

ISIS@MACH ITALIA (IM@IT¹), the Hybrid Italian Multidisciplinary Research Infrastructure for Complex Materials

Implementation Phase - *ad interim*²

Name of Research Infrastructure	ISIS@MACH ITALIA (IM@IT) – the Hybrid Italian Multidisciplinary Research Infrastructure (RI) for Complex Materials
Type of Research infrastructure	The Hybrid RI combines “distributed Small Research Facilities (SRFs)”, “Medium Range Facilities (MRFs)” and interface to “single-sited” Large Scale Facilities (LSFs)”, currently ISIS pulsed neutron and muon source (UK)
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¹ IM@IT is the new short acronym for ISIS@MACH ITALIA.

² This is a ‘living document’ which will be updated on regular basis as new ideas come along and others become lower priorities. The document will be reviewed in consultation with the SAC, research and innovation community.

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1. Executive Summary³

Most of the transformative changes in our society, such for example the revolutions in transport, medicine, and production techniques, the development of technologies for greenhouse gas removal, the constant increase in average life expectancy, are underpinned by advancing and exploiting our knowledge of materials. In this context, the solutions involve the development of both Complex Materials (CM) and related interphases, and unprecedented and complementary experimental and theoretical tools for their deeper understanding represent the basis of innovation. Making advances in almost any industrial sector needs a profound understanding of the processing-microstructure-properties-performance relationships of materials. This requires materials to be characterised chemically and structurally across many length scales.

It is therefore key that researchers from public and private communities have access to a very wide range of multiple and complementary techniques for materials characterisation and investigation. However, it is rare that an individual researcher, or even a small group, have the full range of instrument kit or – equally important – expertise to use them all and successfully. Furthermore, some specialised techniques are only available in large, centralised facilities, possibly only in a few countries. Even if such instrument kit is available, there can be a significant knowledge and expertise barrier to using them.

Materials research, from life sciences to engineering, is at the heart of global societal challenges including the transition ‘from research to business’ identified by Italian and European future strategic plans (European Green Deal, Horizon Europe, PNRR, PNR 2021-2027, PNIR) coherently with the national and regional Research and Innovation Strategies for Smart Specializations.

In this scenario ISIS@MACH ITALIA (IM@IT) Research Infrastructure (RI) is a national hybrid multi-disciplinary and multi-user RI, a people-centric RI that focusses on the human side. It combines “distributed Small Research Facilities (SRFs)”, “Medium Range Facilities (MRFs)” and interface to “single-sited” Large Scale Facilities (LSFs)”, currently ISIS pulsed neutron and muon source (UK)⁴, through a single point of access (Online Proposal System- OPS). IM@IT initially focusses on complex materials within the Italian research landscape, meanwhile planning a rapid transition to support access and e-interface to other single-sited LSFs⁵ [to begin with ILL Reactor (F) and Diamond Light Source (UK)] whilst adopting ESFRI-compatible policies and practices with the ambition of maintaining inclusion in the ESFRI roadmap as a long-term aspiration.)

Presently, ISIS@MACH ITALIA encompasses 6 partners with facilities located in 9 Units in Italy (Table 1).

IM@IT transformative nature sets up a scientific environment where large and distributed instrumental capacity and scientific capabilities based both at IM@IT and at the LSF ISIS (UK), are made available to researchers from academic and industrial communities, explicitly tailored to the transition ‘from research to business’. This is a unique aspect which distinguishes IM@IT from all other national RIs operating in the field of material science; further, a direct e-interface to an international LSF is another unique and distinctive aspect of the hybrid nature of IM@IT. Moreover, the RI provides users tools for the design, formulation and production of advanced functional materials, new classes of materials, cutting-edge sustainable technologies, and effective solutions to be transferred in transversal fields such as: new green materials, materials for energy, cultural heritage conservation, electronic devices, agri-food, textiles, pharmaceuticals, materials for health and nanomedicine, cosmetics, nutraceuticals, detergents, to cite only a few.

Unique hallmark selling point: IM@IT is a hybrid RI – “distributed” SRFs, MRFs and “single sited” LSFs – a ‘people-centric’ vision with at its core the notion of sharing not only ‘equipment but also

³ In response to the assessment by a committee of independent experts (Science Advisory Committee) received on the 14th October 2021

⁴ In PNIR 2021-2027 IM@IT, as a node of the ISIS Pulsed Neutron and Muon Source, must be considered included in the broader notion of ISIS (see PNIR foot note 38 page 30) and IM@IT and RI ISIS UK are jointly listed high priority RI’s in PNIR 2021-2027 (see Table 10 pag. 40).

⁵ There are clear historical reasons for the inclusion of ISIS (UK) in the name of the proposed infrastructure. Moreover, the direct link to an international LSF is a unique and distinctive aspect of the IM@IT hybrid nature. However once IM@IT would support the access to other LSFs an alternative in the name of the RI will be sought, whilst possibly keeping the same acronym: it could become Infrastructures@MACH and keep the acronym

expertise and training, a novel multi-user, multi-techniques and multi-level articulation tailored to user needs. All these features make IM@IT a unique RI that differs from all other RIs operating in the Italian landscape and in EU.

Table 1. IM@IT Partners and Units

Partner n.	Partner	Unit n.	Unit	Location
1	Università di Roma "Tor Vergata" (Coordinator)	1	IM@IT-UNITOV	Roma
2	Associazione Italiana per la Ricerca Industriale	2	IM@IT-AIRI	Roma
3	Consiglio Nazionale delle Ricerche	3	IM@IT-DSCTM-CNR	Roma
			Dipartimento di Scienze Chimiche e Tecnologie dei Materiali	
		4	IM@IT-IPCB-CNR	Napoli
			Istituto per i Polimeri, Compositi e Biomateriali	
		5	IM@IT-IBFM-CNR	Milano
			Istituto di Bioimmagini e Fisiologia Molecolare	
		6	IM@IT-IMAA-CNR	Potenza
			Istituto di Metodologie per l'Analisi Ambientale	
4	Consorzio Interuniversitario per lo Sviluppo dei Sistemi a Grande Interfase	7	IM@IT-CSGI	Firenze
5	Università degli Studi Milano Bicocca	8	IM@IT-UNIMIB	Milano
6	Venice International University	9	IM@IT-VIU	Venezia

Governance and Access Mode⁶.

IM@IT has designed the lightest possible governance and access models required to fulfil the spirit of the ESFRI requirements. The goal is to free research teams from bureaucratic tasks as much as possible, so that they can focus their capabilities on supporting and teaching/transferring science and technology.

A more structured governance could always be designed if and when IM@IT decides to apply for ESFRI. The governance encompasses one external body [the Scientific Advisory Committee (SAC)] and two internal bodies [the General Assembly (GA) and the Board of Directors (BoD)].

Articulation

The RI is a people-centric infrastructure, in which clusters' members and their expertise are highlighted and valued even more than the equipment, and that is focused on problem-led, multi-level instrumental kit and research activities. It is organised in a series of 'clusters'⁷ operating at different levels/scales such as Small Research Facilities (SRFs), National Cluster Mid-Range Facilities (MRFs) and a single point e-interface to Large-Scale Facilities (LSFs), supporting access to all levels. Peer-reviewing procedure are appropriate and implemented only for user access to MRFs and to LSFs.

The scales/level of articulation are the following:

1. A network of department- or university-level facilities and equipment (SRFs), available both to academics in other institutions and to industry. Two uniform and transparent access routes are proposed: open access (to a level of $\geq 30\%$ per year per equipment) and access with a costing scheme is an integral part of this level of infrastructure. Researchers have access anytime to these core facilities through a light touch procedure; access procedures are simplified and streamlined, with assessment of feasibility being done by a panel of local experts. Suitable incentives will be provided for the institution that 'owns' the equipment as to engender a culture of sharing. Node-specific pools of expertise and

⁶ Governance and Access are described in detail in Sections 3 and 5 and Annex 7.7

⁷ Scale of relevant facilities, catalogues of equipment and partners and clusters they belong to are reported in the main body of the text and described in detail in Appendix 7.3

training (clusters⁸) have been created (see Table 2) and will provide a powerful incentive to access the infrastructure rather than using similar kit back home.

2. Unique national Cluster Facilities MRFs “flagships projects”⁹ being created, unique at the national level. Some of the more valuable and innovative equipment of the IM@IT Units are clustered together with ancillary equipment and linked to groups of researchers holding the relevant expertise and training capabilities. Access types are the same as for SRFs. Researchers have access to these specialized facilities through a proposal system (with IM@IT staff providing support and the proposal success rate being much improved because of the preliminary work carried out using IM@IT instrumentation) and could apply, through the OPS, for an outline programme, for which the individual experimental needs would then be assessed (peer-reviewed) on a 6-month basis by Facility Access Panels (FAPs). Where access to LSFs is needed this could either be through the normal open access proposal system (with IM@IT staff providing support and the proposal success rate being much improved because of the preliminary work carried out using IM@IT instrumentation) or at a limited level through a special agreement with the facility. A uniform access template, that will also be applied to future MRFs¹⁰, will be agreed by all the partners and Units during the construction/early operation phases. As for SRFs, MRFs do not consist only of equipment: people and their clusters of expertise, provisions for training of new users, outreach to industry, and dissemination to the general public are an integral part of these facilities and clusters.
3. Interfaces to LSFs are a unique feature of IM@IT. The interface to ISIS (UK) operates since the end of 2019. The model interface set up for ISIS will be preserved and expanded to other LSF (e.g., initially to ILL and DIAMOND, and in the medium term to others). Access could be either through a special agreement with the facility, again a limited level, or through the normal open access proposal system. Previous experiments carried out using other IM@IT installations (SRF and MRF) and the support of IM@IT staff are expected to increase the success rate of access provided through the latter procedure. Although becoming a user of a LSFs is a ‘hard hill to climb’ even more than for small and medium facilities, the unique IM@IT advantage is the unparalleled capabilities of its researchers to attract people by allowing them to make ‘baby steps’ with less expensive equipment complementary to that operating at LSFs. The kind of expertise and training provided by its pools of researcher is typically not LSFs-specific but tend to straddle different levels. This is the aspect making the IM@IT concept extremely innovative in the way it could facilitate this transition. In this scenario, the RI will activate periodical calls for whole research programmes requiring a variety of experimental techniques and with a duration of multiple years aimed at tackling timely and important societal issues – such as those reported in the PNRR and in the HE programme – in a coherent and comprehensive manner. Such programmes would involve experiments both at the partners’ distributed Units and at the LSFs. Successful proposals, peer-reviewed by a specific panel of experts, including independent experts from large-scale facilities, would be granted the suggested “flagged” status, thus making it certain that the successful proposer will be able to complete any experiments planned, including those that could otherwise be rejected at the partner large-scale facilities because of quotas or oversubscription. **IM@IT’s ambition is to act as a privileged channel for accessing international LSFs such as ISIS (UK) and the issues related to funding this access. There is some evidence that the standard access model for LSFs’ is being increasingly challenged, since national and international funding authorities are keen to see a more direct link between the access they fund and their ‘flagship programmes’. In this scenario a good case for Italy would be linking access to ISIS (UK) and other LSFs to the components of the PNRR related e.g. to the ‘zero carbon’ transition.** Possible opportunities arising from the activation of the specific “programme access” would impact on the positive outcome of research programmes associated to SME start-ups, post-doctoral research associates and PhDs, or linked to

⁸ Clusters have a clear identity and are linked to other cognate clusters that already exist even outside IM@IT. Details in Section 4.

⁹ National Cluster Facilities MRF “flagships projects”: “4D Imaging of Complex Systems and Interfaces Facility” and “Nuclear Probes Facility”. Details in Section 2.3

other National calls requiring additional funds. The amount of “flagged” instrument time at both IM@IT partners’ and LSFs would depend on the career experience of the applicant.

Table 2. Clusters: Structure and Composition

CLUSTER 1	“Water”
Cluster node-coordinator	UNIMIB
Participating Units	CNR-DSCTM, CNR-IBFM, CNR-IMAA, CSGI, UNITOV
(Researcher, PhD-Post-doc) assigned to C1	UNIMIB (3,0), CNR-DSCTM (6,6), CNR-IBFM (3,0), CNR-IMAA (2, 2), CSGI (1,1), UNITOV (3, 3)
Short descriptions of the research node-specific pools of expertise	<p><u>UNIMIB</u>: Study of critical relative humidity point of cloud condensation nuclei activation by aerosol chamber; numerical weather and climate modelling operating on aerosol aware microphysics schemes.</p> <p><u>CNR-DSCTM</u>: Water pollution, optical and electrochemical detection, and remediation by photocatalytic nanostructures and bacteria. Membrane operations for water treatment and innovative membranes for toxic metals removal.</p> <p><u>CNR-IBFM</u>: Identification of metabolic changes and/or biomarkers metabolites in liquid matrix (i.e. water, plasma, urine, etc.).</p> <p><u>CNR-IMAA</u>: Study of supercooled liquid water clouds, from their molecular interactions to the phase transitions and aerosol-water interactions in the atmosphere, using ground-based remote sensing data from fixed stations and measurement campaign and using high-resolution numerical weather models.</p> <p><u>CSGI</u>: Dynamics and spectroscopic properties of water in confined systems (inorganic porous reactive and inert matrices, hydrogels and polymeric systems, biological and biorelevant interfaces).</p> <p><u>UNITOV</u>: light and neutron spectroscopy characterizations of ice, water (in stable and metastable phases) and hydrogenous systems; dynamic mechanical analysis of hydrated materials, hydration and de-hydration of materials.</p>

CLUSTER 2	“Soft Complex Systems”
Cluster node-coordinator	CSGI
Participating Units	CNR-DSCTM, CNR-IBFM, CNR-IPCB, UNIMIB, UNITOV
(Researcher, PhD-Post-doc) assigned to C2	CSGI (3, 7), CNR-DSCTM (12, 6), CNR-IBFM (3, 0) CNR-IPCB (3, 0), UNIMIB (2, 2), UNITOV (2, 2)
Short descriptions of the research node-specific pools of expertise	<p><u>CSGI</u>: Development characterization and optimization of soft nano and microstructures, physical and chemical gels (hydro- and organo-), formulations, encapsulation, dispersions, functional materials with particular emphasis, but not limited, to cultural heritage conservation.</p> <p><u>CNR-DSCTM</u>: Multifunctional inorganic/hybrid coatings of soft substrates; safe-by-design engineering of dispersed micro-nano phases; Hybrid polymer systems and hydrogels for regenerative medicine. Membrane emulsification and encapsulation. Porous polymeric membranes.</p> <p><u>CNR-IPCB</u>: Functional polymer gels for biomedical, environmental and cultural heritage applications; physico-chemical, morphological, structural and functional characterization.</p> <p><u>CNR-IBFM</u>: Identification of metabolic changes and/or biomarkers metabolites in solid matrix (vegetables/animal or human tissues and/or cell culture). Drugs validation.</p> <p><u>UNIMIB</u>: fluorescence-based and spectroscopic/spectrometric approaches for characterization of (bio)macromolecules and for biomedical applications.</p> <p><u>UNITOV</u>: pharmacological effects of drugs in arteries, arterial stiffness and central pressure, DNA sequencing.</p>

CLUSTER 3	“Composite Materials Interphases”
Cluster node-coordinator	CNR-IPCB

Participating Units	CNR-DSCTM, CSGI, UNIMIB; UNITOV
(Researcher, PhD-Post-doc) assigned to C3	CNR-IPCB (4, 2), CNR-DSCTM (8, 8), CSGI (2, 4), UNIMIB (2, 2), UNITOV (4, 8)
Short descriptions of the research node-specific pools of expertise	<p><u>CNR-IPCB</u>: Multifunctional, responsive, self-tuneable and interactive multiphase polymer-based materials for environmental, cultural heritage, packaging, health and nanomedicine, and additive manufacturing applications.</p> <p><u>CNR-DSCTM</u>: Hybrid inorganic/organic (nano)composites, multifunctional multiphase ceramics, smart (nano)coatings, layered and multiphase (bio-, geo)polymers, and functionalized membranes for additive manufacturing.</p> <p><u>CSGI</u>: Hybrid inorganic/organic functional composites and cement based composites also for additive manufacturing.</p> <p><u>UNIMIB</u>: Composite materials characterizations through mass spectrometry, x-ray, and microscopic/micro-Raman techniques.</p> <p><u>UNITOV</u>: characterizations based on atomic force microscopy, (cryo) scanning and transmission electron/probe/tunnelling microscopies, infrared and Raman spectroscopies, 3D printing.</p>

CLUSTER 4	“Novel Instrumentation Tools and Methods”
Cluster node-coordinator	UNITOV
Participating Units	CNR-DSCTM, CNR-IBFM, CNR-IMAA, CNR-IPCB, CSGI, UNIMIB
(Researcher, PhD-Post-doc) assigned to C4	UNITOV (3, 8), CNR-DSCTM (5, 5), CNR-IBFM (3, 0), CNR-IMAA (1, 1), CNR-IPCB (2, 0), CSGI (1, 1), UNIMIB (2, 2)
Short descriptions of the research node-specific pools of expertise	<p>Novel instrumentation and methods for x-ray-gamma lab-based instrumentation and neutron beamlines (at eV and MeV energies).</p> <p><u>CNR-DSCTM</u>: Design and realization of new methodologies for dielectric spectroscopies and piezo response, and related computing methods.</p> <p><u>CNR-IBFM</u>: Development of new method for drugs delivery or radionuclides.</p> <p><u>CNR-IPCB</u>: Multi-technique approach for the characterization of complex systems by electron microscopy, XPS, X-ray diffraction and X-ray nano tomography.</p> <p><u>CNR-IMAA</u>: Novel instrumentation and methods to monitor Poly- and per-fluoroalkyl substances (PFAS) on board of soundings balloon.</p> <p><u>CSGI</u>: Novel methods for particle tracking, microfluidics and image analysis applied to industrial problems.</p> <p><u>UNIMIB</u>: – Development of novel neutron detectors.</p>

CLUSTER 5	“Training”
Cluster node-coordinator	VIU
Participating Units	ALL UNITS
Keywords related to the Training Activities	<p><u>CNR-DSCTM</u>: Multifunctional nanomaterials, (bio/geo)polymers, advanced membranes for additive manufacturing, water depollution, nanomedicine, energy storage, smart coating.</p> <p><u>CNR-IBFM</u>: Metabolomics, Targeted metabolomics, One Health</p> <p><u>CNR-IMAA</u>: cloud remote sensing, weather models, in situ atmospheric soundings.</p> <p><u>CNR-IPCB</u>: Advanced materials, Hybrid and nanocomposite systems, Cell/materials interactions, Additive manufacturing, Multitechnique characterization.</p> <p><u>CSGI</u>: Soft Matter, Complex fluids and Interphases, Multiscale characterization</p> <p><u>UNITOV</u>: instrumentation development, nuclear techniques, radiation shielding and safety, accelerated tests of electronic devices, 3D imaging of artefacts, Nuclear quantum Effects (NQE) in complex materials</p> <p><u>UNIMIB</u>: instrumentation development, nuclear techniques, multiscale characterization.</p>

CLUSTER 6	“Outreach”
Cluster node-coordinator	Coordinator: AIRI

Participating Units	Participants: ALL UNITS
Keywords related to the OUTREACH Activities	<u>CNR-DSCTM</u> : Novel (nano)materials, advanced characterization techniques, technological applications. <u>CNR-IBFM</u> : Metabolic snapshot, Biomarkers, environmental stress. <u>CNR-IPCB</u> : Advanced materials, Multitechnique characterization, Industrial applications. <u>CNR-IMAA</u> : Weather and climate, atmospheric monitoring, “Forever Chemical” contamination. <u>CSGI</u> : Industrial Formulations, Multiscale characterization <u>UNITOV</u> : Cultural heritage, Physical Agents and Radio Protection, <i>coatings and electronic components qualification for space applications</i> <u>UNIMIB</u> : Heritage science, experiment-based atmospheric modelling.

Data

Currently, the hybrid RI is operating using a simplified Data Management Plan (DMP) and, since September 2019, is continuing to collect scientific data. IM@IT has started to provide data curation services, a small amount of data and metadata, part of which produced by SMFs instruments, in particular data that underpin accepted publications.

Training and outreach

Pools of expertise and training are committed to a strong industrial outreach programme, focussed on developing a language that is accessible to potential industrial partners to enable potential users in industry and academia to become actual users and developing a vibrant environment of exchanges. This would be extremely beneficial for early-career researchers on the academic side, providing them with career opportunities outside academia of which they are likely unaware at present.

Timeline

Following a successful building phase, IM@IT plans to start immediately on the basis outlined in the main proposal, i.e., with the SRF equipment network and the e-interface supporting access to this network and to ISIS (UK). The phase of early implementation and operation will start from beginning 2022 to 2025.

Cost and Funding

Reason for funding ISIS@MACH ITALIA over the next four years is to allow IM@IT the establishment of its infrastructure, processes, and initial scientific activities which would focus on:

- strengthening clusters of expertise around existing and new equipment,
- identifying ‘flagship projects’ and converting them into national Cluster Facilities MRFs,
- broadening the interface to national and international LSFs,
- strengthening the training, industrial outreach, and dissemination elements, both at the central and at the cluster levels,

before the RI is able to seek other funding sources.

Public funding should remain the ‘bedrock’ upon which the infrastructure is built and sustained.

This is not a funding proposal, so that resource aspects for components, personnel and deliverables have not been evaluated in detail. What follows in Section 3 is a rough bird's eye view with a general estimate of costs that complements the strategic vision. However, as an example, a detailed evaluation of both MRF1 and MRF2 (Sections 2.4.2 and 2.5.2) was made (in Annex 3.2). The same structure will be extended to different projects to include all the other components, such as the SRFs which, being distributed, require more time to be examined in detail. In the project that we are preparing for the Italian PNRR, we shall apply the model used for MRFs to the other components of SRFs, and provide the details of the personnel costs, deliverables, and full costing of the whole IM@IT

IM@IT expects to seek funding through the MUR investment (FOE) (from 2022) integrated with Public (MUR, Regional funds, POR-FESR, Horizon Europe, Infrastructural Funds, PNRR, etc) and private funding's. To this aim, IM@IT is planning to submit a proposal within the call “*Investment 3.1: Fund for the*

creation of an integrated Research Infrastructure and Innovation system” in the framework of the initiatives under the National Recovery and Resilience Plan (PNRR - Missione 4: Istruzione e Ricerca – Componente 2: dalla Ricerca all’Impresa).

In early October 2021 a Scientific Advisory Committee panel of independent experts enthusiastically endorsed the IM@IT proponents aiming to create an Italian RI with a hybrid ‘structure’ and a Europe-wide projection via a direct link to LSFs. An independent and positive recognition came from MUR¹¹ which listed IM@IT and ISIS (UK) jointly as high priority RI’s within PNIR 2021-2027.

Being IM@IT an autonomous national RI with respect to ISIS (UK), IM@IT early phase developments require independent investment and financial supports through appropriate Ministry of Research funding channel (e.g., FOE), see Section 3.

Proponents anticipate that for 2022 they asked President of CNR to request MUR a dedicated FOE for IM@IT. This is shown in the third row in Table 3, details are in Table 4 and in the GANNT chart below (from Section 3. Costing and Funding).

Table 3. Estimate of the total staff involved in implementation and operation activities 2022-2025

	2022	2023	2024	2025
Estimated total IM@IT Personnel (FTE)	60	60 76] -136	60 76 102] -238	76 102 60] -238
Personnel to be recruited by means of MUR contribution (FTE)	22	24	26	28
Contribution requested to MUR (€)	550.000	600.000	650.000	700.000

Table 4. Details the contribution requested to MUR

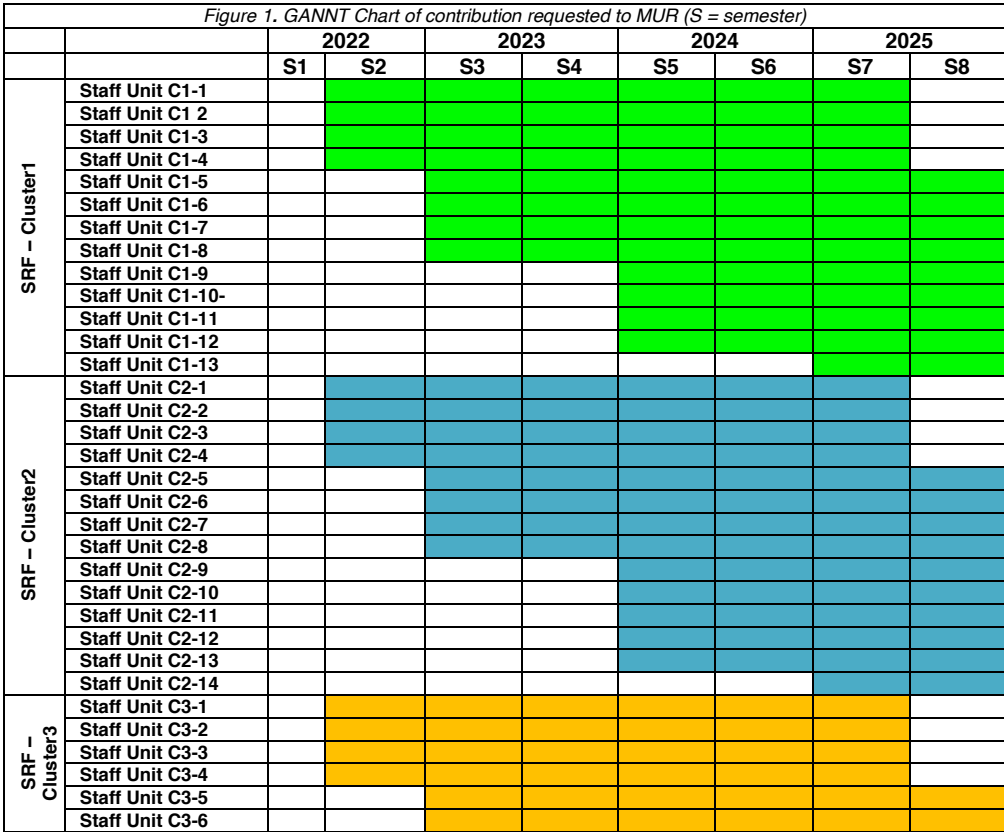
N.	Applies to	Description	Target
C1	SRF Cluster 1	Request to MUR to assign IM@IT 13 staff units (researchers, post-doc, admin-technicians-IT experts) for pursuing research and training within SRFs and Cluster 1 (see Table 2) and personnel for administration, user office and e-interface OPS indicated below. <u>1st July 2022 – 30th June 2025</u> 4 staff units (to be recruited on 3 years basis) <u>1st January 2023 – 31st December 2025</u> 4 staff units (to be recruited on 3 years basis) <u>1st January 2024 – 31st December 2025</u> 4 staff units (to be recruited on 2 years basis) <u>1st January 2025– 31st December 2025</u> 1 staff unit (to be recruited on 1 year basis)	Personnel will be trained by IM@IT staff to run SRFs and assist new users to access the SRFs equipment, to work on both shared activities within clusters and training across Unit facilities. Personnel will be devoted for administration, user office and e-interface OPS
C2	SRF Cluster 2	Request to MUR to assign IM@IT 14 staff units (researchers, post-doc, admin-technicians-IT experts) for pursuing research and training within SRFs and Cluster 2 (see Table 2) and	Personnel will be trained by IM@IT staff to run SRFs and assist new

¹¹ In PNIR 2021-2027 IM@IT, as a node of the ISIS Pulsed Neutron and Muon Source, must be considered included in the broader notion of ISIS (see PNIR foot note 38 page 30) and IM@IT and RI ISIS UK are jointly listed high priority RI’s in PNIR 2021-2027 (see Table 10 page 40).

		<p>personnel for administration, user office and e-interface OPS indicated below.</p> <p><u>1st July 2022 – 30th June 2025</u> 4 staff units (to be recruited on 3 years basis)</p> <p><u>1st January 2023 – 31st December 2025</u> 4 staff units (to be recruited on 3 years basis)</p> <p><u>1st January 2024 – 31st December 2025</u> 5 staff units (to be recruited on 2 years basis)</p> <p><u>1st January 2025– 31st December 2025</u> 1 staff unit (to be recruited on 1 year basis)</p>	<p>users to access the SRFs equipment, to work on both shared activities within clusters and training across Unit facilities. Personnel will be devoted for administration, user office and e-interface OPS</p>
C3	SRF Cluster 3	<p>Request to MUR to assign IM@IT 13 staff units (researchers, post-doc, admin-technicians-IT experts) for pursuing research and training within SRFs and Cluster 3 (see Table 2) and personnel for administration, user office and e-interface OPS indicated below.</p> <p><u>1st July 2022 – 30th June 2025</u> 4 staff units (to be recruited on 3 years basis)</p> <p><u>1st January 2023 – 31st December 2025</u> 4 staff units (to be recruited on 3 years basis)</p> <p><u>1st January 2024 – 31st December 2025</u> 4 staff units (to be recruited on 2 years basis)</p> <p><u>1st January 2025– 31st December 2025</u> 1 staff unit (to be recruited on 1 year basis)</p>	<p>Personnel will be trained by IM@IT staff to run SRFs and assist new users to access the SRFs equipment, to work on both shared activities within clusters and training across Unit facilities. Personnel will be devoted for administration, user office and e-interface OPS</p>
C4	SRF Cluster 4	<p>Request to MUR to assign IM@IT 13 staff units (researchers, post-doc, admin-technicians-IT experts) for pursuing research and training within SRFs and Cluster 4 (see Table 2) and personnel for administration, user office and e-interface OPS indicated below.</p> <p><u>1st July 2022 – 30th June 2025</u> 4 staff units (to be recruited on 3 years basis)</p> <p><u>1st January 2023 – 31st December 2025</u> 4 staff units (to be recruited on 3 years basis)</p> <p><u>1st January 2024 – 31st December 2025</u> 4 staff units (to be recruited on 2 years basis)</p> <p><u>1st January 2025– 31st December 2025</u> 1 staff unit (to be recruited on 1 year basis)</p>	<p>Personnel will be trained by IM@IT staff to run SRFs and assist new users to access the SRFs equipment, to work on both shared activities within clusters and training across Unit facilities. Personnel will be devoted for administration, user office and e-interface OPS</p>
C5	SRF Cluster 5	<p>Request to MUR to assign IM@IT 7 staff units (STEAM Post-Doc and experts' communication) and) for pursuing training course to users and support industrial users and dissemination within Cluster 5 (see Table 2)</p> <p><u>1st July 2022 – 30th June 2025</u> 2 staff units (to be recruited on 3 years basis)</p> <p><u>1st January 2023 – 31st December 2025</u> 2 staff units (to be recruited on 3 years basis)</p> <p><u>1st January 2024 – 31st December 2025</u> 2 staff units (to be recruited on 2 years basis)</p>	<p>Personnel will be trained by IM@IT staff to run SRFs and assist new users for training and dissemination activities across Unit facilities.</p>



		<p><u>1st January 2025– 31st December 2025</u> 1 staff unit (to be recruited on 1 year basis)</p>	
C6	MRF1 Cluster 2,3	<p>Request to MUR to assign IM@IT 14 staff units (researchers, engineering and architect for design of civil building) for designing and realize the MRF1</p> <p><u>1st July 2022 – 30th June 2025</u> 2 staff units (to be recruited on 3 years basis)</p> <p><u>1st January 2023 – 31st December 2025</u> 3 staff units (to be recruited on 3 years basis)</p> <p><u>1st January 2024 – 31st December 2025</u> 3 staff units (to be recruited on 2 years basis)</p> <p><u>1st January 2025– 31st December 2025</u> 6 staff unit (to be recruited on 1 year basis)</p>	<p>Personnel will be trained by IM@IT staff to design MRF1 and be trained and assist new users access to SRFs and ISIS (UK) s</p>
C7	MRF2 Cluster 1,4	<p>Request to MUR to assign IM@IT 14 staff units (researchers, engineering and architect for design of civil building) for designing and realize the MRF2</p> <p><u>1st July 2022 – 30th June 2025</u> 2 staff units (to be recruited on 3 years basis)</p> <p><u>1st January 2023 – 31st December 2025</u> 3 staff units (to be recruited on 3 years basis)</p> <p><u>1st January 2024 – 31st December 2025</u> 3 staff units (to be recruited on 2 years basis)</p> <p><u>1st January 2025– 31st December 2025</u> 6 staff unit (to be recruited on 1 year basis)</p>	<p>Personnel will be trained by IM@IT staff to design MRF2 and be trained and assist new users access to SRFs and ISIS (UK)</p>





	Staff Unit C3-7								
	Staff Unit C3-8								
	Staff Unit C3-9								
	Staff Unit C3-10								
	Staff Unit C3-11								
	Staff Unit C3-12								
	Staff Unit C3-13								
SRF - Cluster4	Staff Unit C4-1								
	Staff Unit C4-2								
	Staff Unit C4-3								
	Staff Unit C4-4								
	Staff Unit C4-5								
	Staff Unit C4-6								
	Staff Unit C4-7								
	Staff Unit C4-8								
	Staff Unit C4-9								
	Staff Unit C4-10								
	Staff Unit C4-11								
	Staff Unit C4-12								
	Staff Unit C4-13								
SRF - Cluster5	Staff Unit C5-1								
	Staff Unit C5-2								
	Staff Unit C5-3								
	Staff Unit C5-4								
	Staff Unit C5-5								
	Staff Unit C5-6								
	Staff Unit C5-7								
MRF1	Staff Unit MRF1-1								
	Staff Unit MRF1-2								
	Staff Unit MRF1-3								
	Staff Unit MRF1-4								
	Staff Unit MRF1-5								
	Staff Unit MRF1-6								
	Staff Unit MRF1-7								
	Staff Unit MRF1-8								
	Staff Unit MRF1-9								
	Staff Unit MRF1-10								
	Staff Unit MRF1-11								
	Staff Unit MRF1-12								
	Staff Unit MRF1-13								
	Staff Unit MRF1-14								
MRF2	Staff Unit MRF2-1								
	Staff Unit MRF2-2								
	Staff Unit MRF2-3								
	Staff Unit MRF2-4								
	Staff Unit MRF2-5								
	Staff Unit MRF2-6								
	Staff Unit MRF2-7								
	Staff Unit MRF2-8								
	Staff Unit MRF2-9								
	Staff Unit MRF2-10								
	Staff Unit MRF2-11								
	Staff Unit MRF2-12								
	Staff Unit MRF2-13								
	Staff Unit MRF2-14								