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Uppsala University, Sweden

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EUROPEAN COMMISSION  
DIRECTORATE-GENERAL FOR RESEARCH & INNOVATION  
Research infrastructure



# qinici H2020 Consortium: a Community

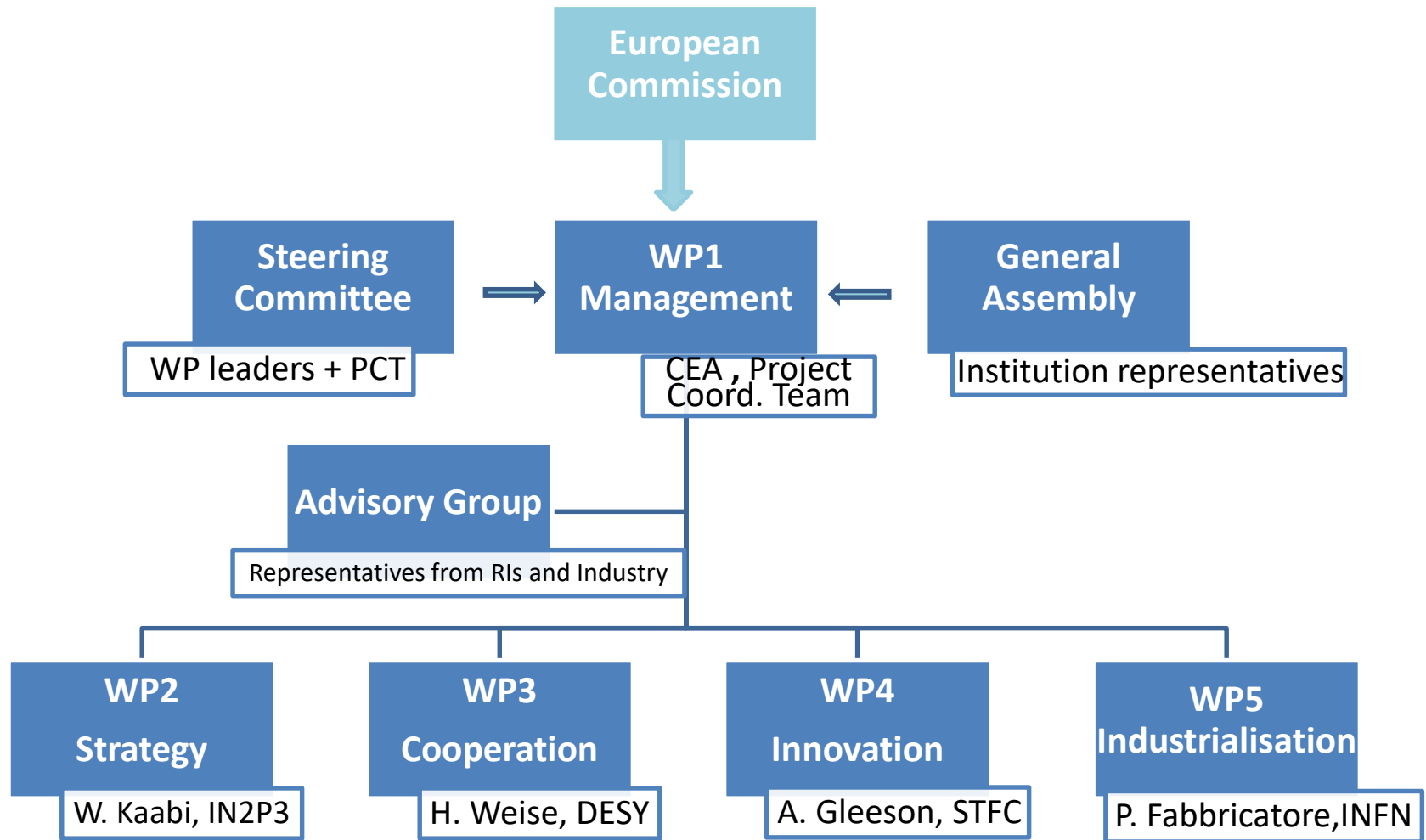


**Science & Technology  
Facilities Council**



UPPSALA  
UNIVERSITET





## **Year 1: 'Introspection Phase' achievements**

- Completing the detailed descriptions of Technical Platform capacities
- Dissemination of TPs to Industry through our Web site
- Articulating the Technological Facilities individual status, operating and economical models, and sustainability challenges
- Establishing direct contact with a first round of Industries
- Enrolling a subset of volunteering companies in the relevant AMICI Tasks
- Solving some of the Industry needs: e.g. Call for Tenders Web repository

## **Year 2: 'Projection Phase' goals**

- Laying down an organization for the Technology Infrastructure
- Elaborating the Accelerator and SC Magnet Technological Roadmap
- Identifying the existing barriers and recommend actions to simplify and support the access of Industry to the Technology Infrastructure
- Articulating the needs for Co-Innovation technical platforms

## **Last Semester: 'Proposition / Persuasion Phase'**

- Gaining the support of the EC and Agencies to our findings and proposals

## Progress: AMICI Partner and Industry Days (Task 1.2, INFN)

The '[AMICI Partner and Industry Days](#)' meeting took place in Padua, on April 18-19 2017.

The goal of the meeting was to present the AMICI project to the participating companies, focusing their attention in particular on the Tasks and activities in which industry is going to play an important role, and to collect their comments, suggestions and expressions of interest in order to organize their involvement in the most effective way.

This meeting lead to the **Definition of the Participation of Industry** in AMICI.

## Progress: AMICI Public Web site (Task 1.4, IFJ-PAN)

- Diffusion of the AMICI Web site public [website](#).
- The “Technology Infrastructure” [tab](#) displays descriptions of the Technological Facilities located at European AMICI partner institutes and available to industry, including contact information. A search engine allows external potential users to quickly browse the list of Technical Platforms and to identify the most appropriate ones in accordance with their needs.
- Communication includes dedicated pages on which future [events](#) are announced and recent scientific achievements or progress of AMICI activities are [reported](#).
- The "Industry Involvement" [tab](#) gives examples of successful collaborations between European Technological Facilities and industry. It also provides access to the ongoing [calls for tenders](#), including those below the EU publication threshold not advertised in the EU platform.

Main step : <http://eu-amici.eu>

– Developing list and description of AMICI TFs



The screenshot shows a web browser window with the URL [eu-amici.eu/technology\\_infrastructure](http://eu-amici.eu/technology_infrastructure). The page features the AMICI logo and a navigation menu with the following items: HOME, ABOUT, EVENTS, TECHNOLOGY INFRASTRUCTURE (highlighted in red), and INDUSTRY INVOLVEMENT. Below the navigation is a large banner image of industrial equipment with the text "WE SHARE" overlaid. Underneath the banner, the heading "TECHNOLOGY INFRASTRUCTURE" is partially visible. A red sidebar menu is open, listing the following items: TECHNOLOGICAL FACILITY @ CEA, TECHNOLOGICAL FACILITY @ CERN, TECHNOLOGICAL FACILITY @ CNRS, TECHNOLOGICAL FACILITY @ DESY, TECHNOLOGICAL FACILITY @ FREIA/UU, TECHNOLOGICAL FACILITY @ IFJ PAN, TECHNOLOGICAL FACILITY @ INFN, TECHNOLOGICAL FACILITY @ KIT, TECHNOLOGICAL FACILITY @ PSI, TECHNOLOGICAL FACILITY @ STFC, and TECHNOLOGICAL FACILITY SEARCH (highlighted in orange).

TECHNOLOGY INFRASTRUCTURE

INDUSTRY INVOLVEMENT

TECHNOLOGICAL FACILITY @ CEA

TECHNOLOGICAL FACILITY @ CERN

TECHNOLOGICAL FACILITY @ CNRS

TECHNOLOGICAL FACILITY @ DESY

TECHNOLOGICAL FACILITY @ FREIA/UU

TECHNOLOGICAL FACILITY @ IFJ PAN

TECHNOLOGICAL FACILITY @ INFN

TECHNOLOGICAL FACILITY @ KIT

TECHNOLOGICAL FACILITY @ PSI

TECHNOLOGICAL FACILITY @ STFC

TECHNOLOGICAL FACILITY SEARCH

## WE SHARE

## TECHNOLOGY INFRASTRUCTURE

The large accelerator and SC magnet Technology Infrastructure includes several Technological Facilities, located at European research laboratories that are dedicated to the development of accelerator components and superconducting magnets and available to collaborations with industry partners. It 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-term relationships between laboratories and industry.



## Perspectives:

- Task 1.2 (INFN) remains active to monitor the participation of Industry to the ongoing WP4-WP5 Tasks through the working groups constituted in the aftermath of the AMICI Industry Days in Padova.
- WP1 is committed to the organization of a *European Forum on accelerators and SC magnets Technology Infrastructure*, during the first semester of 2019, convening academia and industry in Brussels to present the work done in the different WPs and discuss the long-term strategy for the Technology Infrastructure.



	YEAR 1												YEAR 2												YEAR 3						
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	
<b>Work Package 1: Management, coordination and dissemination (CEA)</b>																															
WP1.1 Project management (CEA)	M1.1	D1.1									M1.5	D1.4										M1.5	D1.4						M1.5	D1.4	
WP1.2 Organization of the participation of industry (INFN)			M1.3	D1.2																				D1.6							
WP1.3 Administrative and financial project management (CEA)												D1.5												D1.5							D1.5
WP1.4 Communication and outreach activities (IFJ-PAN)		M1.2			M1.4							D1.3																			D1.7

Figure 3: Gant chart of the project

Ref.	N°	Milestone Name	Milestone Type	Task	Delivered by Contractor	Planned (in months)	Achieved (in months)
MS1	1	Installation of the Advisory Group	Meeting	Coordination	CEA	1	1
MS2	2	Website software ready	Other	Coordination	IFJ PAN	2	2
MS3	3	Industry days and consultation of industry representatives completed	Meeting	Coordination	INFN	3	3
MS4	4	Implementation of deliverable database and tools for the follow up of the milestones progress	Other	Coordination	IFJ PAN	5	5
MS5	5	1st GA and Annual project meetings	Meeting	Coordination	CEA	11	11

Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor	Planned (in months)	Achieved (in months)
D1.1	1	Minutes of the Kick-off Meeting	Report	Coordination	CEA	2	2
D1.2	2	Definition of the participation of industry	Report	Coordination	INFN	4	4
D1.3	3	Public website with searchable databases and communication tools	Other	Coordination	IFJ-PAN	11	11
D1.4	4	Minutes from the 1st annual and GA meetings	Report	Coordination	CEA	12	12
D1.5	5	Progress and financial 1st reports	Report	Coordination	CEA	18	18
D1.6	6	European Forum on accelerators and SC magnets Technological Infrastructures	Other	Coordination	INFN	24	24

## Progress

- A methodology to delineate the Technology Roadmap has been proposed, allowing the identification of Key Technologies from the Scientific and Innovation Roadmaps. Its implementation started with Task 2.1 (CNRS) and Task 2.2 (CEA).
- The current boundary conditions, status and project-wise occupancy of the individual AMICI Technological Facilities regarding their operating and economical models, and sustainability challenges have been identified by Task 2.3 (UU).

## Perspectives:

- Elaborate and explain the Technological Roadmap for Accelerators and SC Magnets
- Spell out the needs for Technical Platform evolution or creation
- Formulation propositions for the long term sustainability of the Technological Facilities.

	YEAR 1												YEAR 2												YEAR 3					
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30
<b>Work Package 2 : Strategy (CNRS)</b>																														
WP2.1 Key technological areas (CNRS)									M2.1															D2.1						
WP2.2 Global landscape (CEA)											M2.2													D2.2						
WP2.3 Accelerator and SC magnet TI sustainability (UU)																		M2.3												D2.3

Figure 3: Gant chart of the project

Ref.	N°	Milestone Name	Milestone Type	Task	Delivered by Contractor	Planned (in months)	Achieved (in months)
MS8	8	Updating of KTA		Strategy	CNRS	9	12
MS9	9	Collection of the scientific Roadmaps	Other	Strategy	CEA	12	12
MS10	10	Intermediate report on sustainability	Report	Strategy	UU	18	18

The recent progress towards Milestone MS9 will be reported by WP2: MS9 fulfilled on M14

Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor	Planned (in months)	Achieved (in months)
D2.1	11	Report on Key Technological Areas survey and prospective outlook	Report	Strategy	CNRS	24	24
D2.2	12	Report on the Technological Roadmaps for the different KTA	Report	Strategy	CEA	27	27
D2.3	13	Report on propositions to guarantee the long term sustainability of TIs	Report	Strategy	UU	30	30

## Progress: Eligibility Criteria (Task 3.1, CEA)

The detailed description of the AMICI Technological Facilities has been completed and disseminated.

The core AMICI group believes that the existence of the Technology Infrastructure must be secured and its future capacity reinforced by providing it with an **organic constitution** allowing, at some level, for

- organized relationships,
- dynamical planning,
- strategy coordination.

A stronger organization will also make it possible to diversify further its activity towards innovation by fostering and hosting industrial developments.

## Progress: Eligibility Criteria (Task 3.1, CEA)

		Name : Tord Ekelof (FREIA)			
Type of eligibility criterion	#	Eligibility criterion (idea of concrete item to be analyzed in order to decide the eligibility of the TF)	Do you agree with this criterion?	Would your TF fulfill this criterion?	Remarks
Capacity and willingness of the new Member to integrate itself in an organization of Technological Facilities that coordinate their efforts and their development towards the construction of future research infrastructures, and that are willing to provide access to their technical platforms (TP) to other partners and to industries	1	TF record and future plans of contributions to the construction of Research Infrastructures, in collaboration with the existing TI (cf. Table of TP Occupancy),	OK	Fulfilled	Past record: ESS, XFEL Future plans: ESS, LHC High Lumi Upgrade
	2	TF record and future plans of collaboration with industry,	OK	Fulfilled	ScandiNova AB, Scanditronix AB, RFR Solutions AB
	3	Accessibility of the Technological Facility to partner and industry collaborators,	OK	Fulfilled	Access is granted case by case
	4	Operability of the platforms in terms of financial and human resources,	OK	Fulfilled	All platforms are operational, except of the vertical cryostat which is under construction and will be in operation from the autumn 2017
	5	Adaptability and versatility of the Technological Facility to evolving technical needs.	OK	Fulfilled	A policy priority, with budget provided by projects
Capability of the new Member to reinforce the technical spread and the expertise of the existing Technology Infrastructure and hence contribute to more efficient sharing of efforts at the European level	1	Complementarity of the Technological Facility within the TI	OK	Fulfilled	FREIA TF is networked with several other AMICI TFs taking part in the current ESS construction
	2	Strength of personnel and technical platforms in some critical areas	OK	Fulfilled	Personnel: highly specialized in cryogenics, rf source, high vacuum, process control, sc accelerator cavities, sc magnets, mechanics, mechanics very versatile horizontal, Technical Platforms: a highly versatile horizontal cryostat of the HobyCat type, high capacity He liquefier 150 l/hour, 800 kW 352 MHz and 300 kW 704 MHz power sources, solid state 352 MHz power sources, vertical cryostat and high current sources for sc magnet test under construction

## Perspectives:

- Networking the TI: formulate the Terms of Association for university research units and industrial companies for benefiting from the work of the Technology Infrastructure core group, will be sought and decided in a second stage.
- Lay down the model of Cooperation Charter between the Members of the future *'Technology Infrastructure Accelerator and Magnet Organization'*.



	YEAR 1												YEAR 2												YEAR 3					
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30
<b>Work Package 3 : Cooperation (DESY)</b>																														
WP3.1 Definition of eligibility criteria (CEA)									M3.1									D3.1												
WP3.2 Networking and coordination model (IFJ-PAN)											M3.2																			D3.2
WP3.3 From cooperation to collaboration (DESY)																		M3.3												D3.3

Figure 3: Gant chart of the project

Ref.	N°	Milestone Name	Milestone Type	Task	Delivered by Contractor	Planned (in months)	Achieved (in months)
MS11	11	First version of the report on eligibility criteria	Report	Cooperation	CEA	9	9
MS12	12	First version of the report on Networking and Coordination Model	Report	Cooperation	IFJ PAN	12	12
MS13	13	Collection and analysis of existing bi- or multilateral agreements between AMICI members and with other partners		Cooperation	DESY	18	18

The recent progress towards Milestone MS12 will be reported by WP3: MS12 fulfilled on M14

Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor	Planned (in months)	Achieved (in months)
D3.1	14	Report defining the eligibility criteria for accessing to the core group of large Tis	Report	Cooperation	CEA	18	18
D3.2	15	Report on the networking and coordination model	Report	Cooperation	IFJ PAN	30	30
D3.3	16	Report about the proposed model of collaboration agreement	Report	Cooperation	DESY	30	30

## Perspectives:

### **Market Surveys (Task 4.1, STFC and Task 4.2, CEA)**

Surveys are being launched to deliver reports identifying specific domains of societal applications and European commercial organisations that have the current capability, and future potential, to innovate and develop solutions in the fields of mature Accelerator technologies and Superconducting Magnet technologies.

In addition the survey will provide insight into the domains of societal applications and potential market sizes beyond Research Infrastructures, to complement WP2 findings.

**Unabridged versions from these Market Surveys are expected in March 2019**

## Perspectives:

### **Good practices and barriers to effective engagement, between Industry and the Technology Infrastructure (Task 4.3, INFN)**

A survey is being launched towards a large set of European Companies to investigate these questions. The ILO's portfolio will be interrogated at the Big Science Business Forum in Copenhagen next week, together with possible incentives to participate in the survey.

**A unabridged version from this Survey is expected in March 2019**

	YEAR 1												YEAR 2												YEAR 3						
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	
<b>Work Package 4: Innovation (STFC)</b>																															
WP4.1 Industry survey - accelerator technologies (STFC)															M4.1												M4.4				D4.1
WP4.2 Industry survey - magnet technologies (CEA)															M4.2																D4.2
WP4.3 Good practices and barriers to engagement between industry and TIs (INFN)																											M4.3				D4.3

Figure 3: Gant chart of the project

Ref.	N°	Milestone Name	Milestone Type	Task	Delivered by Contractor	Planned (in months)	Achieved (in months)
MS14	14	3rd Party selected for survey on accelerator technologies		Innovation	STFC	15	15
MS15	15	Interim report on survey results in the field of SC Magnet Technologies	Report	Innovation	CEA	15	15
MS16	16	Initial analysis of acquired data on good practices and identification of actions		Innovation	c	26	26
MS17	17	Survey on accelerator technologies received from 3rd party	Report	Innovation	STFC	27	27

Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor	Planned (in months)	Achieved (in months)
D4.1	17	Report on accelerator market study	Report	Innovation	STFC	30	30
D4.2	18	Report on SC magnet market study	Report	Innovation	CEA	30	30
D4.3	19	Report on best practice collaboration between industry and technology	Report	Innovation	INFN	30	30

## **Progress: WP5.1: Training (CEA) and Prototyping (INFN)**

Industry may be reluctant to operate on TI platforms: we have to understand their reasons and offer enticements, such as:

- Cutting edge and qualified equipment
- Full product integration, from R&D to verification
- Scientific and Technical expertise (human factor)
- Training, communicating, stimulating (human factor)
- Coordination within TI (organic factor)
- Networking with Universities and Technical Schools (node factor)

**Opportunities for Co-Innovation activities** depend on the availability of all the above services, regarding:

- access,
- operating costs,
- maintenance,
- intellectual property
- personnel availability
- competition rules (SBIR vs. PCP attractiveness)

**No opportunities should be missed:** if one of these parameters is missing or failing at some Technological Facility, or because other impediments occurred during the negotiations with the Institute, **the usage of other platforms should be proposed.**

This is the reason why the Technology Infrastructure capacity should be reinforced by providing it with an **organic constitution** allowing, at some level, for organized relationships, dynamical planning and strategy coordination (cf. AMICI WP3).

## Considerations regarding **co-innovation spinoff**:

- The size of the market is a key parameter (water purification, cargo scanning, medical treatment), is orders of magnitude larger than that allowed by the construction of new Research Infrastructure (RI).
- However, industrialization of new Research Infrastructures is key to accessing to medium TRL's, and increase their readiness.
- For Commercial Innovation based on RI components (magnetic, RF, or instrumentation devices, etc...), industry wishes to enter into the design and prototyping phases products, as part of technology transfer, to **develop in-house expertise**.
- **Subsidiarity** principle: down to which TRL should Institutes provide 'build on specifications' rather than 'build to print' ?



## **Progress: Cryogenic Safety Procedures (Task 5.3, KIT)**

Cryogenics is a 'potential' key technology given:

- the majority of Accelerator and Magnet projects based on Superconductivity
- the important cryogenics capacities within the AMICI Technological Facilities
- the predominance and the present successes of European firms
- the challenges in Helium supply and the need for small portable HTC refrigeration

The expert panel brought by Task 5.3 to AMICI is therefore crucial for understanding the future trends.

# WP5 Milestones and Deliverables

	YEAR 1												YEAR 2												YEAR 3						
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	
<b>Work Package 5: Industrialization (INFN)</b>																															
WP5.1 Professional training and apprenticeship (CEA)																M5.2	M5.3												D5.2	D5.4	
WP5.2 Harmonisation - Material and components reference (CNRS)																											D5.1				
WP5.3 Harmonisation - Cryogenic safety procedures (KIT)											M5.1																	D5.3			
WP5.4 Developing prototyping in industry (INFN)																								M5.4						D5.5	

Figure 3: Gant chart of the project

Ref.	N°	Milestone Name	Milestone Type	Task	Delivered by Contractor	Planned (in months)	Achieved (in months)
MS18	18	List of safety scenarios in liquid helium cryostats	Report	Industrialization	KIT	12	12
MS19	19	Preliminary report on the required conditions for apprenticeships program in TI	Report	Industrialization	CEA	16	16
MS20	20	Preliminary report on the required conditions for apprenticeships program in industries	Report	Industrialization	CEA	18	18
MS21	21	Preliminary conclusions of the working group on prototyping issues	Report	Industrialization	INFN	24	24

Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor	Planned (in months)	Achieved (in months)
D5.1	20	Definition of the possible structure and content of a database for materials and components	Report	Industrialization	CNRS	26	26
D5.2	21	Final report on the required conditions for apprenticeships program in TI	Report	Industrialization	CEA	28	28
D5.3	22	General harmonised guidelines for the safety of cryogenic equipment	Report	Industrialization	KIT	28	28
D5.4	23	Final report on the required conditions for apprenticeships program in industries	Report	Industrialization	INFN	30	30
D5.5	24	Final report on conditions for developing prototypes in industry	Report	Industrialization	INFN	30	30

**AMICI** is only a first step towards a European **Technology Infrastructure Organization**

**AMICI** partners are working on defining its statuses and functioning and networking rules.

This European **Technology Infrastructure Organization** will not be restricted to the current AMICI partners.

The case for **European TI Organization** will require the understanding and the support from the EC and from **Industry**