The European Network of research infrastructures and Industry for Collaboration

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Deliverable Report:

D4.3 Report on representative industry innovation case studies

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Terminology

'Big Science' – Big Science organisations are a common term used for legal entities which build and manage large-scale international research infrastructures, where the scope and cost of the investment exceeds the capability of just one country. Thus, several countries (member states) join forces to finance the infrastructure. These are usually found in the ESFRI Physical Sciences & Engineering domain, and examples are particle accelerators and telescopes. Examples are: CERN, ESO, ESRF, and ITER.

ESFRI RESEARCH DOMAIN – The European Strategy Forum of Research Infrastructures (ESFRI) has identified six main thematic domains of research (ESFRI Strategy Report and Roadmap 2018; pg. 38): Energy (ENE), Environment (ENV), Health & Food (H&F), Physical Sciences & Engineering (PSE), Social & Cultural Innovation (SCI), and – since 2017 – Data, Computing and Digital Research Infrastructures (DIGIT).

ILO – INDUSTRY LIAISON OFFICER. Officially appointed by the Member States and Associated Countries to stimulate the collaboration amongst the national industry and the international RIs, providing advice on business opportunities, R&D collaborations, calls for tenders, and industrial services."

ICO – INDUSTRY CONTACT OFFICER. Research Infrastructures staff in charge of developing business relations with all potential industrial suppliers of innovative components or services, as well as encouraging the economical use of their facility by private players.

RI – RESEARCH INFRASTRUCTURES are facilities that provide resources and services for research communities to conduct research and foster innovation. RIs can be used beyond research, e.g. for education or public services. Research Infrastructures include: major scientific equipment or sets of instruments; collections, archives, or scientific data; computing systems and communication networks; and any other research and innovation infrastructure of a unique nature which is open to external users.

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Abbreviations

CERN	Conseil Européen pour la Recherche Nucléaire
CDTI	Centre for the Development of Industrial Technology (CDTI)
CERIC	Central European Research Infrastructure Consortium
CLARIN	Common Language Resources and Technology Infrastructure
COVID-19	Coronavirus (SARS-CoV-2) disease
DARIAH	Digital Research Infrastructure for the Arts and Humanities
DTI	Danish Technological Institute
EATRIS	European infrastructure for translational medicine
EMSO	European Multidisciplinary Seafloor and water column Observatory
ENRIITC	European Network of research infrastructures & Industry for Collaboration
ESFRI	European Strategic Forum on research infrastructures
ESO	European Southern Observatory
ESRF	European Synchrotron Radiation Facility
ESS	European Spallation Source
F4E	Fusion for Energy
ILL	Institut Laue-Langevin
ITER	International Thermonuclear Experimental Reactor
PRACE	Partnership for Advanced Computing in Europe
NWO	The Dutch Research Council
SME	Small or Medium Enterprise
WPT	Wrocław Technology Park

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Executive Summary

The ENRIITC project aims to build a permanent pan-European network of Industrial Liaison and Contact Officers (ILOs and ICOs) and enable industry to become a full partner of research infrastructures whether it is as a user, a supplier, or a co-creator. In other words, ENRIITC supports the establishment of strategic, cross-border partnerships between industry and research infrastructures.

A strong tool for demonstrating industrial impact from RIs are via case studies illustrating the impact the RI engagement has helped the company. The case studies may both illustrate to other companies the advantage of engaging with RIs, may inspire RIs in their interaction with industry and demonstrate societal impact.

Supported by the wide-reaching ENRIITC RI community, a call for industrial cases was launched in Spring 2022. 26 case proposals were received, and from these, illustrative and representative case stories were selected for further elaboration. The draft for nine such case stories are presented in Section 4.

Each case includes the description of the challenge, the solution, the result and quotes from the company and/or the RI involved in the case.

The collected cases included a mix of cases with industry as a user (9 cases), industry as a supplier (5) and industry as an innovation partner (12). The cases represent all ESFRI domains, but two domains dominate: the Physical Science and Engineering with 12 cases and Health and Food with 7 cases. Both single-sited and distributed RIs were represented.

The companies involved in the cases came from several different industrial sectors, e.g. Biotechnology (6 references in cases), Electrical and electronic engineering (5), Health (4), Mechanical engineering (4) and ICT /data (4). The companies involved in the cases were mainly SME (65%) and came from 14 different countries.

The cases will be presented on the ENRIITC homepage and disseminated via LinkedIn. The cases are furthermore input to a case booklet to be printed as D5.2 and distributed at the Big Science Business Forum (Granada, Spain, 4.-7. October) and the International Conference for Research Infrastructures (Brno, Czechia, 19.-21. October).

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1. Introduction

Case stories describing the interactions between RIs and a company represent an important tool for communicating and understanding the societal impact of RIs. As compared to a catalogue of opportunities from an RI, the case stories both give a more lively and relevant introduction to the collaboration and also serve to demonstrate that actual impact has been created – not just theory.

The case studies serve several purposes:

- Illustrate to other companies what can potentially be gained from engaging with RIs
- Inspire other RIs in their interactions with industry
- Demonstrate to stakeholders in the public and political sphere concrete industrial impacts for companies

The present report presents the procedure employed by ENRIITC to collect and select case stories from the RI stakeholders and homogenized them for publication. The report also includes the first eight cases ready to be rolled out as part of the ENRIITC dissemination.

The dissemination itself will be managed by WP5 who will a) advertise the cases on the homepage and on LinkedIn, and b) assemble the cases in a booklet to be printed by ENRIITC and distributed to stakeholders at events in the last months of the project.

ENRIITC uses 3 main categories to characterise the interaction between companies and RIs:

- **Industry as a user**: Where a company has innovated their products/processes thanks to the access or services at the RI, or technology-knowledge portfolio of the RI. In particular, the case should capture and highlight added value in related business areas for the company based on the RI innovation experienced-user case, where the knowledge generated by the usage of the RI industrial offering has been employed by the company to improve its products or services.
- **Industry as a supplier**: Where an RI has improved its service thanks to the interaction with one or more industrial partners, resulting in novel or novel instruments/processes for research, or new organisational practices, including data-related services or/and administrative procedures.
- **Industry as an innovation partner**: Where the company and RI is engaged in an often longer collaboration in order to develop a solution to a challenge.

2. Methodology and case selection criteria

To ensure a broad representation of case stories, the partners agreed to request nominations for case stories from both the consortium and ENRIITC associates.

2.1. Format of case stories

Case-stories with companies are being widely used by many different RIs in order to illustrate the benefit from the interaction and attract new companies. A mapping of the existing cases revealed a large variety in setup, framing and detail level as well as differences between supplier cases, user cases and innovation cases. Investigated examples include:

- https://www.bsbf2020.org/SME_Track_Selected_companies?_ga=2.112394692.1783581835.1619608476-504980015.1615990051
- https://bigscience.dk/english/success-stories/
- https://www.diamond.ac.uk/industry/Case-Studies.html
- https://www.isis.stfc.ac.uk/Pages/Industry.aspx

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- https://www.dti.dk/specialists/material-analysis-with-x-rays-and-neutrons/industry-cases/41526,9
- https://www.esrf.fr/Apache_files/Industry/Impact/index.html#/page/0

And in some cases, also videos are used to illustrate the industrial benefit:

- https://www.sine2020.eu/industry-back=yes.html

To be able to present a more uniform case booklet, it was decided to request the case story description to consist of the following sections:

- **The Challenge**: The initial challenge addressed by the engagement of the company with the RI. This could be the motivation from the company for initiating the engagement or the motivation of the RI to seek industrial support. This will also often include a description of the problem owner.

- **The Solution**: This describes the solution found during the RI-company interaction. This will also often include a description of the solution provider.

- **The Results**: This describes what the result were. Both directly on the direct challenge in question however also more broadly for the RI, company and society as a whole where applicable.

- **Quote from company and/or RI**: where applicable the cases should be supported by a quote from the sides engaged in the interaction, underlining the most important part of the interaction.

Furthermore, it was decided to record the following information from each case each of which category is discussed in the following sections:

- Whether it was a user, supplier or innovation case
- Link to UN sustainable development goals
- The ESFRI Domain
- The RI involved in the case
- Technical area
- Country location
- Size of company

2.2. Industry case categories

It was decided to include cases from all 3 categories of interactions with companies, although some balancing considerations were discussed already early in the process based on the remarks inserted below:

- **Industry as a user:** Most stories in this category were expected to come from the neutron facilities and synchrotrons, where the industry user aspect is well developed. It was noted to make sure, that other, less obvious, cases were also collected from non-Physics and Engineering domain
- **Industry as a supplier:** The partners expected this category to only relate to the so-called “Big Science” RIs.
- **Industry as an innovation partner:** It was expected that this category would contain also supplier-stories with an element of knowledge transfer, or user-stories involving a level of collaboration.

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2.3. UN sustainable development goals

The UN development goals seen in Fig. 1 were established in 2015 as overarching ambitions for the planet. The goal is associated with the industry cases to illustrate the overall impact from the RIs interactions with industry.

Figure 1: UN sustainable development goals (source: UN)

2.4. ESFRI Domains

The case studies should preferentially represent all of the 6 ESFRI domains listed below. They should not all be related to the same few domains.

- Energy
- Environment
- Health & Food
- Physical Sciences and Engineering
- Social & Cultural innovation
- Digital

Based on the number of available cases found on homepages, it was expected that many cases would originate from the Physical Sciences and Engineering domain. An effort should be made to engage the other domains.

2.5. Facility

As was revealed in the survey (ENRIITC D2.1), significant differences exist between different types of RIs. Most notably was the difference in operation and approach between so-called single site RIs and distributed RIs. A certain spread of both facilities and type of facilities should be ensured.

2.6. Technical area

The stakeholders were requested to assign a technical area to the case story. Attention should be given to ensure a certain spread in technical area over, e.g., biotechnology, mechanical engineering and construction. In ENRIITC D2.1, the following 27 categories defining different industrial sectors were used: Aeronautics industries, Automotive industry, Biotechnology, Chemicals, Construction, Cosmetics, Cultural heritage, Defence industries, Electrical and electronic engineering industries,

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Energy, Environment, Firearms, Food and drink industry, Gambling, Healthcare industries, ICT / data, Maritime industries, Mechanical engineering, Medical devices, Postal services, Pressure equipment and gas appliances, Raw materials, metals, minerals and forest-based industries, Social economy, Space, Textiles, fashion and creative industries, Tourism and Toys. For the work with the case studies, it was soon realized, that a more narrow range of sectors could be adopted.

2.7. Country

A geographical spread should be ensured.

2.8. Company size

A preference is given to case stories involving SMEs as compared to larger companies, since supporting SMEs are a strategic priority in EU.

3. Selection of cases

3.1. Industry case categories

It was possible to find sufficient cases illustrating industry engagement in RIs as both users, suppliers and innovation collaboration. A preference was given to cases where the value impact was most evident. Some user and supplier cases from the Physical Science and Engineering domain (see Section 3.3) were observed to be too simple to constitute a convincing case story.

The following number of stories was selected:

- Industry as a user: 9
- Industry as a supplier: 5
- Industry as an innovation partner: 12

3.2. UN sustainable development goals

The following 11 UN sustainable development goals were registered on the cases:

- GOAL 3: Good Health and Well-being;
- GOAL 4: Quality Education;
- GOAL 7: Affordable and Clean Energy;
- GOAL 8: Decent Work and Economic Growth;
- GOAL 9: Industry, Innovation and Infrastructure;
- GOAL 10: Reduced Inequality;
- GOAL 11: Sustainable Cities and Communities;
- GOAL 12: Responsible Consumption and Production;
- GOAL 13: Climate Action;
- GOAL 15: Life on Land;
- GOAL 17: Partnerships to achieve the Goal;

By far, the most used goal was GOAL 9 which was quoted by 22 of the cases, while GOAL 3 was referenced in 12 cases. No other goals were referenced more than 6 times.

3.3. ESFRI Domains

We succeeded in finding case stories in all domains.

As expected, cases from the Physical Science and Engineering domain were much easier to locate for both users, suppliers and innovation, and 100s of cases were identified in this domain. In the end, 12 cases were selected. Health & Food accounted for 7 of the selected cases, while only one case was found from Energy and Environment, respectively.

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The distribution of cases is depicted in Figure 2.

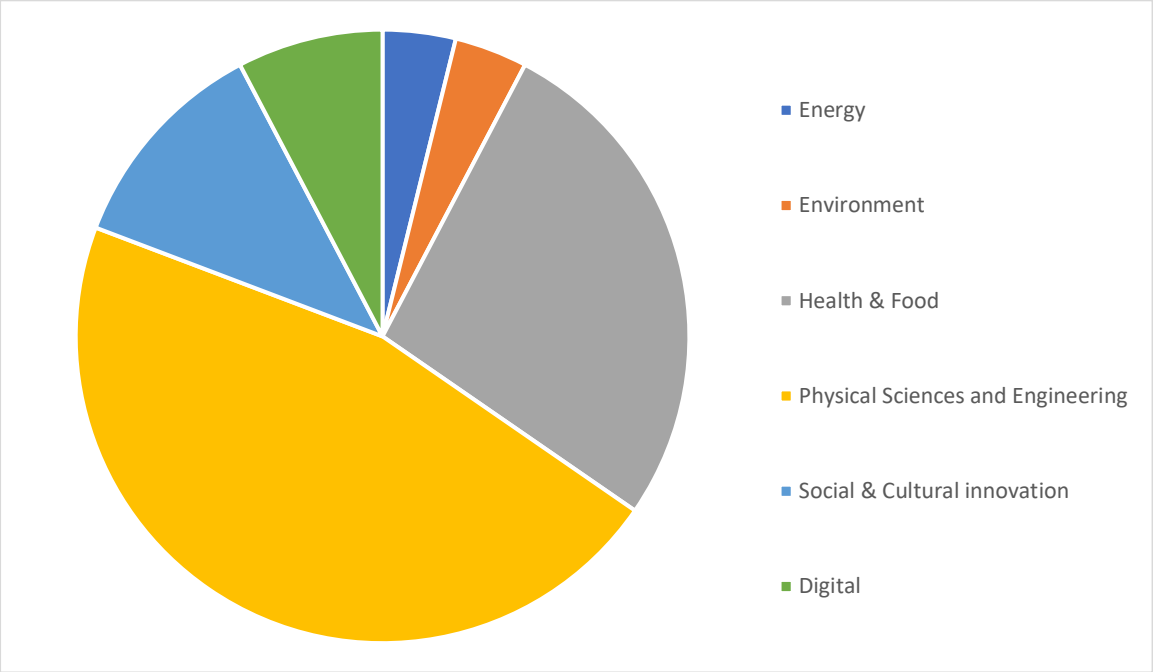

Figure 2: Distribution of cases on ESFRI domains.

3.4. Facility

Several facilities were featured with more than once case while other facilities did not propose any cases. The majority of the case stories came from single-site facilities but, overall, there was a reasonable spread over the facilities and facility types.

3.5. Technical area

A good spread was registered for the technical/industrial sectors and the distribution is depicted in Figure 3. The most reference industrial sectors were Biotechnology (6 references), Electrical and electronic engineering (5), Health (4), Mechanical engineering (4) and ICT /data (4). Note that some cases referenced several industrial sectors.

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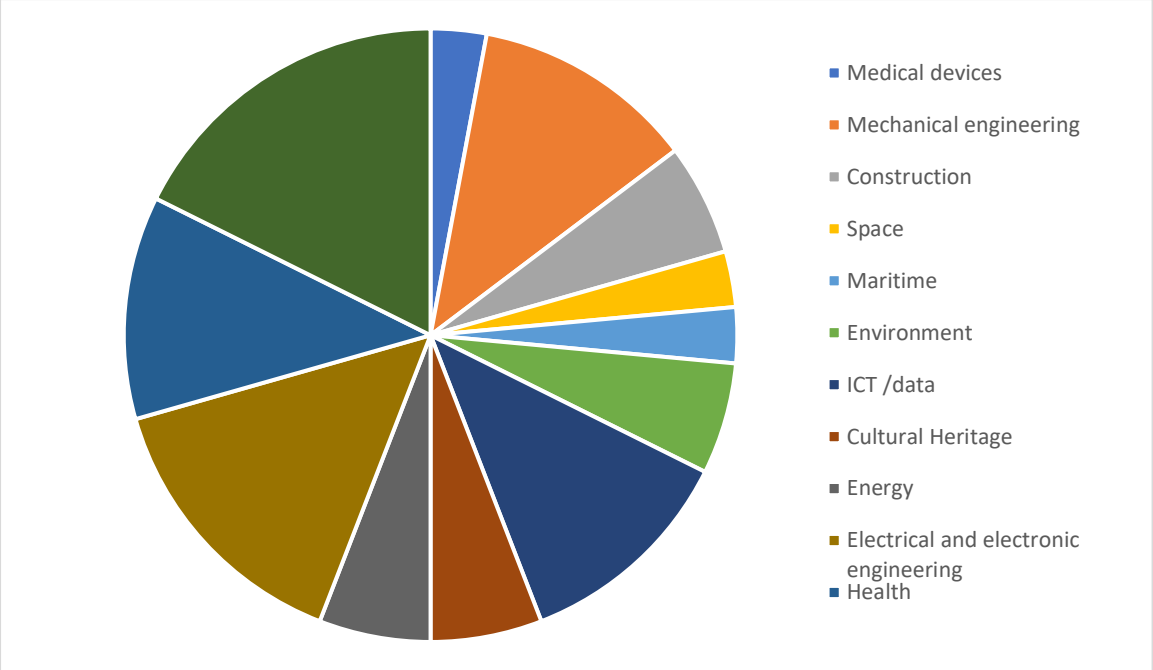

Figure 3: Industry sector distribution.

3.6. Country

Case stories involving companies from 14 different countries were collected. Spanish companies contributed by far the most stories (8), while companies from France and the Netherlands each accounted for 3 cases. Figure 4 show the companies that were represented by case stories.

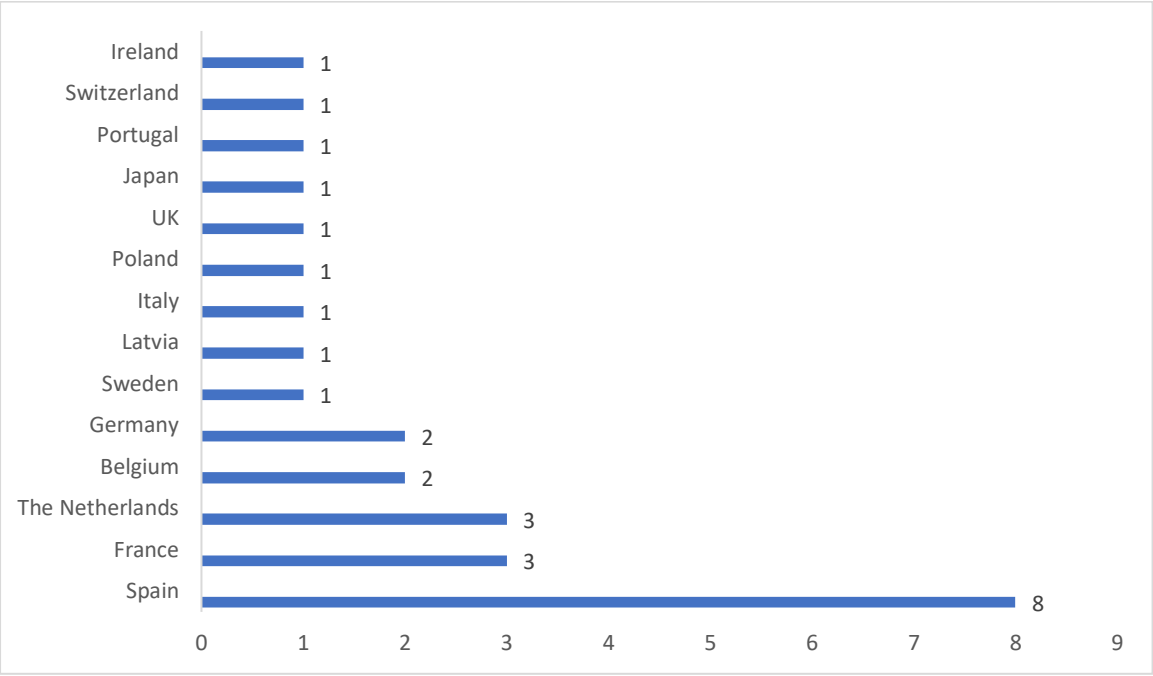

Figure 4: Company origin of case stories. In one case, 2 countries were registered on the same case and therefore, the numbers add up to 27 rather than the 26 cases.

3.7. Company size

A majority of the cases came from SMEs which were involved in 17 of the cases

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4. Case descriptions

Nine cases have been completed for the case booklet (D5.2). Of the originally selected 26 cases, further 14 cases are expected to be published but additional information has been requested from the company and responsible RI-contact.

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4.1. Case ID21: AVS

Physical Sciences and engineering

Development of beam diagnostics provides SME with key technology for advanced cancer therapy

Electrical and electronic engineering SME

The Challenge

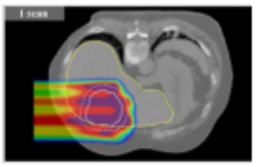
A major upgrade of the on-line isotope mass separator facility ISOLDE at CERN took place since 2010 under the HIE-ISOLDE project. As part of the upgrade CERN required a new diagnostic boxes (DBs) for HIE-ISOLDE LINAC.
The technical challenges for beam diagnostics included the development of new instruments for low-intensity ion beams with energies up to 10 MeV/u. Moreover, in the inter-cryomodules regions of the superconducting LINAC, the longitudinal space available for beam instrumentation was very limited (58 mm) due to restrictions coming from the beam optics design. As a consequence, all the devices needed to be designed with a very compact geometry

The Solution

CERN hired the company AVS Added Value Industrial Engineering to develop the desired solution. AVS is a SME specializing in complex solutions for the Big Science market and after three years of R&D the had developed a satisfactory solution which CERN acquired.

The Result

The developed Beam Diagnostic component have worked well and shown good reliability since installation in 2015.
When the CERN Spin-off, ADAM, Applications of Detectors and Accelerators for Medicine (later acquired by Advanced Oncotherapy), required beam diagnostics systems with very challenging parameters CERN only recommended one solution: AVS Diagnostic Boxes. AVS have since used their knowhow of the successful CERN collaboration as a springboard to develop an integral part of the high tech Proton therapy instruments for especially challenging cancer treatments provided by Advanced Oncotherapy.



https://www.a-v-s.es/

https://home.cern/

" "

– ms Brown, company director

After a first period of commissioning the DBs have shown that their behavior is within the required specification and have been used during regular machine operation since the summer of 2015. The beam instrumentation has shown very good accuracy and reliability and is very appreciated by the HIE ISOLDE operation team. […] have been essential for both, commissioning and everyday operation.

- W. Andreazza, Beam Department, CERN

Learn more: Www.facility.org/case

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4.2. Case ID17: ELYTT ENERGY

Energy

SME wins large contract at ITER and opens new markets

Energy;
Electrical and electronic engineering;
SME

The Challenge

Toroidal Field coils are "D" shaped coils whose core task in the ITER device is the confinement of plasma; they are composed of a winding pack and a stainless steel coil case and just to have an idea of the complexity, each winding pack is 14 meters high, 1 meter wide and 9 meters long with a weight of 110 tones. Construction of these is one of the most relevant and challenging contracts of the ITER project, which aims to pave the path for cheap carbon neutral and abundant energy through fusion power.

The Solution

Elytt Energy is currently an innovative SME, working in high technology projects in the field of energy and particles accelerators, with projects in Germany, USA, France, Italy and Switzerland. They were founded in 2002 and starting their activities designing standard and custom-built resistive magnets.
In 2010, they were awarded the contract for the Toroidal Field coils (in consortium with Iberdrola and ASG Superconductors) and successfully provided ITER with this very complex system.

The Result

After this significant step in the fusion energy market, they were given the opportunity of leading a consortium for the supply of the handling and impregnation tooling required for the production of the PF coil magnets also for the ITER project and the company is currently being a great example of how an SME can be successfully leading a multimillionaire and very complex contract in one of the most sophisticated engineering hubs in Europe.
The successful participation on the manufacturing of the world largest superconducting magnets contract allowed them to access the superconducting magnets market. They have since then been awarded with other very relevant contracts and accessing the market of particles accelerators, working for leading scientific institutions such as CERN, GSI or ILL and increasing their turnover in more than 12.5% and their employees in more than 43%.

ELYTT ENERGY
https://www.elytt.com

"This contract was a milestone for our company supplying high technology components and services. Together with our collaborators, we feel very proud and honored that our work is going to contribute to the development of a future inexhaustible energy source for all mankind."
– Julio Lucas, Technical Director of ELYTT ENERGY

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4.3. Case ID04: Seven Solutions

Physical Sciences and engineering

Nanosecond synchronization protocol expanded beyond science by SME

Electrical and electronic engineering;
SME

The Challenge

White Rabbit (WR) was envisioned as an extension to Ethernet technology initially proposed by CERN. It allows users to synchronize remote devices within one billionth of a second (1 nanosecond). At a first stage, the target was timing systems for particle accelerators but soon the goal shifted to a much broader scope. This pushed the technology to evolve to a more general solution to be used on astrophysics facilities, metrology institutes, fintech datacenters or radar applications. The development required a collaboration with many institutes and companies.

The Solution

Seven Solutions joined the White Rabbit initiative at a very early stage back in 2010, as one of the first industrial partners.
The company's participation was partially funded by CDTI (the Spanish innovation agency) with a national R&D. This represents a clear successful case of a public-private collaboration that transformed a small co-funded seed capital into a private initiative at Seven Solutions that eventually led to a full set of competitive products and services.
Seven Solutions is the original designer of the main and most advance deviced of the open hardware White-Rabbit ecosystem, the White-Rabbit Switch.

SEVEN Solutions

The Result

Seven Solutions transformed White Rabbit into a full industrial solution, offering new breakthrough products and features as well as services and support.
White Rabbit is now a commercial solution used by hundreds of customers worldwide. Seven Solutions, native in subnanosecond timing, is the leading company in this technology.
White Rabbits users include research infrastructures and institutions as CERN, GSI, Fermilab, IFMIF, ELI-ALPS, ELI-BEAMS, EISCAT, KM3Net, CTA, SKA, DESY, ESS, PANOSETI, Berkeley, ProtoDUNE, ESA, DLR, ESRF, LHAASO and many others. Most of the timing units of national metrology institutes around the world use this technology. In addition, many industrial companies from the telecommunications, smart grids automation, fintech and other markets have adopted WR.

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4.4. Case ID13: Asturfeito

Physical Sciences and engineering

SME helps push the boundary of radio telescopes

Mechanical engineering; SME

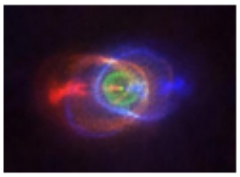
The Challenge

ESO's ALMA radio telescope is composed of 66 high-precision antennas, which operate on wavelengths of 0.32 to 3.6 mm. Its main array has fifty antennas, each with 12-meter diameters, which act together as a single telescope: an interferometer. This is complemented by a compact array of four antennas with 12-meter diameters and 12 antennas with 7-meter diameters. ALMA's antennas can be configured in different ways, spacing them at distances from 150 meters to 16 kilometers, giving ALMA a powerful "zoom" variable, which results in images clearer than the images from the Hubble Space Telescope. All these antennas had to be precision manufactured and installed in a remote mountain area of Chile.

The Solution

ASTURFEITO has successfully delivered 25 Radiotelecopes for ALMA project.
Project scope includes: detail and fabrication engineering,, raw material purchase, welding process definition, fabrication (welding, machining, etc), final assembly, Electrical and hydraulic installation, shop commissioning, packing and delivery at port.

The Result



ALMA is already "irrigating" the fields of astronomy in depth, 24 hours a day, 365 days a year. Scientists foresee record harvests, where invisible light (radio waves) accumulated by ALMA will be vital to our understanding of the Universe. The purpose of ALMA is to study star formation, molecular clouds and the early Universe, closing in on its main objective: discovering our cosmic origins.
Furthermore, the successful delivery have of such a large and complex order have given ASTURFEITO a commercial boost:

asturfeito

https://www.asturfeito.com/

"ALMA Project was our first large experience in the SPACE/ BIG Science facilities, thanks to our good performance and our customer satisfaction this project opened us the doors to even more incredible projects. As per example the complete VLBI antennas fabrication , testing and site assembly, or the JPL/NASA references that we have now in the field of fabrication and systems integration. And the most recent ASTURFEITO success, that was the complete fabrication of the LSST Telescope Mount assembly, where we were responsible of the complete fabrication, mechanical, electrical and hydraulic installation and the full site assembly and commissioning"

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4.5. Case ID05: Priors

Physical Sciences and engineering

Improved performance of inhaler drug delivery device through x-ray investigation

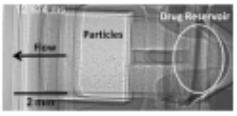
Medical devices; SME

The Challenge

According to the World Health Organisation, over 300 million people worldwide suffer from respiratory diseases such as asthma and chronic obstructive pulmonary disorder (COPD). Inhaled medicine, typically in the form of pressurised metered dose inhalers (pMDI) and dry powder inhalers (DPI), is used to treat these diseases due to the direct delivery and reduced side effects. However, device/treatment efficacy is often quite poor with only 10-20% total lung deposition for most devices on the market.

Prior PLM Medical is a company that specialises in supporting the medical and pharmaceutical industry to develop drug delivery devices from initial idea to end of product life. The company believed the dynamics of the plume up to the point at which it exits the device to influence speed and aerodynamic particle size distribution (APSD) which are considered important to drug transport to the lungs. However, this internal behaviour within the inhaler is not well understood due to the transient nature of the event and the difficulties in accessing the internal chambers within the device.

The Solution



A monochromatic X-Ray beam was used at beamline ID19 at the European Synchrotron Radiation Facility. A Prior PLM Medical custom-built fixture was used to shake and actuate the inhalers. Phase contrast X-ray video of the dose release event from each inhaler showed the propellant mixture behaviour inside the canister and actuator. In addition mechanical interactions could be viewed taking place. This has provided new insights and is of value as a validation method for modelling efforts.

The Result

X-rays are capable of penetrating inhaler devices to visualise internal features but conventional techniques, for example industrial CT, are too slow to investigate fast events such as inhaler dose release. The ESRF beamlines have sufficient intensity to achieve the required temporal resolution and the phase contrast X-ray imaging technique gives excellent contrast for the low atomic number polymer/propellant/drug materials involved.

PRIOR PLM MEDICAL

https://priors.com/

"Our work at the ESRF has allowed us to see what's happening inside both development stage and off-the-shelf commercial inhaler devices and has enabled our clients to make informed design decisions. We also use the facility for our own internal R&D programmes and are very excited by the prospect of the ESRF Extremely Brilliant Source."

- Alan McKiernan, Research Manager Prior PLM Medical, physicist

Learn more: https://www.esrf.fr/home/Industry/industry-news/content-news/esrf-news-list/improving-asthma-and-other-respiratory-diseases.html

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4.6. Case ID06: Carbios

Physical Sciences and engineering

Structural analysis of enzyme enables more efficient recycling of plastics

Biotechnology; SME

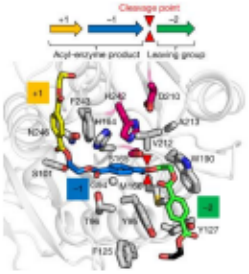
The Challenge

Poly(ethylene terephthalate) (PET) is the most abundant polyester plastic, with almost 70 million tons manufactured annually worldwide for use in manufacture bottles, polyester clothing fibers, food containers, and various thermoformed packaging and components. The main recycling process for PET, via thermomechanical means, results in a loss of mechanical properties. As an example, only about 30% of the plastic that goes into bottles gets turned into new plastic. This new plastic is often of lower quality, so it is used in carpets or textiles that will ultimately end up in landfills.
In 2012, Japanese scientists found an enzyme that could break down PET plastics, within a microbe present in compost heaps. The enzyme, called leaf-branch compost cutinase (LCC), cuts bonds between two building blocks in PET plastics, terephthalate, and ethylene glycol. Unfortunately, the reaction reaches only a low depolymerization yield at 65°C due to thermal denaturation. Scientists from the Toulouse Biotechnology Institute (TBI, Université de Toulouse, CNRS, INRAE, INSA) and the start-up Carbios set out to overcome the themal limitations of LCC.

Plastic bottles

The Solution

In order to overcome the thermal limitations a thorough understanding of the structure of the enzyme and possible improved enzyme candidates is very important.
The team reengineered the enzyme and switched out the amino acids for activity-improving and heat-stabilizing ones. To that end, thanks to the access to the crystallization facility provided by the Structural Biophysics Team of the Institute of Pharmacology and Structural Biology (IPBS, Toulouse), the team collected data from hundreds of crystals on ID30B beamline at the ESRF and at the synchrotron ALBA and subsequently, TBI researchers solved the structure of the new enzyme.



The Result

The novel enzyme can biologically depolymerize all PET plastic waste in an extremely efficient way by increasing the degradation yield of PET waste to 90% in 10 hours, a significant upswing from the initial degradation yield of 1% after several weeks. This paves the way for substantially increased recycling of PET.

"This experiment shows how synchrotron sources, and in particular the ESRF, can do its bit to contribute to tangible new technology that will lead us to a cleaner environment in the years to come",
- Gordon Leonard, head of structural biology at the ESRF.

esrf.fr

Learn more: https://www.esrf.fr/home/news/general/content-news/general/scientists-create-a-plastic-eater-enzyme-that-breaks-down-plastic.html

ENRIITC is funded by the European Framework for Research and Innovation Horizon 2020, under grant agreement 871112

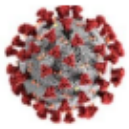
4.7. Case ID12: Takis

Physical Sciences and engineering

Synchrotrons play key role in the fight against covid-19

Medicine;
SME

The Challenge



The Covid-19 pandemic demonstrated not only the risk to modern society from new infectious deceases. It also demonstrated how rapidly modern society is able to develop medical solutions to such a decease if the required resources are dedicated to the project. An integral part of such projects is understanding the structure of key part of the virus as well as the structure of proposed drugs. Since the organic molecules in question are tine, yet very complicated in their structure this is not possible with traditional laboratory methods. Instead companies such as Takis relies on ESFRI facilities when developing vaccines against Covid.

The Solution

ESRF
The European Synchrotron

esrf.fr

By crystalizing tiny crystals of the proteins in question it is possible to determine their structure at synchrotron facilities with x-ray diffraction. ESRF supported the crystallization and structure determination through EU funding from the CALIPSOplus TamaTA program. The work was also supported by an academic group as experts for data analysis showcasing the possibilities when industry, ESFRI facilities and academia works together.

The Result

Takis

www.takisbiotech.it/

Takis used the result in as part of their work to develop a DNA vaccine which work along similar principles to the very successful RNA vaccine however ic can be storred at room temperature unlike RNA vaccines which requires extremely cold temperatures. Such innovative solutions will make worldwide vaccination considerably faster. Takis hopes to start the phase III trials in autumn 2022.

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4.8. Case ID23: Kazerne Dossin

Social and Cultural Innovation

Close collaboration conserves the memory of holocaust

Cultural Heritage
SME

The Challenge

Trans-national Holocaust research, commemoration and education is the mission of the European Holocaust Research Infrastructure (EHRI). The EHRI Portal enables online access to information about Holocaust sources.

EHRI
EUROPEAN HOLOCAUST RESEARCH INFRASTRUCTURE
www.ehri-project.eu/

The Solution

KAZERNE DOSSIN
kazernedossin.eu/en/

Right from the start there was a bond between the EHRI and Kazerne Dossin. Knight Nathan Ramet, Holocaust survivor and founder of the Memorial and the museum in Mechelen, was present at the launch of EHRI in Brussels on 16 November 2010 and there have also been contacts between the research centre of Kazerne Dossin and EHRI since 2011 to share the archival collections managed in Mechelen via the EHRI portal.
The learning process constituted Dossin's first contribution to the EHRI Document Blog. The history of the deportations from the Dossin barracks and the accompanying deportation lists formed a second blog entry, interpreting the archival documents and visually mapping out the deportations on a timeline.
Finally, the "Left Behind" project van introduced via the EHRI blog, which tells about the impact that the deportation of Jewish men from Antwerp for slave labour in Northern France had on their families who were left behind.

The Result

The EHRI project has benefitted greatly from the contributions to its database from Kazerne Dossin. Many blog posts have been filed and the collaboration also demonstrated how new geo tools can help support and enrich research.
Likewise Kazerne Dossin has benefitted from the exposure through EHRI and the access to the EHRI database.
Veerle Vanden Daelen, Deputy General Director and coordinator of Collections & Research at Kazerne Dossin, has besen leading the identification and integration of data in the EHRI Portal since April 2011, at that time still managed by CegeSoma. Several colleagues in Kazerne Dossin are actively contributing to this project whose international context and exchange activities signify a great enhancement of expertise and motivation for the entire team.

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4.9. Case ID02: S2innovation

Physical Sciences and engineering

Close industrial corporation helps synchrotron overcome covid shortages

Electrical and electronic engineering;
SME

The Challenge

Although MAX IV synchrotron was officially inaugurated in 2016, it is still intensively developing its R&D infrastructure which leads to the need of qualified personnel and support of the software development companies. Due to the COVID pandemic lot of processes slowed down and at the same time many of the research centres started to suffer from an overload of tasks and limited personnel and time. In a result, MAX IV (and many other research institutions) need help from external companies, however do not have the time and/or resources to describe precisely what is exactly the scope of the work.

MAX IV LABORATORY

https://www.maxiv.lu.se/

The Solution

S2Innovation is the only company in Poland delivering control systems and software development services for the most advanced research centers in the world conducting high-tech scientific research. The company was founded at the end of 2017 in Krakow. Currently one of S2Innovations most important customers is MAX IV . Due to the close relationship S2Innovation and MAX IV have developed a model of in which S2Innovaiton software developers work closely with MAX IV specialists as one team in an Agile model solving the ongoing needs and working on projects for which the specification and scope are defined very dynamically. What is crucial for this type of collaboration is mutual trust between partners (which we built during the first smaller projects in previous years) and the ability of the company to provide highly skilled and qualified team members.

https://s2innovation.com/

The Result

Thanks to the support from S2Innovation MAX IV were able to reduce the impact of Covid-19 and keep up the progress during some very challenging times.

ENRIITC is funded by the European Framework for Research and Innovation Horizon 2020, under grant agreement 871112

4.10. Other cases for booklet

Information is still being collected from the following companies with the aim to include them in the printed version of the case booklet and present the case on the ENRIITC homepage and on LinkedIn:

- SEFTECH (FRA)
- VDL (NL)
- SOITEC, Schneider, SERMA (FRA)
- Tilde (LV)
- Koninklijke Bibliotheek (NL)
- Techtra Ltd. (PL)
- GlaxoSmithKline (UK/NL)
- Sumitomo Dainippon Pharma Company (Japan)
- ALGAE Innovation (BEL)
- Promega (ES)
- Aquarray (GER)
- InnoMe (GER)
- Navigator Company (POR)
- Scailyte (CH)

5. Dissemination of cases

The final case catalogue with 20-25 cases will be completed in September 2022 and printed in a version suitable for handing out to stakeholders at the Big Science Business Forum (Granada, Spain, 4.-7. October) and the International Conference for Research Infrastructures (Brno, Czechia, 19.-21. October).

All cases will be featured on the ENRIITC homepage and distributed on LinkedIn in Sept-Dec 2022.

6. Conclusion

The ENRIITC community of stakeholders was engaged to identify examples of successful case stories from the engagement between RIs and companies.

Based on the incoming suggestions, an initial selection of 26 cases was made. Further information on these cases was collected to make a case description to go into the case booklet in ENRIITC D5.2 and to be presented on the ENRIITC homepage and on LinkedIn.

Each case should include the following information:

- The Challenge
- The Solution
- The Result
- Quote from company and/or RI

The collected cases included a mix of cases with industry as a user (9 cases), industry as a supplier (5) and industry as an innovation partner (12). The cases embraced 11 UN sustainable development goals with GOAL 9 (Industry, Innovation and Infrastructure) and GOAL 3 (Good Health and Well-being) being most quoted by, respectively, 22 and 12 cases.

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The cases were selected to represent all ESFRI domains, but two domains dominated: the Physical Science and Engineering with 12 cases and Health and Food with 7 cases. Both single-sited and distributed RIs were represented in the cases.

The companies involved in the cases came from several different industrial sectors, the most referenced being Biotechnology (6 references), Electrical and electronic engineering (5), Health (4), Mechanical engineering (4) and ICT /data (4). The companies came from 14 different countries, and the majority of cases (17 out of 26; 65%) involved SMEs.

Overall, the selected cases offer a broad and wide-ranging insight into the links between RIs and industry.

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Research and Innovation Horizon 2020, under grant agreement 871112