

Research Infrastructures and Innovation

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Overview

- Open Innovation and Research infrastructures
- RI and industry: opportunities and barriers
- The European Strategy Forum on Research Infrastructures (ESFRI) contribution
- The consultation on the Long Term Sustainability (LTS) of Research Infrastructures
- The contribution of H2020: past and future
- Examples of research infrastructure projects focussed on innovation



Open Innovation

"Open innovation is about involving far more actors in the innovation process, from researchers, to entrepreneurs, to users, to governments and civil society. **We need open innovation to capitalise on the results of European research and innovation**. This means creating the right ecosystems, increasing investment, and bringing more companies and regions into the knowledge economy"

Carlos Moedas Commissioner for Research, Science and Innovation



Research infrastructures

are "facilities, resources and services that are used by the research communities to conduct research and foster innovation in their fields."

How is the innovation potential of Research Infrastructures translated into open innovation?

Only a minimal part of the innovation conducted in the RIs is linked to the direct involvement of industry (Industry participation as partners in RIs projects is maximum 10-15 %)

Despite this, the contribution to open innovation of RIs is huge



The Example of the LHC at CERN

According to a cost-benefit analysis (CBA) to 2025 and beyond of the CERN Large Hadron Collider (LHC)[1], *there is 92% probability that the Net Present Value over 30 years (1993-2025) of the LHC is positive.*

TOTAL MEASURED BENEFITS OF LHC

- Knowledge output (scientific impact) 2 %
- Technological externalities (such as technical spillovers, benefits to the supply chain and to software users), 32%
- Cultural effects (such as the benefits to personal and website visitors) 13%
- Human capital formation (such as the return to salary due to LHC training) 33%
- Existence value 20%

[1] Cost-Benefit Analysis of the LHC to 2025 and beyond: Was it Worth it ? M. Florio (Univ. Milan) https://indico.cern.ch/event/398256/



Additional contribution of Research infrastructures to Innovation

Many distributed Research infrastructures included in the ESFRI Roadmap 2016 provide a large amount of data on several Ecosystems (marine, arctic, etc), on environment, energy, health, demography, and other domains that are largely used by policy-makers, scientists and other stakeholders to **develop new strategies for the growth of a sustainable economy and society (Policy)**.



Research Infrastructures and Industry



Research Infrastructures and Industry Opportunities

• Industry as user

innovation resulting from the possibility of access and use of world-class facilities by industry

Industry as supplier

innovation resulting from provision of technological advances (innovative solutions, advanced prototypes, etc.)



Research Infrastructures and Industry Barriers

• Rules for access:

- Selection criteria centred around the "science case" (academic criteria, peer review by scientists)
 Limits set to the use of RI by industry
- **Risk avoidance**: among industry players (especially SMEs) in particular if access needs to be paid for
- Poor communication and limited awareness: overall lack of understanding of the potential industrial user community
- Lack of customized services: uncertainty about industry access



ESFRI WG on Innovation



The ESFRI Innovation Working Group

In 2013, ESFRI set up the Innovation Working Group with the objective to contribute to the development of a strategy aimed to:

- strengthen and improve the relations between Research Infrastructures and Industry and
- to promote the potential for innovation of Research Infrastructures in all its aspects



Specific tasks of the ESFRI Innovation WG

- Propose solutions to the problems of dissatisfying **RI-industry** interactions (especially with industrial suppliers)
- Explore the **major obstacles for enterprises** to use publicly owned RIs, and identify the specific requirements for hosting industry users

Main focus on:

- How to improve the **mutual cooperation**: a properly balanced and win-win approach
- Need to increase and optimize simultaneously the addedvalue provided by RIs to industry and the contribution of industry to the development of RIs



Innovation WG main recommendations [1]

- Support the Industrial Liaison Officers (next WP)
- Promote the creation of Industry Advisory Boards (policy)
- Raise awareness on RIs access and services for industry (next WP and policy)
- Develop a transparent data management policy (next WP)
- Anticipate the foresight of purchase of large equipment in European RIs (partly addressed in the next WP)
- Support the pre-development of highly innovative components (partly addressed in the next WP)
- Define **Roadmaps** and strategic agendas (RIs and Funding Authorities) (policy)
- Develop new collaborative frameworks for co-innovation between RIs and industrial companies (partly addressed in the next WP)
- Promote the development of **local or regional ecosystems** integrating RIs, T-infrastructures, Technology and service providers, industrial users (policy)

[1] Working Group on Innovation, Report to ESFRI - March 2016



Consultation on the long-term sustainability of Research Infrastructures



Long-term sustainability of Research Infrastructures A long story...

- Stakeholder consultation on LTS (Dec 2015): results presented during ESFRI Roadmap launch event (March 2016),
- Conclusions of the Competitiveness Council of 26 May 2016: "...UNDERLINES the importance of ensuring long-term sustainability of Research Infrastructures and INVITES the Commission to prepare together with ESFRI and relevant stakeholders a targeted action plan. "
- Stakeholders' workshop (Nov 2016): report published in March 2017



Consultations on the Long Term Sustainability

of Research Infrastructures





Outcome of the consultations Unlocking the innovation potential of the RIs

Consolidating ongoing initiatives and practices

- Support the development of innovation ecosystems around RI;
- Enhance the role of intermediaries and develop mechanisms to facilitate knowledge and technology transfer for the translation into industrial and commercial environment;
- Increase RIs engagement with industry, by fostering their direct and early-involvement in Advisory Boards and through dedicated training and exchange schemes;
- Include provisions in RI access policies to facilitate the use of RI services by Industry;



Outcome of the consultations

Unlocking the innovation potential of the RI

Tackling new challenges

- Stimulate large scale initiatives involving industry, RI and academia for the development of instrumentation and technologies in a co-creation process;
- Develop strategic roadmaps in key technologies required for the construction and upgrades of the pan European RI in synergy with EIT, KICs, FETs and KETs



Research Infrastructures part of Horizon 2020

Innovation activities



Research Infrastructures in Horizon 2020 Objectives

1. Developing the European RIs for 2020 and beyond

- Developing new world-class RIs
- Integrating and opening national and regional RIs of pan-European interest
- Development, deployment and operation of ICT based e-Infrastructures

2. Fostering the innovation potential of RIs and their human resources

3. Reinforcing European RI policy and international cooperation



Research Infrastructures in Horizon 2020 Specific Programme

Stimulate innovation both in the infrastructures themselves and in their supplier by supporting:

- **R&D partnerships with industry** to develop industrial supply in high-tech areas such as scientific instrumentation or ICT;
- pre-commercial procurement by research infrastructure actors to drive forward innovation and act as early adopters of technologies;
- The use of research infrastructures by industry, e.g. as experimental test facilities or knowledge-based centres; and
- encourage the integration of research infrastructures into local, regional and global innovation ecosystems



Research Infrastructures in Horizon 2020 *What has been done so far*

One of the objectives of the Integrating Activities (INFRAIA) Call is to address **innovation capacity** \rightarrow technology transfer

 \rightarrow participation of SMEs

 \rightarrow instrumentation development

Specific actions for innovation:

INFRASUPP Call \rightarrow innovation and R&D partnership between RIs and industry fostered through the **pre-commercial procurement scheme** (QUACO Project)

INFRAINNOV Call

- → Support to **Technological Infrastructures** (Ex: AMICI Project)
- → Fostering co-innovation for future detection and imaging technologies (evaluation on going)



Project examples

QUACO: PCP project

AMICI: Technological Infrastructures

WHAT IS QUACO

- QUACO is a H2020 project bringing together CERN, CEA, CIEMAT, and NBCJ
 CERN is the Lead procurer in the project
- The project will last for 48 months and will receive 4,6 m from H2020 (70% of the costs). It started on 1st March 2016.
- The project aims at obtaining a small-series of superconductive quadrupole magnets that will be required for an upgrade of the Large Hadron Collider, the most powerful particle accelerator in the world for at least the next two decades.



Why PCP is a good instrument for QUACO's objective

The EU superconducting magnets market is limited to a few large players, at the moment busy with some large projects.

The QUACO business opportunity was not perceived as very attractive by large companies \rightarrow need to involve new players and especially SMEs

The PCP instrument is the right approach to follow because of:

- the sharing technical risks,
- the **staged approach** to the development,
- the graded financial commitment,
- the technical support from the buyers group to the R&D effort.





AMICI, 'qu'est-ce-que c'est ?'



EUROPEAN COMMISSION DIRECTORATE-GENERAL FOR RESEARCH & INNOVATION

Research infrastructure



- AMICI, 'Accelerator and Magnet Infrastructure for Cooperation and Innovation', is a H2020 project for the coordination and support of the Technological Infrastructure dedicated to the design, construction and validation of accelerators and large superconducting magnets, in European laboratories and industries.
- Its general goal is to propose a model for the long term profitability and sustainability of the Accelerator and Magnet Technological Infrastructure in Europe, based on the engagement of the European Commission, the National Agencies and the Industry, and serving innovation and scientific research.

18/01/2017

AMICI Kick-off Meeting FIAP Jean Monnet, Paris



AMICI: Motivation

Development and construction of accelerator based scientific Research Infrastructures (RI) are going through a **deep paradigm change** because of the need for **large scale Technological Infrastructures**, distributed over several sites, at the forefront of technology to master the key **accelerator and magnet science and technology** needed for several fields and requiring:

- sophisticated R&D platforms on key accelerator and magnet technologies,
- large-scale facilities for their assembly, integration and verification,
- large concentrations of dedicated skilled personnel, and
- long term relationships between laboratories and industry.



In response to those challenges, several large platforms specialized in interdisciplinary technologies have emerged.

'T-Infrastructure', a new paradigm

Our vision is that a **Technological Infrastructure** will emerge from the few large platforms creating an efficient integrated ecosystem comprising:

- **laboratories** focussed on R&D, with a long term vision for the technological needs of future RI's, and
- **industry**, including SME, motivated by the innovative environment and the market created by the realisation of the technological needs of several RI's.



With its 'equidistant' position between RI's and Industries, the T-Infrastructure should be more capable to create new applications of direct benefit to society.

18/01/2017

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