proposals received so far and their innovation impact.

3.2. TamaTA-INNOV procedure

The procedure for the TamaTA-INNOV programme has been established by ALBA-CELLS and ELETTRA. The SMEs can apply for subsidised access to the following European light sources: ALBA, DESY, DIAMOND, ELETTRA, ESRF, EuXFEL, FELIX, HZB, INFN, MAX-IV, PSI and SOLEIL.

Although not initially involved in this Task, the scheme is also open to the rest of partners of WP8: ISA, SOLARIS, PTB, HZDR and KIT.

The established procedure (Figure 5) is based on a call for proposals system centralised in a single-entry point (https://wfl.elettra.eu/tamata/) where the company must fill in a short description of the project, the samples they would like to be measured, as well as the anticipated innovation and impact. The proposal is technically evaluated by the selected facility and sent to two different reviewers for external evaluation. For this, a list of 10 reviewers has been nominated with different fields of expertise. Calls for proposals for SMEs to apply are launched periodically although the evaluation process takes place in a continuous way upon the receipt of proposals. If a proposal is approved, the access to the facility is then formalised (Figure 5).

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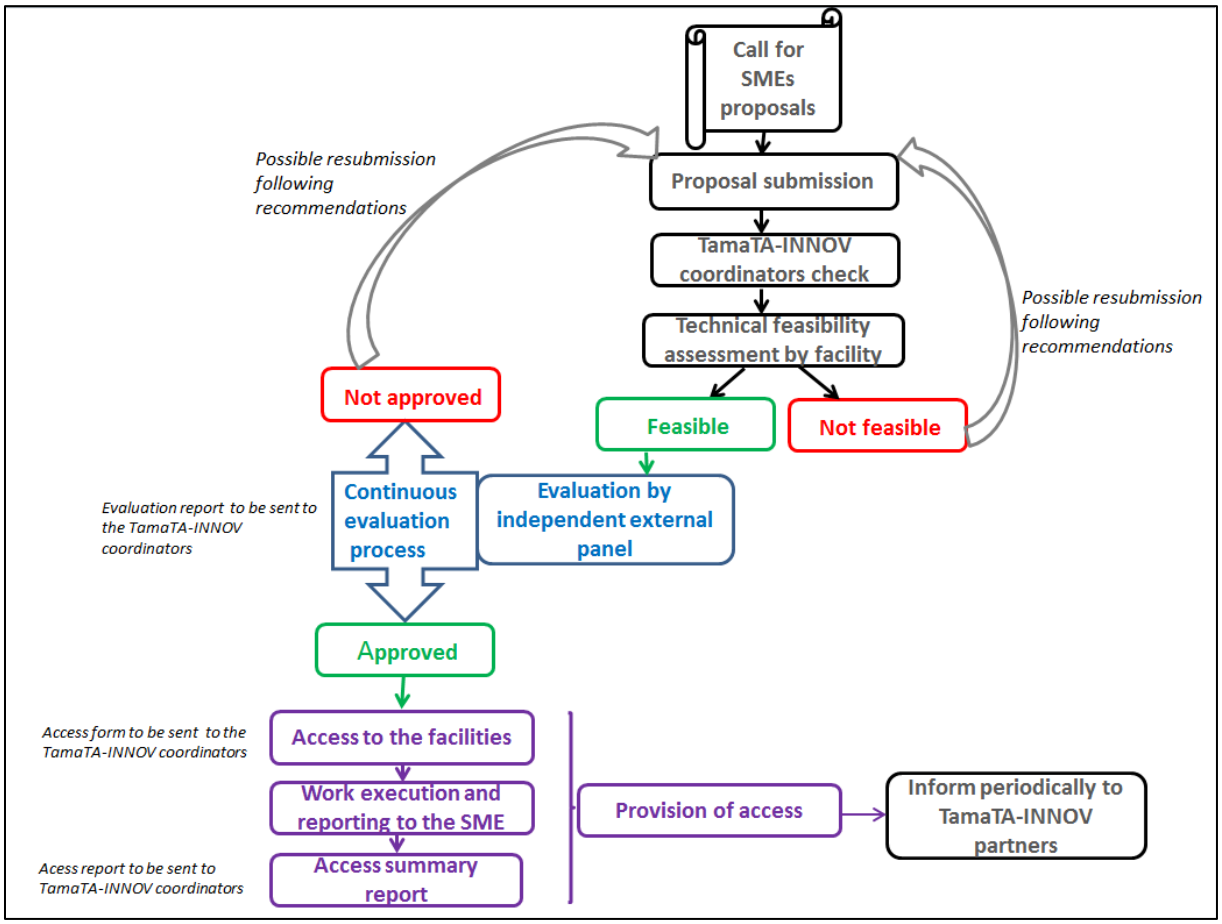

Figure 5: Flow diagram of the SME access through TamaTA-INNOV

The terms of references applicable to this programme have been defined according to the European research and development framework regulations and the company must accept them before submitting a proposal (Annex III). In addition, TamaTA-INNOV coordinators will record a list of documents shown in Figure 6 with the aim to register and to follow-up each proposal and experiment (Annex IV).

3.3. Status and analysis of the TamaTA-INNOV proposals

Calls for proposals are issued periodically (maximum twice per year) although they are rolling calls since the evaluation process takes place on an ongoing basis right after the industrial proposals are received.

So far, two call for proposals have been opened through the single access portal. The first call for proposals has been completed. It was open from the 11 November 2021 until the 31 July 2022. The second call for proposals is open from the 9 September 2022 until the 28 July 2023.

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In the second call two extra fields have been introduced in the application form: company webpage and company postal address in order to avoid confusions about the origin of the firm (Figure 6).

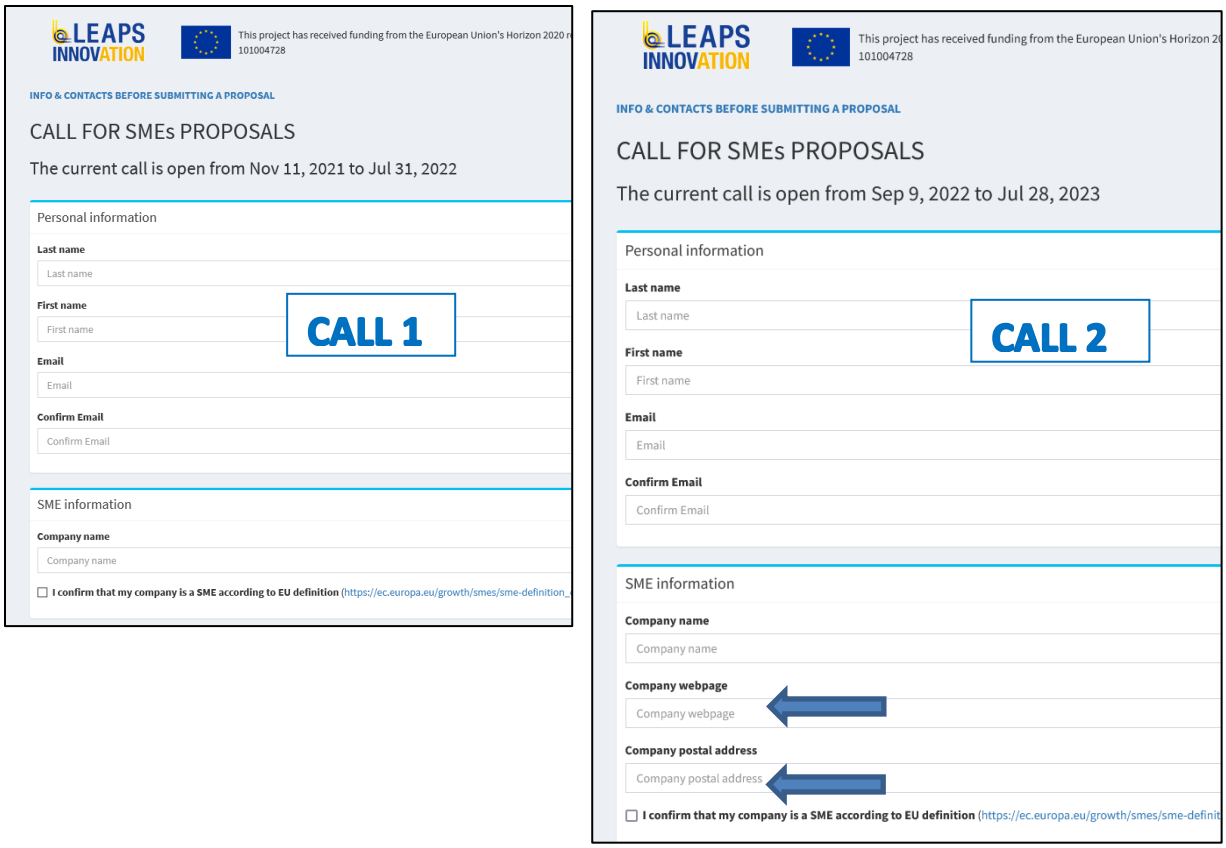

Figure 6: Partial view of the on-line application form (https://wfl.elettra.eu/tamata/)

A total of 16 SME proposals have been received through the single entry point requesting 20 different accesses. Call 1 closed with 8 proposals and call 2 has received 8 different proposals, two of them asking for access to more than one facility (Figure 7). One of the advantages of TamaTA-INNOV programme is that SMEs can have subsidised access to light sources through a very easy and agile process and one company may have access to more than one single facility by submitting just one proposal requesting a complete service to several facilities. This has been shown to be very useful as there are two different companies that have applied beamtime at different facilities. The first one, will have access to ESRF, DESY, SLS and ALBA for a new methodology to characterise drugs using powder diffraction technique; In the second one, ESRF will provide the measurements and MAXIV the data analysis and interpretation for the company. These are two different examples on how light sources have complementary capabilities (in these proposals, 2 proposals and 6 different access have been considered for statistics purposes).

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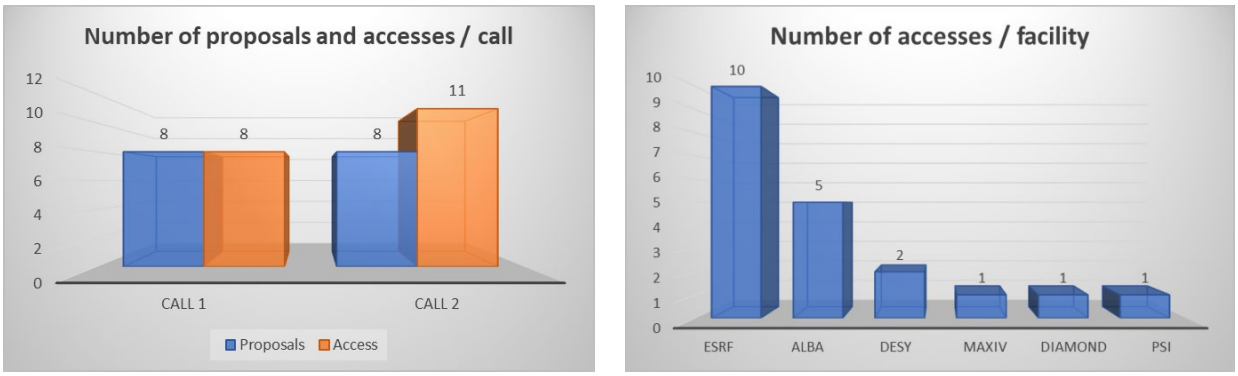

Figure 7: Number of proposals and accesses per call and facility

The proposals received in call 1 and call 2 are from companies coming from ten different European countries and one proposal comes from USA, showing that the European light sources services are also appealing for companies from non-European countries (Figure 8).

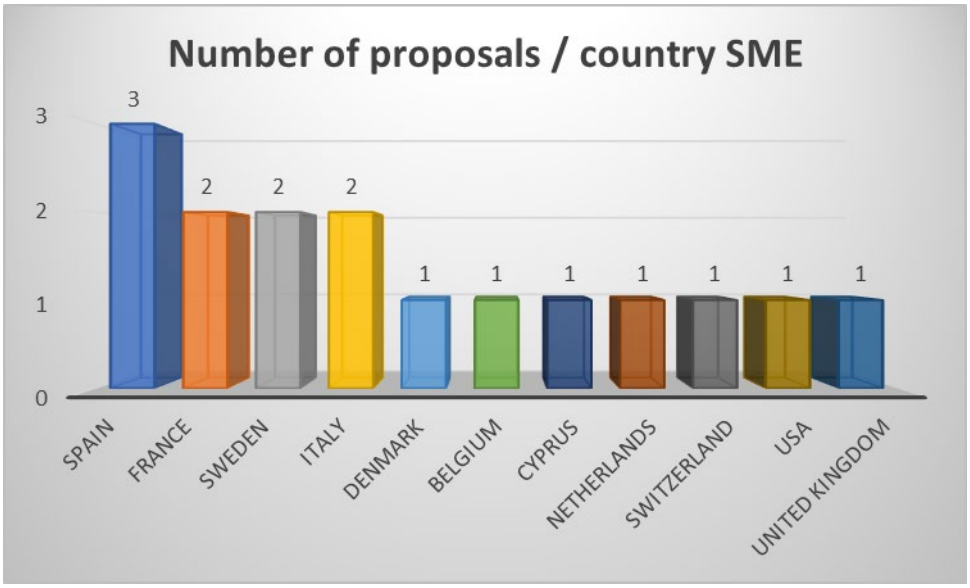

Figure 8: Number of proposals per SME country

Given the multidisciplinary nature of the light source techniques, the industrial sectors of the proposals are very diverse, being the most abundant pharmaceuticals, cosmetics, additive manufacturing and instrumentation (Figure 9).

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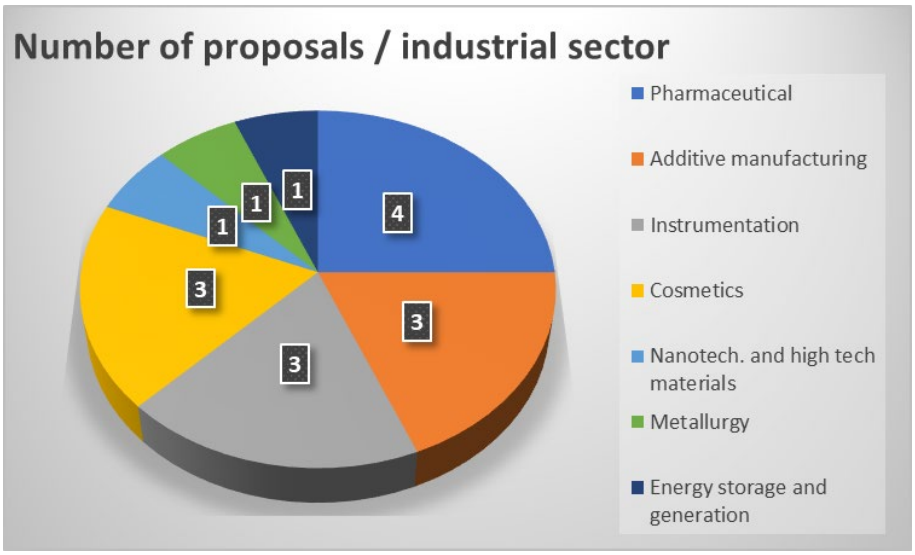

Figure 9: Number of proposals per industrial sector

Other aspects of the proposals received have been analysed to have a deeper knowledge of the importance of the projects that will be performed. One of these aspects is the analysis of the impact that the research project and the characterisation performed in light sources may have in terms of material and product development, performance, claims (..). Results show that most of the projects are related to new product development and product improvement followed by new material development and new service development, in addition, other important aspects are also addressed as for example new product applications, battery technology development and product and service performance claims (Figure 10).

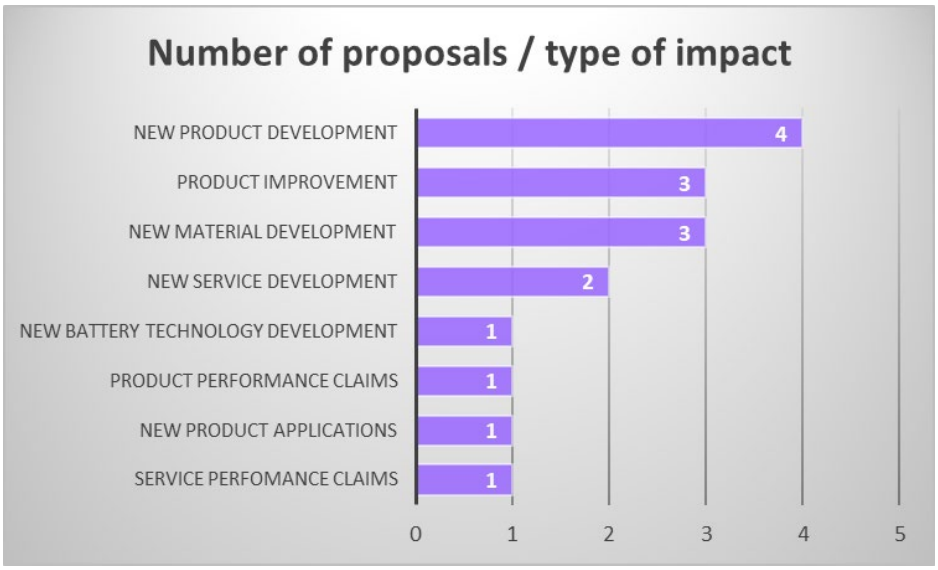

Figure 10. Number of proposals per type of impact

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Another index very relevant for industries is the TRL, technology readiness level, that gives an idea on how close is one product or service to the market. The TRL level of the TamaTA-INNOV proposals have been analysed in order to know which is the starting TRL of one project and the expected TRL at the end of the project. This information is very useful to better understand how the light sources techniques may help in the commercialisation progress (Figure 11).

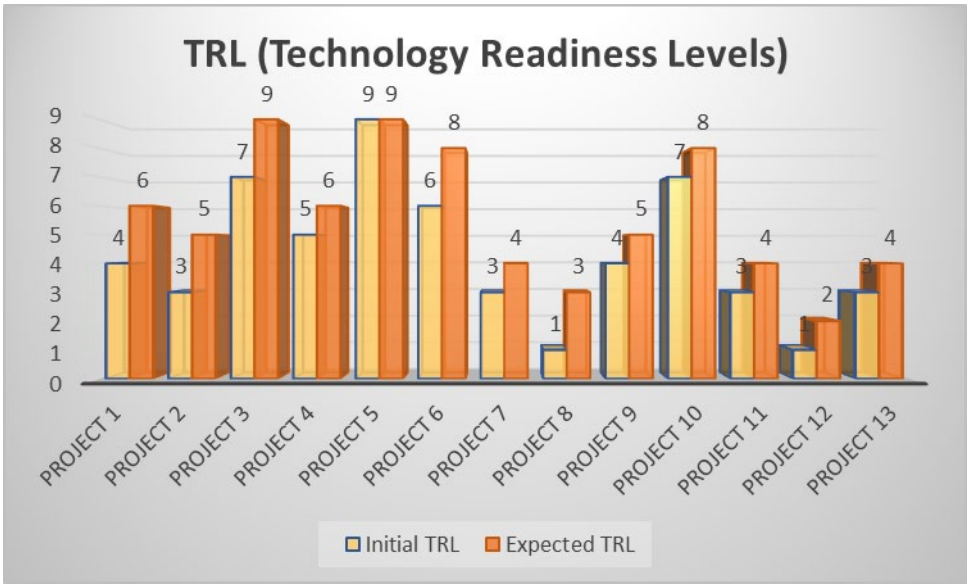

Figure 11. TRL before the light source access and TRL expected after the performance of the proposal (13 out of 16 proposals have provided this information).

Results show that the starting TRL are very different in each project, from a minimum of TRL 1 up to TRL 9. Also, the expectations of most of the projects except for one is to increase the TRL after the experiment. It shows that first, light source techniques may contribute in many different steps and second, may contribute in approaching the product or technology to the market.

From the 16 proposals received, all of them have already completed the full evaluation process: all of them have approved the technical feasibility and the external review. It has to be mentioned that only in one proposal there was a disagreement between reviewers. In such cases, the proposal was submitted to a third reviewer for final evaluation. There are six different proposals that have been successfully completed and the partner facilities have provided a total of 8 different services to companies. The status of each proposal is shown in Table 3.

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Call	Proposal ID	SME	Title	Facility	Feasibiloty check	External review	Completed
1	TamaTA-INNOV-20220330-0821-CBCC	Orbital Express Launch ApS	Quality control of Additive Manufactured rocket engine parts	ESRF	OK	OK	YES
1	TamaTA-INNOV-20220614-1234-FB19	MPP SRL (Belgium)	TOMOGRAPHY OF NEW HIGH DENSITY INCONEL 3D PRINTED PARTS	ESRF	OK	OK	on-going
1	TamaTA-INNOV-20220615-1006-55B9	Imagine Optic	Differentiate samples through measurement of optical index (delta, beta) in the 5-25 keV energy range	ESRF	OK	OK	on-going
1	TamaTA-INNOV-20220620-0646-FCFD	CTC	Hair and Scalp Solutions for protein protection	ALBA	OK	OK	YES
1	TamaTA-INNOV-20220620-1646-A903	Scatterin AB	Mapping dislocation density evolution in bearing steel subsurface using synchrotron X-ray diffraction	DESY	OK	OK	YES
1	TamaTA-INNOV-20220704-0835-67D6	Francesco Pellisari	The relationship between residual strain and sound transmission in earthenware components, employed by the Hi-Fi industry	ESRF	OK	OK	on-going
1	TamaTA-INNOV-20220713-1447-A898	AmaDema - Advanced Materials Design & Manufacturing Limited	Investigation of the multiscale structure of NanoWeldÂ® carbon fiber reinforced composites	ESRF	OK	OK	YES
1	TamaTA-INNOV-20220728-1600-439F	IMcoMET B.V.	Determining the effect of local soluble microenvironment flushing with M-Duo microneedles on collagen hydrogel nanostructure using Small Angle X-Ray Scattering (SAXS)	ALBA	OK	OK	YES
2	TamaTA-INNOV-20220925-1658-A39D	Excelsus Structural Solutions (Swiss) AG	Enhancement of the accuracy of quantification of small fractions of crystalline Active Pharmaceutical Ingredients (APIs)	ALBA, ESRF, PSI, DESY	OK	OK	on-going
2	TamaTA-INNOV-20220929-0733-D0CE	Tec Eurolab Srl	Multi materials components by hybrid 3D Printing manufacturing	ESRF	OK	OK	on-going
2	TamaTA-INNOV-20221028-0721-D246	Provital S.A.	Global protection of Provital product on structural integrity of hair shafts	ALBA	OK	OK	on-going
2	TamaTA-INNOV-20221205-0846-AD98	Nanomol Technologies	SAXS characterisation of novel nanovesicles for drug delivery	ALBA	OK	OK	YES
2	TamaTA-INNOV-20230203-1032-931A	Iconovo AB	High speed X-ray radiography of nasal inhaler	ESRF, MAXIV	OK	OK	on-going
2	TamaTA-INNOV-20230213-1813-309F	Nanoramic Laboratories	Development of High Capacity â‍“ High Power and longevity Li-ion batteries	ESRF	OK	OK	on-going
2	TamaTA-INNOV-20230220-0930-0E2E	Renaissance Fusion SAS	Vacuum characterisation of materials for fusion reactor design	ESRF	OK	OK	on-going
2	TamaTA-INNOV-20230301-1252-B995	The Protein Forge Ltd.	Crystalline therapeutics	Diamond	OK	OK	on-going

Table 3: Current status of the SME proposals

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3.4. Case studies

A very interesting output from this programme will be creating different case examples from the performed experiments illustrating the usefulness and the powerfulness of the analytical techniques available at light sources. This material can also serve as an inspiration for other companies. In that regard, several case studies have been prepared:

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CASE STUDY 1

CTC is using ALBA synchrotron for a better understanding of the efficacy of hair products

CTC (Centro de Tecnología Capilar) is a Spanish company specialised in personal hair and scalp care that has become an expert in the research and development of innovative technologies for assessing the efficacy of active ingredients and finished hair care products. The R&D activities of the company involve consultancy, formulation, efficacy test, training and advance technology solutions for the hair industry challenges. In that regard, CTC is continuously seeking for new and modern technologies to complement the studies and characterisation with non-conventional techniques such as the synchrotron light. In particular, the FTIR (Fourier Transform infrared) micro-spectroscopic imaging method available at ALBA synchrotron (MIRAS beamline) enables chemical imaging by combining spectral and spatial information. This technique allows characterising the internal parts of the hair and evaluate the effects of a damaging treatments in the biochemical components of the hair as well as the beneficial effects of a cosmetic product.

TamaTA-INNOV funding for SMEs is a very interesting tool for companies that would like to test the capabilities of light sources and to show them the valuable information that can be obtained. In this project, the company CTC had the opportunity to have access to MIRAS beamline at ALBA synchrotron and compare different hair samples through TamaTA-INNOV funding scheme. The goal of the study was to confirm the protective effect of a natural cosmetic product. This preliminary study showed some indications of changes in the samples that will need to be confirmed with further analysis.

These type of analysis and services require a strong relationship between the light source and the company to carefully plan the experiment and analyse the results, crucial steps for a successful project. For all this, TamaTA-INNOV is a very useful programme, easy and agile, that helping to get closer light source facilities to SME companies.

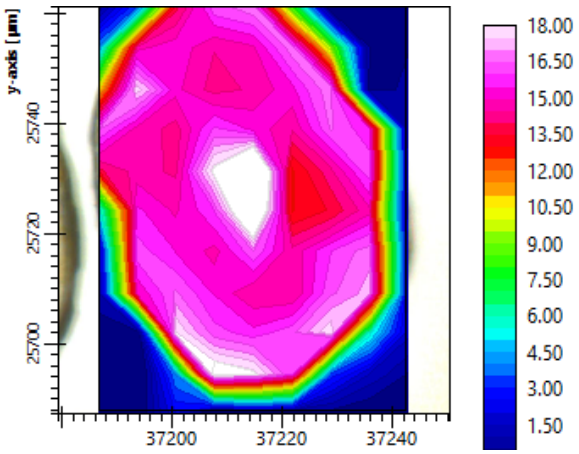

Figure 1. Hair cross section of a control sample showing the distribution of lipids (white and pink colours show the highest concentration of lipids and blue the lowest).

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CASE STUDY 2

High-resolution synchrotron XRD analysis for damage-tolerant bearing steel

Bearings are exposed to cyclic loads during their operation. This causes deteriorations in the steel microstructure. The type of microstructural evolution ranges from stress-induced martensite transformation, formation of elongated ferrite and ferrite microbands, to the formation of white etching bands and lenticular cementite. The decay of the steel microstructure during cyclic loading also includes cementite dissolution and re-precipitation, and such phenomena are strongly dependent on dislocation rearrangement. These make dislocation density a critical parameter in affecting the microstructural evolution and, accordingly, the performance of a bearing.

However, the investigation of dislocation density evolution in the steel subsurface is limited at lab-scale X-ray diffraction devices (XRD) because of their large beam size. Furthermore, due to the low penetration depth only the near-surface information can be detected. This hinders the complete understanding of microstructural evolution that can pave the way for the design of better steel microstructure for more compact and lighter bearings.

Within the project, scientists from Scatterin AB teamed up with the global engineering steel producer Ovako AB for 2D mapping study of the dislocation density evolution in bearing steel subsurfaces. The synchrotron X-ray diffraction measurements were performed at the Swedish Materials Science Beamline P21.2 (SMS) at the Petra III, DESY in Hamburg, as part of the Tamata-Innov funded project in particular for SME. Whilst Ovako has contributed to the project by providing steel expertise, sample preparation, and complementary lab-scale investigations, Scatterin has been responsible for the synchrotron XRD measurements and data analysis using their dislocation density analysis code package as part of their software product 'Scatterin SaaS'.

Synchrotron XRD has enabled an unprecedented spatial resolution in measurements within a significantly shorter measurement time. High-resolution monochromator, small beam size, and use of large area detectors revealed features and trends that are impossible to observe in a lab-based X-ray instruments. A significant number of measurements were performed within minutes, which would otherwise take days in lab measurement.

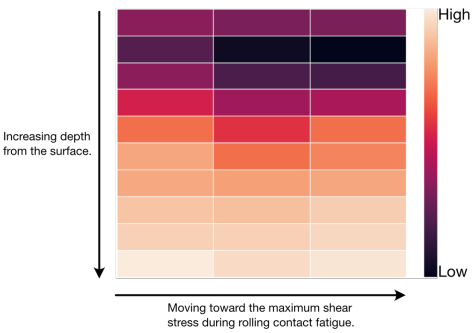

Figure 1. Dislocation density evolution in bearing steel subsurface revealed in µm resolution.

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CASE STUDY 3

TamaTA- INNOV success story: AmaDema and ESRF

A concrete example of the TamaTA-INNOV impact for European SMEs, is the successful case of AmaDema, a small company based in Cyprus which focuses on the enhancement of technical fabrics and prepregs (laminate composites of fibre sheets that are impregnated with polymer resins) to be used in fibre-reinforced composites. AmaDema deals with the design and manufacturing of advanced composite materials, by identifying the problems and needs of customers in a variety of industries such as aviation, defence, sports, automotive, shipping, etc., and by providing them with a variety of services and products solutions in the field of materials.

AmaDema has introduced NanoWeld®, a revolutionary, easily adjustable technology that significantly enhances the mechanical properties of fibre-reinforced polymer composites (FRPs), allowing the use of less material (fewer composite layers) to achieve the same load-bearing capacity. NanoWeld® technology increases composite performance by up to 100% for certain mechanical properties and reduces their weight by up to 15% compared to standard composites. NanoWeld® creates a hierarchical reinforcement at the damage-prone regions (interlayer), using nanofibres and protruding nanoparticles that work as anchors with the matrix, resulting in the increased mechanical performance of FRP composites.

Thanks to Tamata-Innov, AmaDema's had the opportunity to collaborate with ESRF, to expand AmaDema's understanding of the underlying mechanisms of NanoWeld® through the investigation of the various interfaces formed between the material phases. AmaDema will use these insights to better control the overall performance of the final product and strengthen its NanoWeld® portfolio.

https://www.esrf.fr/home/Industry/industry-news/content-news/esrf-news-list/tamata-innov-boosting-the-smes-research-facilities-cooperation.html

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3.5. Outreach activities and promotion material

A specific webpage page for all the partners has been created in the wayforlight portal (Figure 12). The webpage provides concise information for the companies that want to apply and allows them to understand in a quick and straightforward way what the TamaTA-INNOV programme is about and which are the contact points of the industrial liaison offices of each facility (https://wayforlight.eu/en/industries/ and https://www.leaps-innov.eu/project-calls).

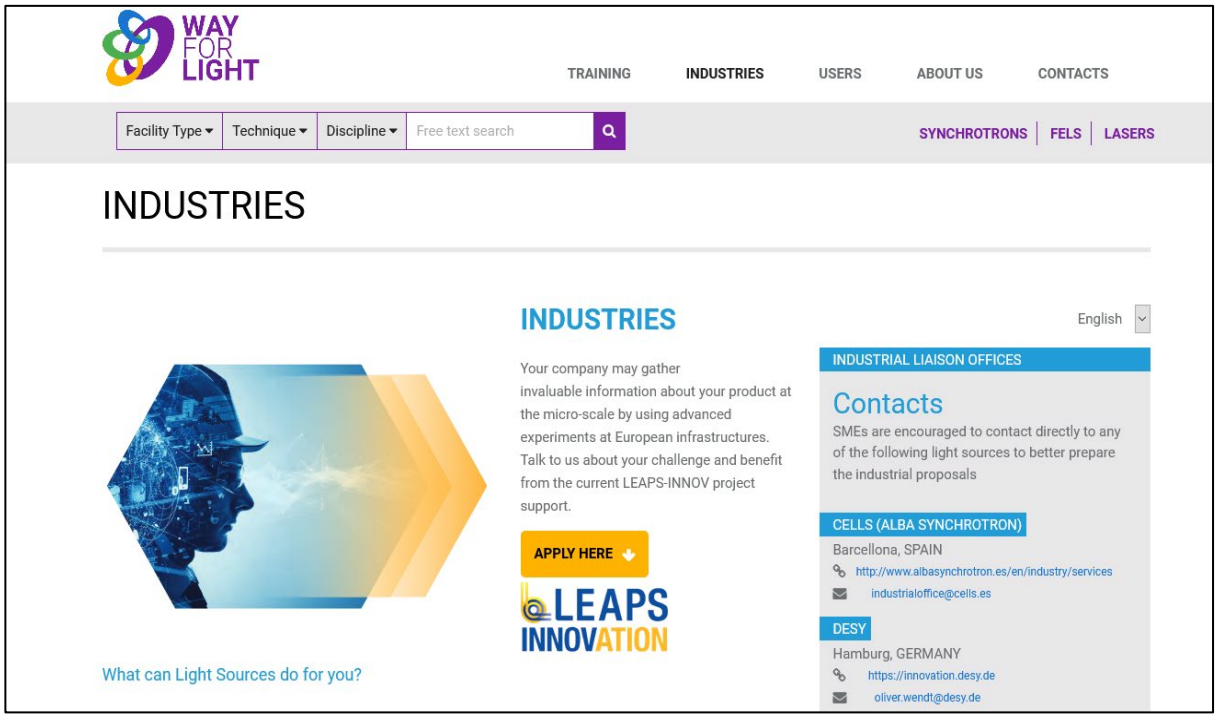

Figure 12: Partial view of the industry page in wayforlight (https://wayforlight.eu/en/industries/)

In addition, different materials have been created to disseminate the programme within SMEs (A0 poster, A5 flyer and HTML file, Figure 13).

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Figure 13: A5 flyer content

Engaging SMEs is strategic for light sources but it is also particularly challenging. For this reason, the involvement of all LEAPS – INNOV partners has been crucial in order to enhance the awareness of light sources capabilities within the industries and to promote TamaTA-INNOV programme. In that regards, many different activities have been carried out including dissemination in webpages, social media and participation and organisation of events focused on industrial needs. During this period partners have participated in almost 40 different events, both on-line and in presence, at a national and international level, reaching more than 20.000 attendees involved in many different industrial sectors (Figure 14, Table 4).

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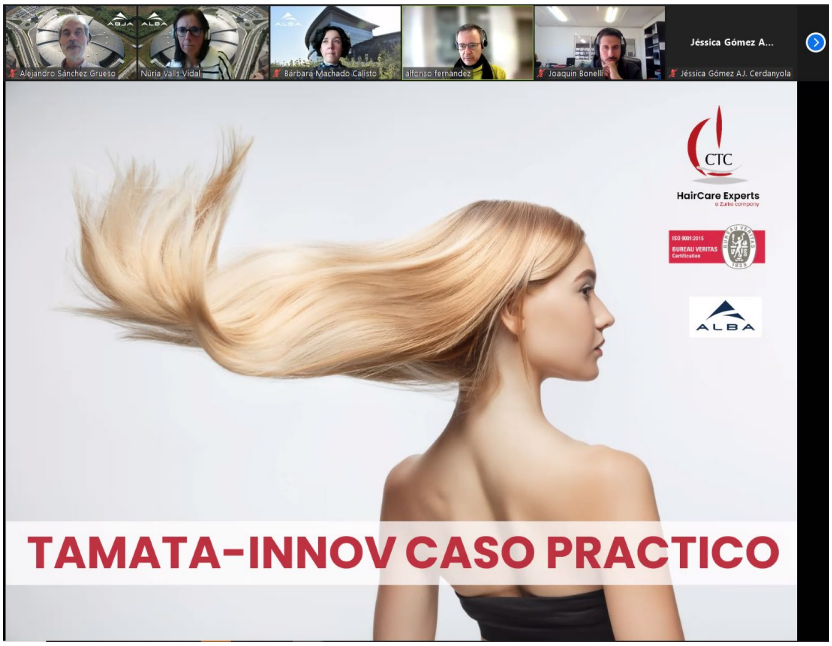

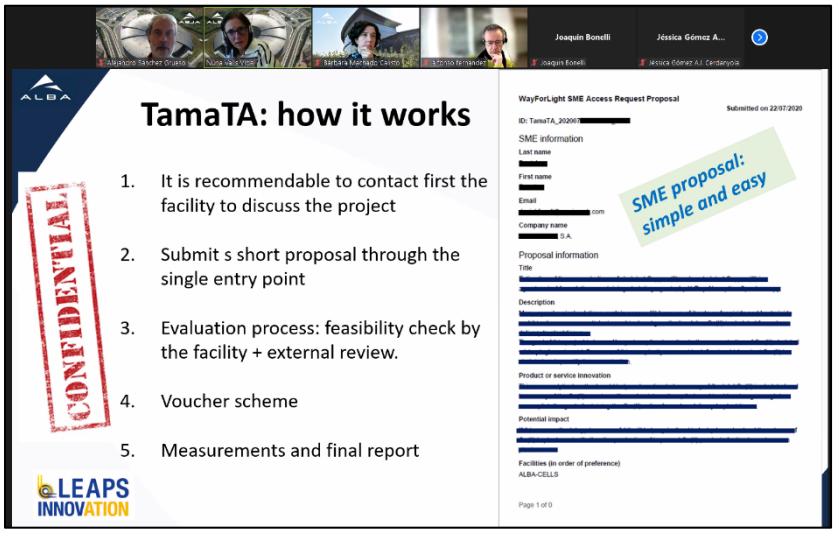

Figure 14: Snapshots of the webinar organised by ALBA to promote TamaTA-INNOV programme. The company CTC explained its experience using this programme.

Social media has also been used to disseminate the programme among industries:

https://www.cells.es/en/media/news/new-call-for-smes-to-ask-for-funded-access-to-european-lightsources
https://twitter.com/ALBAsynchrotron/status/1469291559606800385
https://www.linkedin.com/feed/update/urn:li:activity:6875056139348795392/
https://www.leaps-innov.eu/post/new-opportunities-for-smes-fundet-access-to-european-light-sources
http://hubb30.cat/ca/territori-b30
https://leaps-initiative.eu/new-opportunities-for-smes/
https://journals.iucr.org/s/issues/2023/01/00/s230100psi.pdf

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Event	Date	Place	Estimated nr of atendees
Industrial applications of ALBA Synchrotron in cements, pigments and ceramics	*19/05/2021*	*Zoom, online*	40
Smart Agrifood Indusry	*25-26/05/2022*	*Secpho platform, online*	40
Expoquimia	*15/09/2021*	*Barcellona*	20
Cosmetorium 2021	*21/10/2021*	*Barcelona*	20
Hangar 21, Tech show	*30/11/2021*	*Secpho platform, online*	30
Webinar TamaTA: subsidised measurements for SMEs at ALBA Synchrotron	*02/12/2021*	*Zoom, online*	25
Advanced Microscpy	*10/12/2022*	*Secpho platform, online*	25
Industrial applications of ALBA Synchrotron for the pharmaceutical industry	17/06/2022	ALBA Synchrotron, Cerdanyola del Valles	50
How to innovate with ALBA Synchrotron	14/09/2022	*Secpho platform, online*	8
ALBA Synchrotron: a tool to innovate in the Health sector	20/09/2022	Scientific Parc of Barcelona	20
Cosmetorium 2022	27/09/2022	Barcelona	20
Webinar ALBA synchrotron: high technology for industries	16/12/2022	Zoom, online	20
Industry collaboration: MaxLab IV & ESS & Alfa Laval & Swedish Research Council	19.&20. September 2022	PSI, Villigen, Switzerland	20
MECSPE Bologna	jun-22	Bologna Trade Fair	50
CONNEXT 2020 presso il MiCo - Milano Convention Center	jun-21	Milano convention center	10
Industrial Application of Elettra Synchrotron for pharmaceuticals companies	dic-21	Modena, DEMOCENTER	20
CPHI Frankfurt	nov-22	Frankfurt Messe	15
Meetin Italyforlifescience 2021	oct-21	Zoom, online	15
Meetin Italyforlifescience 2022	oct-22	Zoom, online	7
Nanoinnovation 2021	sep-21	Zoom, online	5
Oppurtunies for business @ Elettra Synchrotron	ene-22	Zoom, online	40
SPRING Paris-Saclay 2021	20/05/2021	Online	1800
ConneXions R&D Cosmetic Valley 2021	08/06/2021	Online	50
Visit of SOLEIL by the AMI association	01/10/2021	Saint-Aubin, France	20
COSMETIC 360 (International Innovation Fair for Cosmetics Industry) 2021	13&14/10/2021	Paris, France	5000
Visit of SOLEIL by the company Saint-Gobain Cristaux et Détecteurs	27/10/2021	Saint-Aubin, France	12
Business convention Rendez-vous Carnot 2021	17&18/11/2021	Lyon, France	1900
Cosmetic Visit R&D Cosmetomics Ile-de-France	23/11/2021	Cergy-Pontoise, France	50
Business Photonics Meeting Environnement	15/02/2022	Paris, France	30
Business convention TechInnov 2022	23/03/2022	Paris, France	2000
Visit of SOLEIL by a delegation of the France Bioproduction Congress	06/04/2022	Saint-Aubin, France	15
SPRING Paris-Saclay 2022	12&13/05/2022	Palaiseau, France	1800
Visit of SOLEIL by the cluster EMS (Eau-Milieu-Sols)	17/05/2022	Saint-Aubin, France	25
Business Photonics Meeting Agroalimentaire	24/05/2022	Paris, France	50
COMET (International Congress for Testing & Measurement in Cosmetics) 2022	05&06/07/2022	Cergy-Pontoise, France	200
COSMETIC 360 (International Innovation Fair for Cosmetics Industry) 2022	12&13/10/2022	Paris, France	5000
Business convention Rendez-vous Carnot 2022	12&13/10/2022	Paris, France	2000
AWT - FA 13 Eigenspannungen (Residual Stresses)	19.-20.07.2022	Hannover	120
ProRA 2022 (process-related X-ray analysis)	24.-25.11.2022	Berlin	120
Batterieforum Deutschland	18.-20.01.2023	Berlin	300

Table 4: List of events in which the different partners have participated

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3.6. Conclusions of TamaTA-INNOV and Next Steps

In summary, a single access programme for SMEs, named TamaTA-INNOV, has been set-up based on a previous pilot programme, where an agile, simple and easy process has been stablished. So far, 2 calls for proposals have been launched thanks to the outreach programmes carried out at each facility, 16 different proposals have been received requesting access to 20 different services. The single entry point allows the companies having access to more than one facility at the same time and within the same project to receive a more complete service. This has been shown to be very useful as in two different cases, the company has used this modality, enhancing the quality of the services that light sources can provide and its complementarity.

The number of access granted so far is 20 (from 16 proposals), meeting by far the expectations of the project at this stage. Six of the proposals have been completed providing 8 different services, thus, successfully meeting MS35 (8 services) on time. There are currently many proposals on-going that will be closely monitored by the facilities and coordinators of this Task. In that regards, the main objective for the next period will be to follow-up the on-going proposals and provide all the services granted. In addition, in order to increase the number of proposals, dissemination activities will keep going, promotion of TamaTA-INNOV is crucial to engage companies and to increase the competitivity of SMEs around Europe.

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