‘Accelerator and Magnet Infrastructure for Cooperation and Innovation’

Partner and Industry Days

Olivier Napoly, coordinator

CEA/Irfu
The collaboration between European Technological Facilities and Industry has been seminal for the realization of unprecedented scientific endeavors, like LHC, W7X, EU-XFEL, SwissFEL, ESS and ITER, that have recently projected Europe to an undisputed position of worldwide leadership.
The collaboration between European Technological Facilities and Industry has been seminal for the realization of unprecedented scientific endeavors, like LHC, W7X, EU-XFEL, SwissFEL, ESS and ITER, that have recently projected Europe to an undisputed position of worldwide leadership.
The construction of such projects is only possible through the realization of a large and distributed accelerator and SC magnet **Technology Infrastructure (TI)** including high technology systems built to unparalleled quality standards. **This TI represents a major investment and asset for Europe.**

It includes several technological facilities, located at research laboratories and industrial sites, and entails:

- sophisticated R&D platforms for key technologies,
- large-scale facilities for assembly, integration and verification,
- large concentrations of dedicated, highly-skilled personnel and,
- **long-standing relationships between laboratories and industry.**
“Large-scale science projects address fundamental questions at the forefront of science and technology. These projects require large and sustained infrastructures and a good collaboration on long time scales. In turn, such projects provide unique equipment, challenging request for high technology and innovation, stimulating ideas that attract good people, and offer the occasion to bring people closer together.”

AMICI, for ‘Accelerator and Magnet Infrastructure for Cooperation and Innovation’, is an H2020 ‘Coordination and Support Action’ project.

Its general goal is to propose a model for the profitability and sustainability of the Technological Facilities dedicated to Accelerators and Superconducting Magnets in Europe, based on the engagement of the European Commission, the National Agencies and the Industry, and serving innovation and scientific research.

AMICI is charged by the EC with the challenging task of building the conditions for consolidating and exploiting these Technological Facilities:

- to strengthen the capabilities of European companies to compete on the global market, as qualified suppliers of components for accelerators and big superconductor magnets,
- and also in the development of innovative applications in advanced sectors such as healthcare and space.
AMICI Consortium

INFN
Istituto Nazionale di Fisica Nucleare

DESY

IFJ

CERN

Science & Technology Facilities Council

PAUL SCHERRER INSTITUT

KIT
Karlsruher Institut für Technologie

UPPSALA UNIVERSITET

CNRS

dépasser les frontières

CEA
DE LA RECHERCHE À L'INDUSTRIE

18/04/2017, Padova
Technology Infrastructure: 2020 Horizon

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

- **Laboratories** focussed on R&D, with a long term vision for the technological needs of future Research Infrastructure RI’s (e.g. ILC, FCC, DONES, DEMO),
- **Industries**, including SME’s, motivated by the innovative environment and the market created by the realisation of the technological needs of RI’s,
- **Technology Infrastructure**, with an ‘equidistant’ position between RI’s and Industries, to create new applications of direct benefit to science and society.
Some ‘definitions’:

- Technology Infrastructure = a network of ‘Technological facilities’
- Technological facilities = a cluster of ‘Technical platforms’
The question of the participation of Industry to the AMICI Work is the paramount and central question treated during these ‘Partner and Industry Days for Technology Infrastructure’.

It precedes that of the association of Industry to the ‘future’ TI.
To optimize the future impact of the Technology Infrastructure, i.e. its adequation to the needs of Society (WP4 ‘Innovation’) and Science (WP5 ‘Industrialisation’) applications, AMICI will:

• assess the prevailing strategic elements (WP2 ‘Strategy’)
• explore new modes of cooperation (WP3 ‘Cooperation’)

**WP1 ‘Management’** will ensure the overall coordination of the project, including the capital question the Industry participation.

18/04/2017, Padova
AMICI Partner and Industry Days
“Cutting-edge science relies on cutting-edge instrumentation.
...
There is a need to strengthen the relations between academia and industry in the field of scientific instrumentation. This could be accomplished through the promotion of knowledge and technology transfer between the two entities.”

The *Innovation*-related activities aim at transferring the knowledge and know-how of research laboratories to industry and creating new products and new applications of direct benefit to society.

For that purpose, Industry will access a pool of technical platforms made available by European Research Institutes such as test beam facilities, cryogenics, magnet and RF facilities and test benches, laboratories for material analysis and vacuum technology, for chemistry and surface characterization, for beam electronics and instrumentation, clean rooms and assembly halls including the equipment and the associated human expertise.
WP5 Industrialization

The *Industrialization*-related activities aim at keeping industry at the forefront of the international competition, in terms of technology, quality and costs, in view of the construction of future scientific research instruments in Europe and elsewhere.

This will be achieved by fostering collaboration initiatives and opportunities between Industry and the TI that include: research and development of key technology prototypes, test and verification of industrial products, professional training and apprenticeship, certification studies and training (e.g. vacuum, cleanliness, welding, etc.), harmonization and standardization studies (e.g. cryogenics, material, etc.).
<table>
<thead>
<tr>
<th>Ref.</th>
<th>Deliverable Name</th>
<th>Deliverable Type</th>
<th>Task</th>
<th>Delivered by</th>
<th>Planned (in months)</th>
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<tbody>
<tr>
<td>D4.1</td>
<td>Report on accelerator market study</td>
<td>Report</td>
<td>Innovation</td>
<td>STFC</td>
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<tr>
<td>D4.2</td>
<td>Report on SC magnet market study</td>
<td>Report</td>
<td>Innovation</td>
<td>CEA</td>
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<td>D4.3</td>
<td>Report on best practice collaboration between industry and technology</td>
<td>Report</td>
<td>Innovation</td>
<td>INFN</td>
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<td>D5.1</td>
<td>Definition of the structure and content of a database for materials and components</td>
<td>Report</td>
<td>Industrialisation</td>
<td>CNRS</td>
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<td>D5.2</td>
<td>Final report on the required conditions for apprenticeships program in TI</td>
<td>Report</td>
<td>Industrialisation</td>
<td>CEA</td>
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<td>D5.3</td>
<td>General harmonised guidelines for the safety of cryogenic equipment</td>
<td>Report</td>
<td>Industrialisation</td>
<td>KIT</td>
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<td>D5.4</td>
<td>Final report on the required conditions for apprenticeship program in industry</td>
<td>Report</td>
<td>Industrialisation</td>
<td>INFN</td>
<td>30</td>
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<tr>
<td>D5.5</td>
<td>Final report on conditions for developing prototypes in industry</td>
<td>Report</td>
<td>Industrialisation</td>
<td>INFN</td>
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“Facilities for high-energy physics (but also for other branches of science) are becoming larger and more expensive. Funding for the field is not increasing and the timescale for projects is becoming longer; both factors resulting in fewer facilities being realized.

... All this leads to the need for more co-ordination and more collaboration on a global scale.”

The *Strategy*-related activities aim at providing strategic insights into opportunities and needs of future basic research and applications, thus steering and sustaining the activity of the Technology Infrastructure.

This will be achieved by:

- updating the Key Technological Areas (KTA) of accelerator and superconducting magnet science and technology,
- collecting the scientific roadmaps Research Infrastructures in Europe (ESFRI) and in the global landscape,
- assessing the workload, the capabilities and, when possible, the priorities of the Technology Infrastructure in the different KTAs.
The *Cooperation*-related activities will study the conditions of the coordination of the Technology Infrastructure in order to harmonise its operation and increase its efficiency, and to establish a co-innovation platform with industry.

These investigations will be performed by:

- defining the eligibility criteria for the participation/association to the Technology Infrastructure,
- developing a coordination model for the use of eligible TFs and industries
- supporting the integration into local, regional and global innovation systems,
- identifying synergies, complementarities and duplication.
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<td>Definition of the participation of industry</td>
<td>Report</td>
<td>Coordination</td>
<td>INFN</td>
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<td>D1.3</td>
<td>Public website with searchable databases and communication tools</td>
<td>Other</td>
<td>Coordination</td>
<td>IFJ-PAN</td>
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<td>D1.6</td>
<td>European Forum on accelerators and SC magnets Technological Infrastructures</td>
<td>Other</td>
<td>Coordination</td>
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<tr>
<td>D2.1</td>
<td>Report on Key Technological Areas survey and prospective outlook</td>
<td>Report</td>
<td>Strategy</td>
<td>CNRS</td>
<td>24</td>
</tr>
<tr>
<td>D2.2</td>
<td>Report on the Technological Roadmaps for the different KTA</td>
<td>Report</td>
<td>Strategy</td>
<td>CEA</td>
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</tr>
<tr>
<td>D2.3</td>
<td>Report on propositions to guarantee the long term sustainability of TI</td>
<td>Report</td>
<td>Strategy</td>
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<td>Report defining the eligibility criteria for accessing to the TI</td>
<td>Report</td>
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<td>CEA</td>
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<tr>
<td>D3.2</td>
<td>Report on the networking and coordination model</td>
<td>Report</td>
<td>Cooperation</td>
<td>IFJ PAN</td>
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</tr>
<tr>
<td>D3.3</td>
<td>Report about the proposed model of collaboration agreement</td>
<td>Report</td>
<td>Cooperation</td>
<td>DESY</td>
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</table>
Management Structure

European Commission

Steering Committee
WP leaders + PCT

WP1 Management
CEA, Project Coord. Team

General Assembly
Institution representatives

Advisory Group
Representatives from RIs and Industry

WP2
Strategy
W. Kaabi, IN2P3

WP3
Cooperation
H. Weise, DESY

WP4
Innovation
A. Gleeson, STFC

WP5
Industrialisation
P. Fabbricatore, INFN

18/04/2017, Padova
AMICI Partner and Industry Days
‘Deliverables’ to Industry

Mid-2019 the AMICI project will have explored and assessed all the means to ensure that European industry:

- will have a clear view of the strategic science and technology roadmaps for the future accelerator and SC magnet-based Research Infrastructures worldwide and therefore they will be in a strong position to compete on the global market, *(WP2 Strategy)*
- will have a simplified and supported access to the most adequate technical platforms thanks to the stronger and optimized integration model established among the large existing technological facilities, *(WP3 Cooperation)*
- will benefit from the integrated ecosystem that will foster innovation based on cutting-edge tools and developments and will enhance their visibility and competitiveness in new markets, *(WP4 Innovation)*
- will overcome their technology development barriers and further develop commercial opportunities within the Research Infrastructures and wider societal markets, *(WP4 Innovation, WP5 Industrialization)*
- will profit from the information exchange, definition of harmonized and standardized procedures and access to databases, which should allow cost reduction in the long term. *(WP5 Industrialization)*
‘Deliverables’ to Industry

Mid-2019 the AMICI project will have explored and assessed all the means to ensure that European industry:

- will have a clear view of the strategic science and technology roadmaps for the future accelerator and SC magnet-based Research Infrastructures, and therefore they will be in a strong position to compete on the global market, *(WP 2 Strategy)*
- will have a simplified and supported access to the most adequate technical platforms thanks to the stronger and optimized integration model established among the large existing technological facilities, *(WP 3 Cooperation)*
- will benefit from the cross-cutting tools that will foster innovation based on cutting-edge technology and will enhance their visibility and competitiveness in new markets, *(WP 4 Innovation)*
- will overcome their technology development barriers and further develop opportunities within the Research Infrastructures and wider markets, *(WP 4 Innovation, WP 5 Industrialization)*
- will benefit from the information exchange, definition of harmonized and standardized procedures and access to databases, which should allow cost reduction in the long term. *(WP 5 Industrialization)*
AMICI Web Site

First step: [http://eu-amici.eu](http://eu-amici.eu)

– Developing list and description of AMICI TIs

(Courtesy R. Wichmann)
2020: post-AMICI Horizon

Objective:
• convince EU Commission of the importance of the Technology Infrastructure, along with Research Infrastructures, for RI sustainability, in a new scheme associating more closely industry and innovation, e.g. ‘European Technology Platform’ (ETP)
• follow-up of AMICI ideally in the next Work H2020 Programme (2018-20) or in FP9 with a (substantial €-budget) call integrating the structure and ideas proposed by AMICI.

Lobbying the EU Commission is needed, and actually is already going on. Your feedback and your activity is desirable.
Conclusion (1/2)

The goal of the AMICI project is to explore and assess the means to fructify this European Technology Infrastructure, to make it profitable and sustainable, by the means of Cooperation and Innovation. It is also to consolidate our existing Tool to be in position to contribute to future facilities with the same success as for the past ones, in terms of schedule, budget, performance and discovery.

On our horizon we have ambitious projects like the DONES accelerator and the DEMO tokamak for nuclear fusion, the ILC in Japan, and the FCC at CERN and CEPC in China for particle physics, and others. But we also have to preserve and consolidate our capacity to maintain and upgrade the facilities built in this decade like the LHC, the European XFEL, the FAIR nuclear physics facility, the European Spallation Source, the ITER tokamak, the Extreme Light Infrastructures in central Europe.
AMICI first overarching objective is to rally European Industry and get it on board of the AMICI project. This is the absolute priority of the next month with,

1) first, the occurrence of the ‘Partner and Industry Days for Scientific Technology Infrastructure’ in Padova in April 2017,

2) then, in May 2017, the delivery of the report ‘Definition of the participation of industry’, under the coordination of INFN.

Concrete actions will only start after this.
The aims of these ‘Partner and Industry Days for Technology Infrastructure’ are to:

1) Understand the scopes and activities of the 2 Work Packages (WP2 & 3) and 6 Tasks (WP4 & 5)

2) Collect the interest of industry in such activities

3) Establish the basis for collaborative work, identify next steps and define timescales
Thank you for your attention

Thank you for your participation