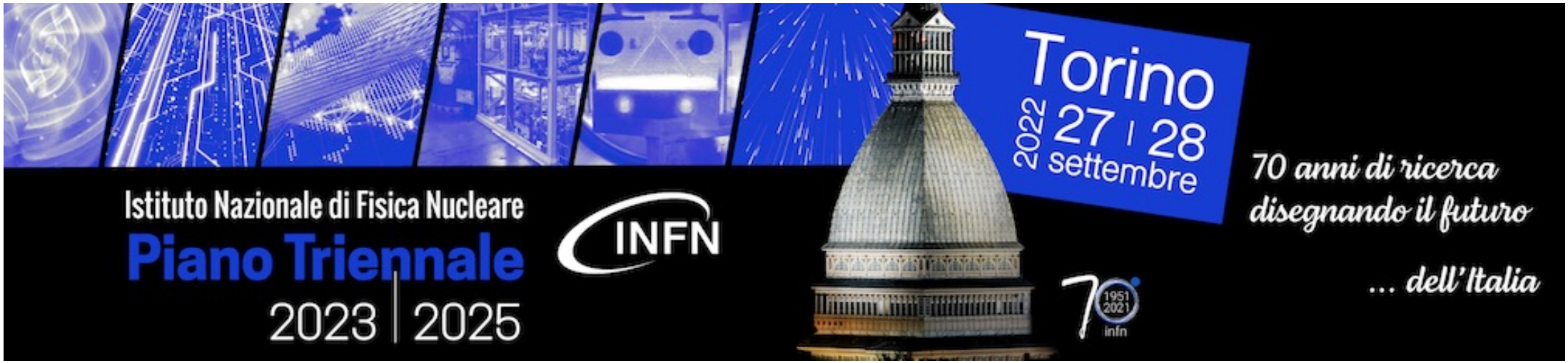
PNRR: Progetti INFN in ambito Computing e Life Science

Diego Bettoni



Indice

- ICSC
- TeRABIT
- PE1 Artificial Intelligence
- PE4 Quantum Science and Technology
- ITINERIS
- PE30
- ECOSISTER
- SAMOTHRACE
- THE
- Rome Technopole

ICSC
Italian Centre for SuperComputing


ICSC
Centro Nazionale HPC,
Big Data e Quantum Computing
INFN

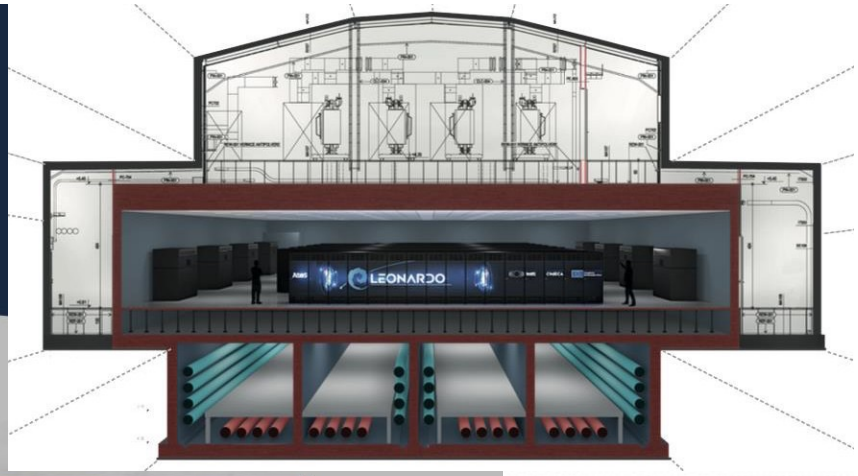
The ICSC aim and objectives

Create the **national digital infrastructure** for research and innovation, starting from the existing HPC, HTC and Big Data infrastructures ...

… evolving towards a cloud datalake model accessible by the scientific and industrial communities through flexible and uniform cloud web interfaces, relying on a high-level support team …

…form a globally attractive ecosystem based on strategic public-private partnerships to fully exploit top level digital infrastructure for scientific and technical computing and promote the development of new computing technologies

The Big Data Technopole – Bologna



ECMWF Data Center

ICSC

CINECA & INFN Exascale Supercomputer Center

Big Data Association and Foundation

Civic Protection and agency for development and innovation

Conference and Education Center

Meteo National Agency

Innovation Center

IFAB - International foundation Big Data

Competence Center Industry 4.0

University Centers

Biobank and Life Science

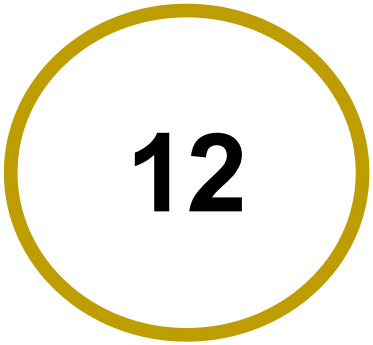
ENEA Center

Co-funded by the European Union

Regione Emilia-Romagna

ICSC Founding Members: a public private partnership

Universities



Research Institutions

Strategic private partners

Public Research Institutions Founding Members: a pervasive initiative throughout Italy

National Institutions

INFN Istituto Nazionale di Fisica Nucleare
CINECA
ENEA
Consiglio Nazionale delle Ricerche
INGV
Consortium GARR
INAF Istituto Nazionale di Astrofisica

Hub Only

UNIMORE Università degli Studi di Modena e Reggio Emilia
Università di Parma
OGS

Private Founding Members: strategic players for digital transformation

LEONARDO

Terna
Driving Energy

sogei

autostrade per l'italia

ENGINEERING
THE DIGITAL TRANSFORMATION COMPANY

FINCANTIERI

HUMANITAS
RESEARCH HOSPITAL

UnipolSai
ASSICURAZIONI

FERROVIE DELLO STATO ITALIANE

ThalesAlenia Space
a Thales / Leonardo company

INTESA SANPAOLO

Highly-qualified group of large leading companies covering most of the strategic industrial sectors involved by digital transformation at the national level

fondazione innovazione urbana

Strategic partner to implement and develop the digital twin pilot case of an urban complex system

iFAB INTERNATIONAL FOUNDATION BIG DATA & ARTIFICIAL INTELLIGENCE FOR HUMAN DEVELOPMENT

Industry-driven not-for-profit international organization aimed at: (1) aggregating companies, including SMEs, to engage with ICSC through a structured partnership, (2) funding research and innovation projects, (3) promoting the Big Data Technopole

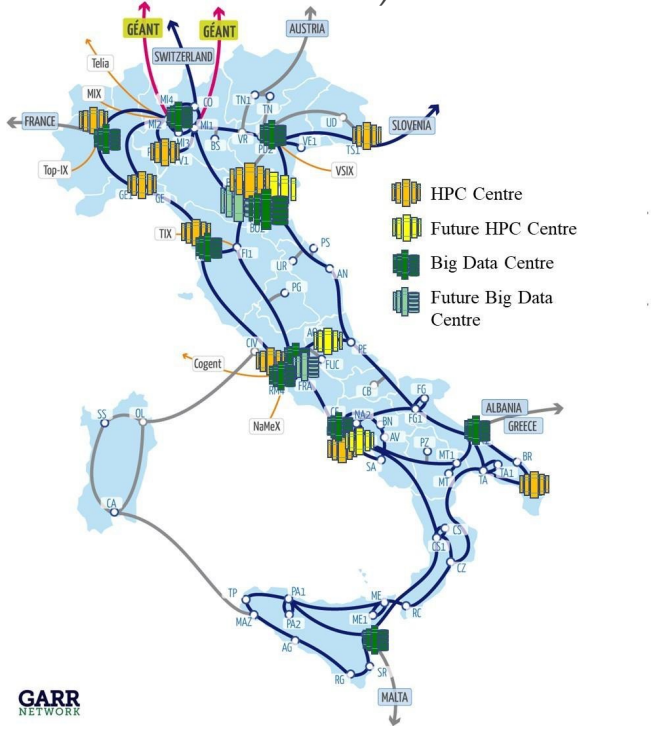
The ICSC will include ten **thematic Spokes** and one ***Infrastructure* spoke**

EDUCATION & TRAINING, ENTREPRENEURSHIP, KNOWLEDGE TRANSFER, POLICY, OUTREACH

1. FUTURE HPC & BIG DATA
2. FUNDAMENTAL RESEARCH & SPACE ECONOMY
3. ASTROPHYSICS & COSMOS OBSERVATIONS
4. EARTH & CLIMATE
5. ENVIRONMENT & NATURAL DISASTERS
6. MULTISCALE MODELING & ENGINEERING APPLICATIONS
7. MATERIALS & MOLECULAR SCIENCES
8. IN-SILICO MEDICINE & OMICS DATA
9. DIGITAL SOCIETY & SMART CITIES
10. QUANTUM COMPUTING

0. SUPERCOMPUTING CLOUD INFRASTRUCTURE

equipped with high-level teams of experts integrating the Spokes working groups (mixed cross-sectional teams)



ICSC: Main figures over the next 3 years

1575

Personnel shared by partners

200+

New researchers

250+

New PhDs

32 ME

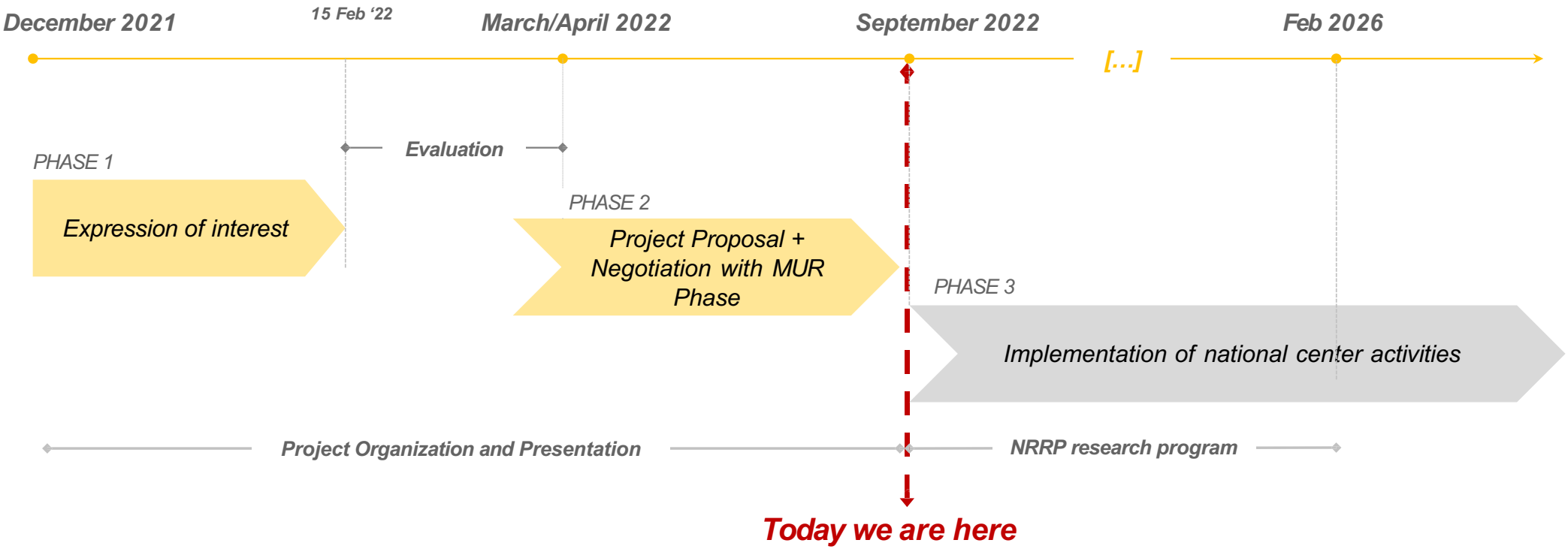
Open calls

Sustainable & Well balanced (territory, gender, age, size)

32 ME

Innovation grants

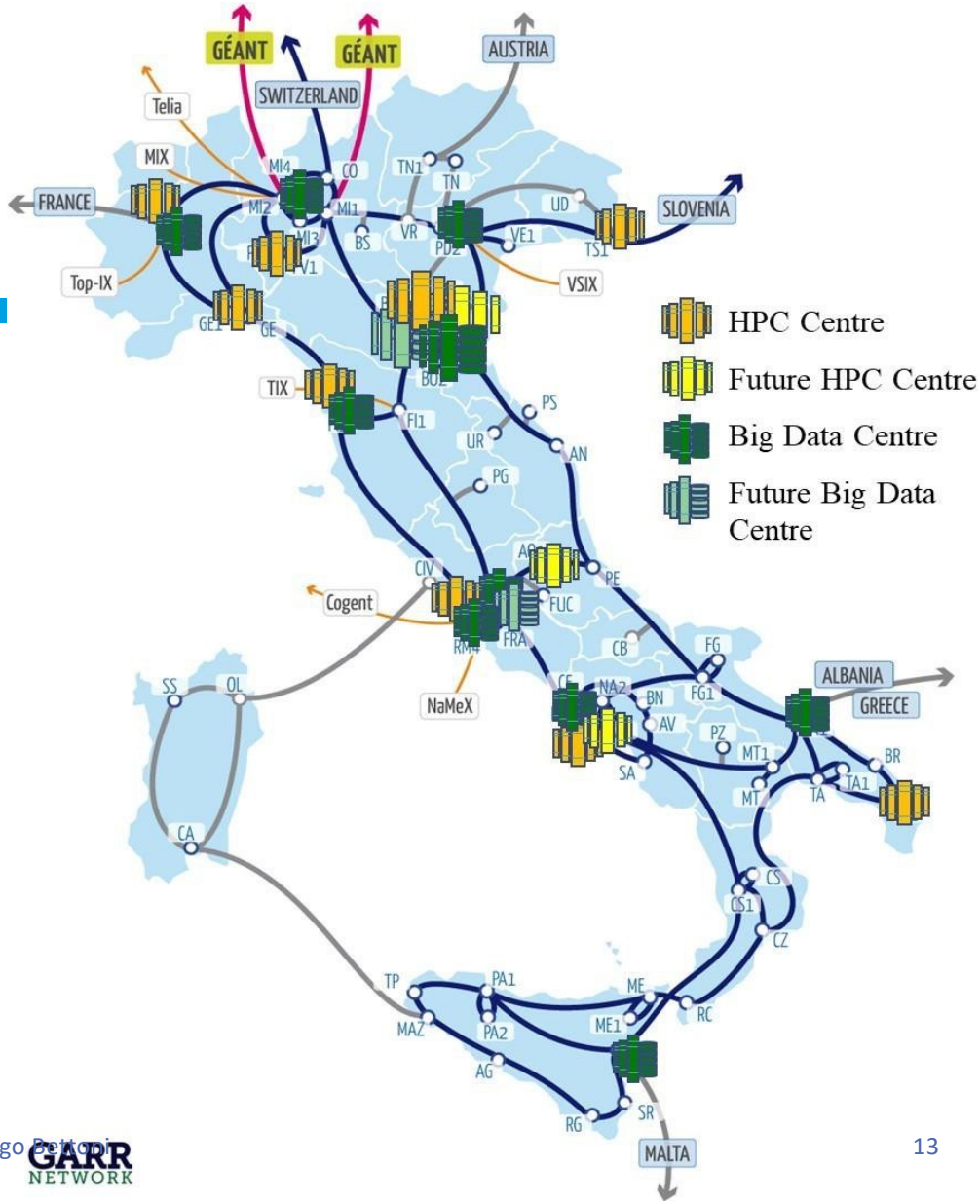
Three phases of the Project: today we are in the evaluation period



ICSC Infrastructure

- 117 M€ in spoke 0

  CINECA, INFN, GARR
- 22 M€ more in other spokes
- 15 M€ for personnel dedicated to the management of the infrastructure



ICSC infrastructure

GARR: upgrade of the Italian research and education network to multiple of Tbps

CINECA: upgrade of the pre-exascale HPC facility Leonardo, in Bologna, including a new quantum accelerator, new datacentre in Naples, support for HPC exploitation

INFN: upgrade of the distributed big data infrastructure, national cloud federation

New thematic sites

INFN Laboratori Nazionali del Gran Sasso

- Dedicated to natural and anthropic disaster resilience

INFN Laboratori Nazionali di Frascati

- Dedicated to space economy

More resources for CNR and INAF at CINECA (Bologna) and for CMCC in Lecce

TeRABIT

Terabit network for Research and Academic Big data in ITaly

Call DIGIT

La call per le infrastrutture di ricerca è divisa in diverse aree

L'area rilevante per il calcolo è quella denominata DIGIT

Il budget per l'area DIGIT è 90 M€

Possono partecipare infrastrutture di ricerca censite dal PNIR di rilevanza alta o media, individualmente o assieme

Presentati 4 progetti (INFN, S.Anna di Pisa e 2 CNR)

Il progetto coordinato dall'INFN è Terabit, con una richiesta complessiva di circa 55 M€

Partner di Terabit

Terabit unisce tre infrastrutture di ricerca censite nel PNIR:

- **GARR-X** (ora GARR-T) di GARR (importanza alta), rappresentato da INFN
- **Prace-Italy** di CINECA (importanza alta), rappresentato da OGS
- **HPC-BD-AI** di INFN (importanza media)

Possono partecipare solo entità vigilate dal MUR, quindi il progetto è di fatto presentato da INFN e OGS

GARR e CINECA sono enti attuatori

Le personale di GARR sono formalmente nel progetto col loro ruolo di dipendenti INFN

Finalità

Il progetto è pensato per essere complementare al centro nazionale ICSC:

- L'evoluzione della rete GARR-T indirizza aree geografiche diverse da ICSC (in particolare la Sardegna) (WP2)
- L'evoluzione dei sistemi di calcolo riguarda il sistema Galileo 100 di CINECA (WP3) e la creazione di un sistema distribuito di piccoli centri HPC (*Cloud HPC bubbles*) su centri dell'INFN (WP4)

Finanziamenti

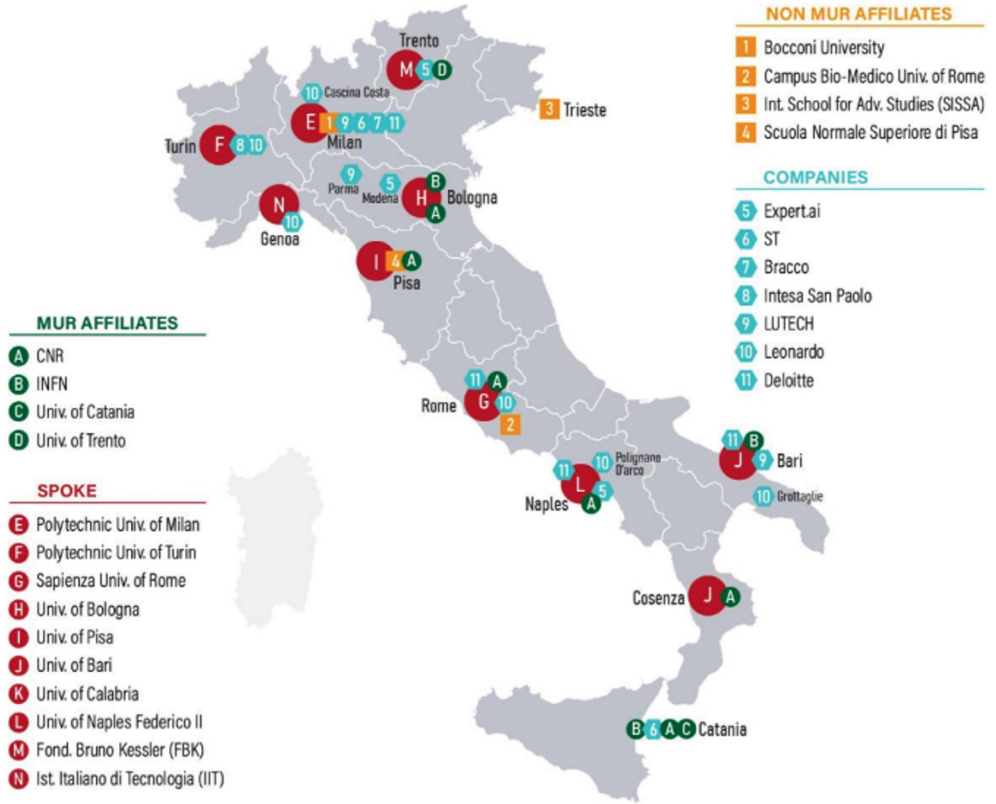
INFN:	13.65 M€ su 20 M€ richiesti
GARR:	17.67 M€ su 20 M€ richiesti
CINECA/OGS:	9.68 M€ su 15 M€ richiesti
TOTALE	41.00 M€ su 55 M€ richiesti
Personale strutturato:	*Non rendicontabile*
Personale a tempo determinato:	4.0 M€ (2.5 M€ INFN incl. manager)
Strumentazione:	22.0 M€ (10.3 M€ INFN)
Infrastrutture civili:	12.5 M€ (0 INFN
Costi indiretti:	1.5 M€ (0.8 M€ INFN)
Training:	1.0 M€ (0 INFN, oltre al personale)

PE1
FAIR

Future AI Research

PE 1: “Intelligenza artificiale: aspetti fondazionali”

- Titolo non adatto per la maggior parte delle attivita’ AI INFN: visto come territorio dei Computer Scientists puri, con interesse minimo per la parte applicativa.
- Attivita’ piu’ calzanti lato fondazionale INFN in CSN4, ma portate avanti prevalentemente da associati
- Progetto guidato da CNR (IIT/Pisa)
  - Comitato di coordinamento CNR, SNS, UNIBO, Sapienza/CINI
  - Comitato Scientifico con 20 enti, inclusa INFN
- Partenariato finale selezionato mediante una survey, a cui hanno risposto 70 istituzioni candidate, 350 gruppi di ricerca, 3100 persone (55% INF, 11% FIS, 8% MAT, ….) → 25 membri del partenariato
- (survey INFN delle attivita’ un interessante byproduct → 120 attivita’ censite)
- 10 spokes, a guida UNI e carattere regionale. CNR e INFN presenti in multipli Spokes



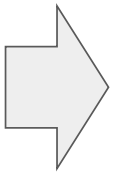
160 MEur di richiesta iniziale

INFN in FAIR

- 3 attivita' INFN inserite in Spokes "Regionali"
  - Spoke 6 (lead UniBA): attivita' legate a AI su BigData, use cases di riferimento **analisi dati HEP**
    - Elia (BA), Antonacci (BA), Doria (NAP), Battaglieri (GE)
  - Spoke 8 (lead UniBO): attivita' legata a **explainability in fisica medica**
    - Retico (PI), Chincarini (GE)
  - Spoke 10 (lead UniCT): attivita' legata a studi di **sistemi brain inspired**, con legami a HBP
    - Vicini (RM1), Paolucci (RM1)

Budget totale 160 MEur (richiesta)

Partenza progetto prevista Dicembre 2022



- Meeting con MUR/MEF/Chair dei referees 7 Settembre / 14 Settembre: budget da ridurre a 1610 MEur /14 = 115 MEur (-28%)

- **Rimodulazione finale per INFN 1963 → 1620 kEur (-17%)**
  - ~660 kEur su rendicontazione staff
  - Il resto indiviso per TD+Borse+PhD+Hardware
  - + quota parte per le Open Calls, per ora lasciate indivise sull'Hub

PE4
NQSTI

National Quantum Science and Technology Institute

Partenariato Esteso su Scienze e Tecnologie Quantistiche (PE4)

- Focus "*sulla ricerca a basso TRL nel campo delle scienze, delle tecnologie quantistiche per applicazioni radicalmente innovative nel sensing, nella comunicazione sicura e nell'elaborazione della informazione quantistica e nella simulazione. A questi saranno affiancati i necessari sviluppi di concetti, materiali innovativi (anche allo scopo di ridurre l'impatto ambientale) e dispositivi di frontiera, da quelli fotonici a quelli a stato solido*»
- Due proposte presentate per il PE4: l'INFN partecipa a quella denominata National Quantum Science and Technology Institute (NQSTI), comprendente:
  - Universita' di Camerino (Presentatore del Progetto)
  - Consiglio Nazionale delle Ricerche (CNR)
  - Istituto Nazionale di Fisica Nucleare (INFN)
  - Universita' di Bari
  - Universita' di Catania
  - Universita' di Firenze
  - Universita' di Milano Bicocca
  - Universita' di Napoli
  - Universita' di Parma
  - Universita' di Pavia
  - Universita' di Roma Sapienza
  - Universita' di Trieste

National Quantum Science and Technology Institute

- Al termine della 1a fase di valutazione delle proposte per i PE (02/08/2022), la proposta NQSTI e' stata selezionata tra le 14 ammesse alla fase 2 (prima nel ranking).
- Obiettivo a medio termine (oltre la conclusione del PNRR): costituire una realtà nazionale di natura consortile che raccolga tutte le istituzioni attive nelle scienze e tecnologie quantistiche e che garantisca la competitività e la presenza stabile, a lungo termine, del Paese in questo importante settore scientifico tecnologico.
- Struttura Hub-and-Spoke. 7 line di ricerca (vedi prossima slide).
- Passi fatti e da fare:
  - Risposte ai rilievi dei revisori e presentazione della proposta finale attuate nei tempi previsti (7 settembre)
  - Fase di negoziazione col MUR in Corso
  - Prossimi passi: costituzione della societa' consortile NQSTI che svolgera' le funzioni di hub
- Budget INFN € 6.416.929,11
- 5 RTD

Linee di ricerca NQSTI

In blu le attivita' nelle quali sono coinvolti I gruppi INFN.

1. Foundations and architectures for innovation in quantum information processing and communication.
2. Foundations and architectures for quantum sensing, metrology, novel materials, and sustainability
3. Atomic and molecular platforms for quantum technologies
4. Photonic platform for quantum technologies
5. Solid state platform for quantum technologies
6. Integration of platforms
7. Complete systems

ITINERIS

ITalian INtegrated Environmental Research Infrastructures System

RAFFORZAMENTO E CREAZIONE DI INFRASTRUTTURE DI RICERCA NELLAMBITO DEL PIANO NAZIONALE DI RIPRESA E RESILIENZA (PNRR) - AVVISO 3264 DEL 28/12/2021

M4C2 - Dalla ricerca all'impresa - 3.1: Fondo per la realizzazione di un sistema integrato di infrastrutture di ricerca e innovazione

PROGETTO DI MESSA IN RETE DELLE INFRASTRUTTURE DI RICERCA (IR) DEL SETTORE AMBIENTALE

Soggetto Titolare: CONSIGLIO NAZIONALE DELLE RICERCHE

PI: Gelsomina Pappalardo
Financial Officer: Lucia Telesca

Costo totale del progetto: 155.208.809,00 €

Data di avvio del progetto: 1 Novembre 2022

Abstract

ITINERIS will build the Italian Hub of Research Infrastructures in the environmental scientific domain for the observation and study of environmental processes in the atmosphere, marine domain, terrestrial biosphere, and geosphere, providing access to data and services and supporting the Country to address current and expected environmental challenges.
ITINERIS coordinates a network of national nodes from 22 RIs (18 from the environmental domain, 2 from agri-food with strong link with the environment and 2 from the PSE domain, supporting services for the marine domain).
The main goal is to develop cross-disciplinary research in environmental sciences through the use and re-use of existing (or preoperational) data and services and new observations, to address scientifically and societally relevant issues such as sustainable use of natural resources, implementation of Nature-Based Solutions, Green and Blue Economy, pollution reduction, critical zone and ecosystem management and restoration, carbon cycle, mitigation of the downstream effects of climate and environmental change.
ITINERIS has been designed looking at synergy with the European RI framework, and it will support the participation of Italian scientists in pan-European initiatives (ENVRIFAIR, EOSC) and in HE (Pillar 1, Missions, Partnerships, Clusters).
ITINERIS will have significant impact on national environmental research, providing scientific support to the design of actionable environmental strategies. ITINERIS adopts a whole-system, cross-disciplinary approach to the Earth System and its changes, allowing users to benefit from the integrated system of RIs and the knowledge it produces. This broad-scale vision of environmental research, sustained by the main Italian environmental scientists involved in European RIs, is truly innovative and it will support our Country in taking a leading role in European environmental research, designing the framework for the next decades.

Unità Operative INFN

INFN Organisation: G. Riccobene (INFN coordinator, LNS), M. Chiari (FI), G. Donvito (BA), P.Prati (GE)
Legal officer: Federica Lugli
Legal Support: A. Priori, A. Sequi

UO	Activity	Title
LNS	5.7	Implementing a deep-sea e-highway: data and power gateway for deep-sea observatories
BA	6.14	LIFEWATCH-Italy data center upgrade and implementation of a VRE solution for the community
FI	4.8	Activities for integration and harmonization with the Italian Network of Environment RIs
GE	4.9	Integration and harmonization with the Italian Network of Environment Ris
GE	4.13	Aerosol characterization inside atmospheric simulation chamber

Partners

Partner	Dipartimento	Infrastruttura di ricerca	WP	Activity	Budget/Euro
INFN					5.071.697,28
	LNS	LNS (EMSO)	5	7	2.245.437,80
	Sez. Firenze	ACTRIS	4	8	1.002.765,48
	Sez. Genova	ACTRIS	4	9,13	1.156.306,20
	Sez. Bari	LIFEWATCH	6	14	667.187,80
INGV	WIS, BO				9.800.019,17
OGS	OCE, CGN, GEO CRS				17.541.772,24
ISPRA					1.499.926,00
Uni Firenze	UNIFIDAGRI, UNIFI-SMA UNIFI-CPC				5.356.254,15
Uni Cà Foscari					1.900.000
CNR	23 institutes				114.039.139,00

Progetto 30 Anthem

AdvaNced Techonologies for Human centrEd Medicine

Iniziative di ricerca per tecnologie e percorsi innovativi in ambito sanitario e assistenziale

Progetto Anthem

HUB Leader Mi-Bicocca

Spoke 4 Leader Uni CT

Under Evaluation by MUR-MS

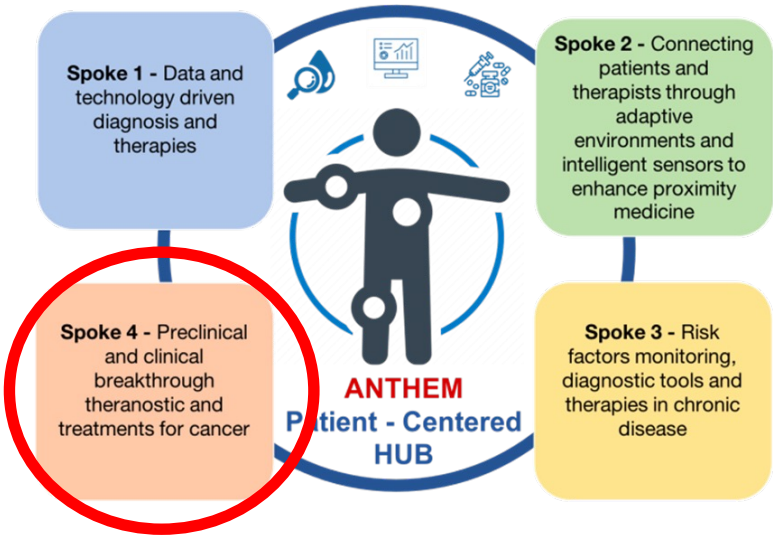
Spoke 4:

Innovative radiotherapy techniques and imaging (Flash therapy & BNCT)

PNRR-PE30

For FLASH: explore testing different types of particle beam detectors and monitoring systems, and define a dosimetric protocol for Flash regime beams of both electrons and protons

For BNCT: the accelerating system has unique performances, the best neutron beam and radiobiology studies concentrate on boron carriers and their ability to be internalised



Anthem

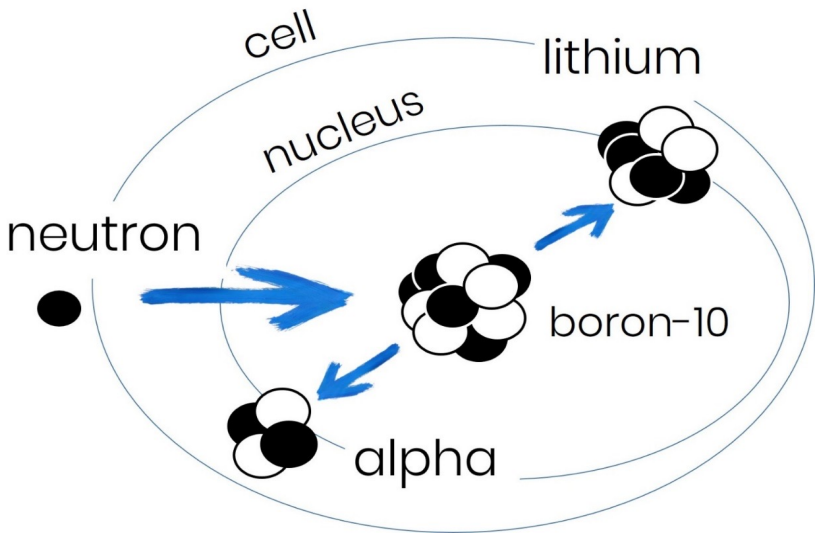
AdvaNced Technologies for Human-centEred Medicine

Boron Neutron Capture Therapy

A binary form of radiotherapy

- Administration of BORON
- Irradiation with low energy NEUTRONS

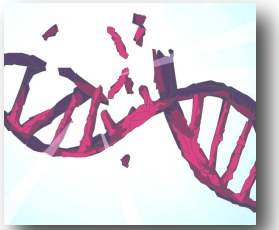
$^{10}B(n,\alpha)\ ^{7}Li$



Selectivity

Range of charged particles in tissue: around 10 micron. Biological targeting, selectivity at the cell level

Effectiveness



High-LET radiation: high biological effectiveness

PNRR PE30 Spoke 4

- Executive project for the installation of the high technology for a clinical centre BNCT@Caserta – INFN
- Preclinical studies (radiobiology-dosimetry-treatment planning): Univ. Vanvitelli + Polyclinic with support by INFN

MUNES: Acceleratore RFQ 5 MeV, 30 mA, CW
Target di Be sottile, BSA basato su AlF3

INFN LNL, PV

Neutron production via nuclear reaction

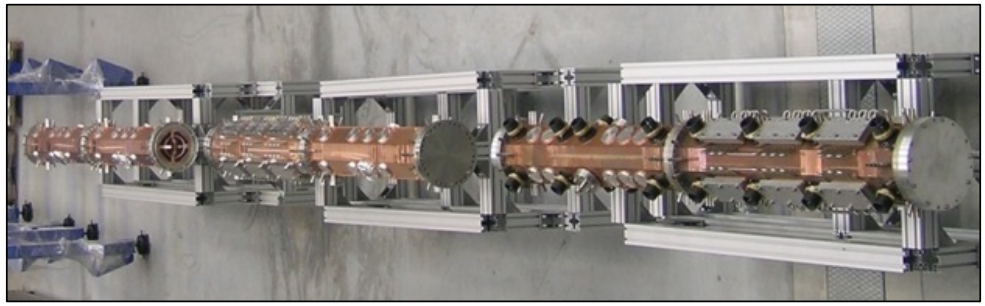
Linear, small

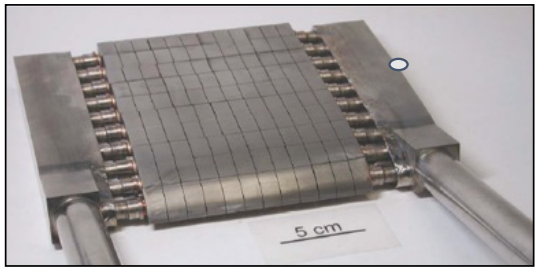
Proton Accelerator

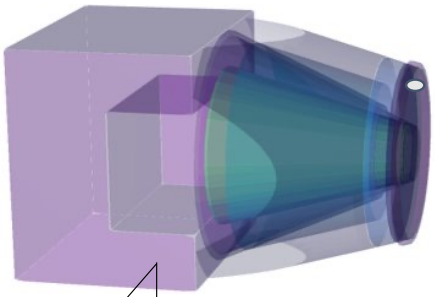
Target

BSA shapes the beam

Patient



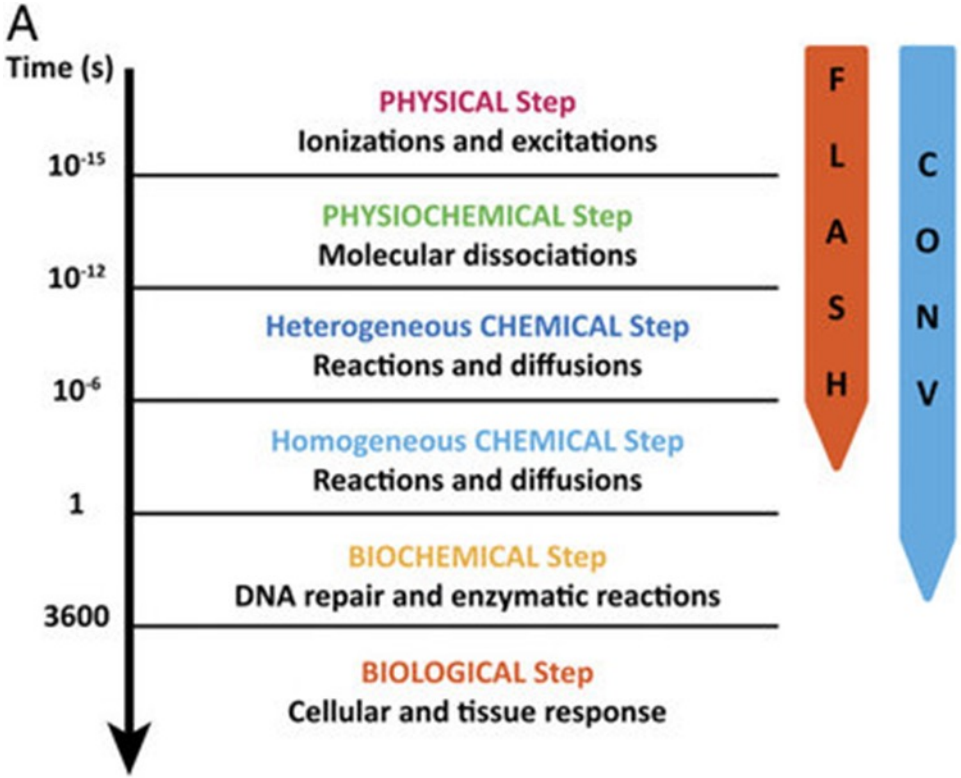




Changes spectrum and collimates

FLASH Therapy

Ultra-high dose rate (uHDR) shows promise to improve efficiency and efficacy



Montay-Gruel et al, 2020;

PNRR PE30 Spoke 4

Study of FLASH therapy effect on glioblastoma (GBM) (UNICT, INFN, CANNIZZARO, IOM, BIOGEM)

Achievement of a biological response to FLASH and ULTRA-FLASH therapies of tumour and healthy tissues by

1. 2D and 3D in vitro tumour and healthy cells response to therapy
2. in vivo tumour and healthy tissues response to therapy, in a murine GBM model
3. development of complementary therapies to improve the efficacy of treatment and quality of patient's life

ECOSISTER

ECOSYstem for Sustainable Transition in Emilia-Romagna

Il progetto

PNRR – Missione 4 - componente 2 - Investimento 1.5

Ecosistemi dell'innovazione

Coordinamento: ART-ER (Attrattività Ricerca Territorio Emilia-Romagna)

Società Consortile dell'Emilia-Romagna nata per favorire la crescita sostenibile della regione attraverso lo sviluppo dell'innovazione e della conoscenza, l'attrattività e l'internazionalizzazione del sistema territoriale

Partner:

Università della Regione: Bologna, Modena e Reggio Emilia, Ferrara, Parma; hub piacentini di Politecnico di Milano e Università Cattolica; EPR: CNR, ENEA, INFN, CINECA e CMCC; enti privati e fondazioni.

Budget: 110 M€

Il progetto

Supporto al sistema industriale regionale con attenzione agli aspetti legati a clima, energia e mobilità sostenibile – focus sul trasferimento tecnologico

- Spoke 1 Materials for sustainability and ecological transition
- Spoke 2 Clean energy production, storage and saving
- Spoke 3 Green manufacturing for a sustainable economy
- Spoke 4 Smart mobility, housing and energy solutions for a carbon- neutral society
- Spoke 5 Circular economy and blue economy
- Spoke 6 Ecological transition based on HPC and Data Technology

← INFN

Ruolo INFN

INFN partecipa assieme a CINECA allo Spoke 6 (coordinato da UniPR e UniMoRe) col compito di fornire consulenza per l'utilizzo delle risorse HPC presenti sul territorio (al Tecnopolo di Bologna) e del Centro Nazionale ICSC

Contributo in staff corrispondente alla massa critica

- 7 persone di cui 4 con almeno 3 mesi/anno

Budget INFN: 480 k€ per rendicontazione staff e assunzione di un tecnologo TD per 36 mesi (CNAF)

Gestione interna del progetto

Non ci sono acquisti

Assunzione con bando nazionale assieme agli altri progetti

Verifica della compilazione dei time-sheet

Redazione dei contributi ai deliverable come concordato con i partner che ne sono responsabili

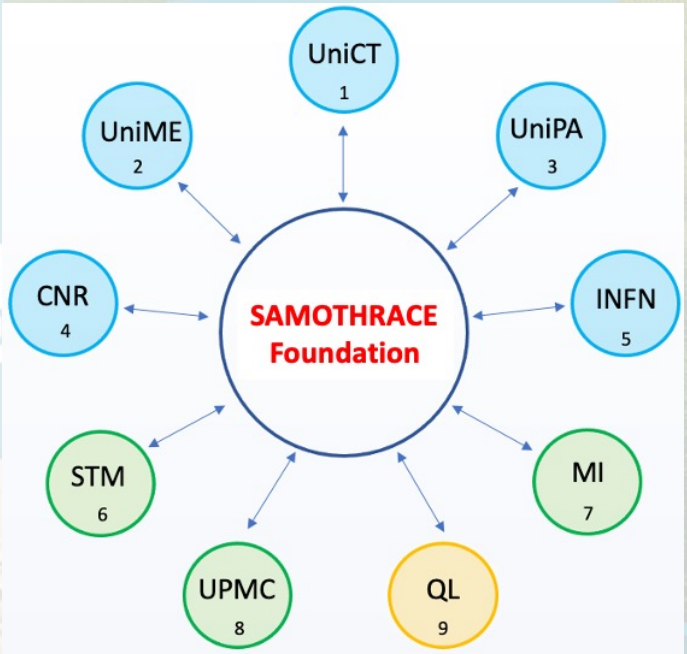
Sarà necessario concordare le modalità di supporto ai partner dello spoke

SAMOTHRACE

Sicilian Micro and NanoTechnology Research and Innovation Centre

PNRR M4C2 Ecosystems for Innovation

- 28 partners: 4 Universities, 5 Research institutes, 4 large companies, International, 10 PMEs
- 9 spokes
- 997 participant subjects
- 140 Meur total budget
- 120 Meur total contribution
- 115 RTDa and 69 PhDs



Six application areas: *Energy, Environment, Smart Mobility, Smart systems for precision agriculture, Health, Cultural Heritage*

The Sicilian Ecosystem will have the role of boosting interconnections /facilitating the sharing of knowledge and good practices among all partners with the goal of boosting innovation through an efficient technology transfer process.

SAMOTHRACE perfectly aligns with the priorities identified by the regional strategy 2021-2027:

a more competitive and smart Sicily;
a greener Sicily;
a more connected Sicily through the strengthening of mobility;
a more inclusive Sicily

SAMOTHRACE SPOKES

S1. **ITM3**-Innovation Through Microelectronics, Microsystems and Materials (UNICT)

S2. **AdSeS**-Advanced Sensors and Systems (UNIME)

S3. **S2-COMMs**-Micro and Nanotechnologies for Smart & Sustainable Communities (UNIPA)

S4. **MiSteRI**-MicroSystems based Routes to Innovation (CNR)

S5. **MADE4IS**-Micro-Accelerator and DEtectors for Innovation and Sustainability (JNFN)

S6. **MicTex**-Microelectronic based Technologies (STM)

S7. **I3**-Industrial & ICT Innovation (MI)

S8. **MedTex**-Medical oriented Technologies (UPMC)

S9. **R2I**-Route to Innovation (Quantum Leap)

MADEIS Organization and goals (INFN, UNICT, UNIME)

5 WPs aimed to exploit INFN competence on micro-acceleration and detector innovation

- WP1- Micro accelerators for health and energy applications (LNS)
- WP2- Micro e Nano beams for Health and Energy (LNS)
- WP3- Photodetectors and digital ACQ for Environment, Agritech, Health and Cultural Heritage (INFNCT)
- WP4- Micro detectors for particle therapy, dosimetry e micro-dosimetry (INFNCT)
- WP5- Detectors and technologies for Fusion Power (LNS)

THE

Tuscany Health Ecosystem

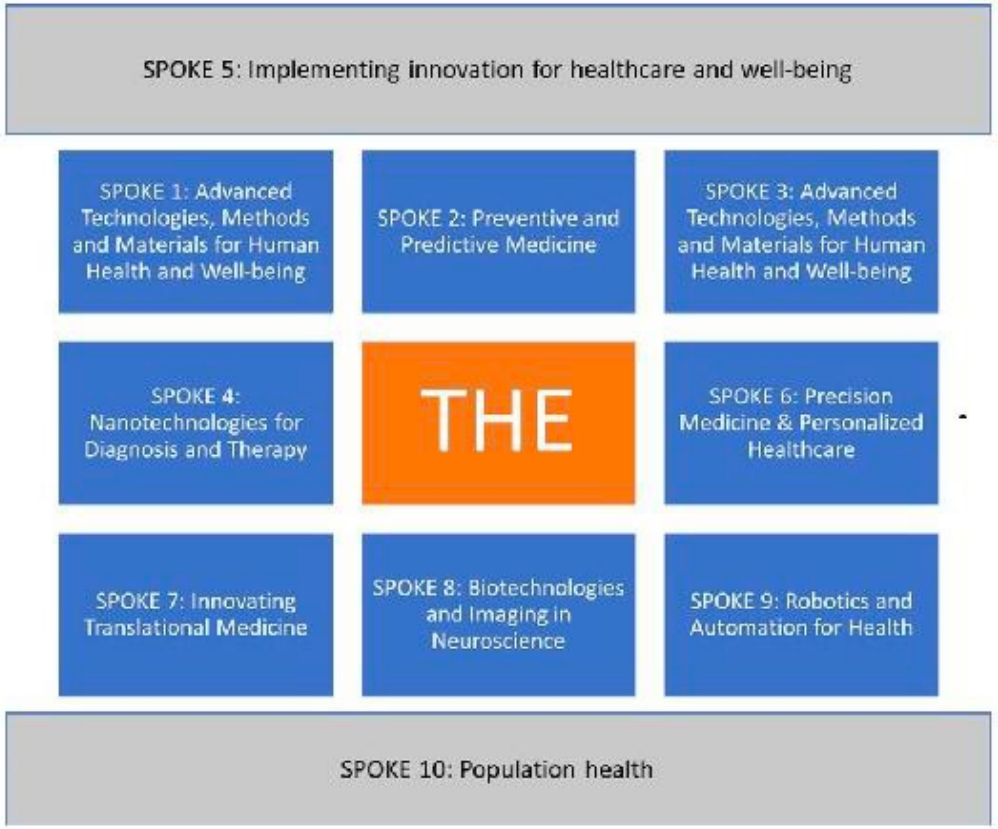
Ecosistema dell’innovazione

THE - Tuscany Health Ecosystem

Finanziato dall'Unione europea NextGenerationEU

Ministero dell'Università e della Ricerca

NAME OF THE INNOVATION ECOSYSTEM: THE - Tuscany Health Ecosystem
DURATION OF THE RESEARCH AND INNOVATION PROGRAM (months): 36
NAME OF THE PROPOSER: University of Florence
IMPLEMENTING BODY - HUB: *Indicate the names of the parties involved and the chosen* 1. University of Florence (UNIFI) 2. University of Pisa (UNIPI) 3. University of Siena (UNISI) 4. School of Advanced Studies – Pisa (SSSA) 5. Scuola Normale Superiore (SNS) 6. IMT School for Advanced Studies Lucca (IMT) 7. University for Foreigners of Siena (UNISTRASI) 8. Istituto Italiano di Tecnologia (IIT) 9. National Research Council (CNR) 10. Toscana Life Sciences (TLS) 11. National Institute for Nuclear Physics (INFN) 12. Confindustria Toscana (CIT)



https://www.unifi.it/art-6035-presentato-tuscany-health-ecosystem.html
https://www.toscanalifesciences.org/it/2022/07/nasce-the-tuscany-health-ecosystem/

INFN contributes to Spoke1:

Advanced Radiotherapies and Diagnostics in Oncology

Spoke 1 coordinator: L. Gizzi (CNR)

It is focused on the study of the mechanisms underlying the **FLASH effect** in Radiotherapy and on its **clinical translation**

Activity	Partners involved
1.0 – Open calls for recruitment and spoke management setup	All
1.1 Innovative approaches to oncologic radiotherapy: radiation sources	CNR-INO, INFN, UNIPI
1.2 Simulations, molecular mechanisms validation and radiobiological effect modelling	CNR-IFC, CNR-INO, CNR-ITB, CNR-NANO, INFN, UNIPI
1.3 Radiobiological effects of ionizing radiation: in vitro (cell culture) and in vivo	CNR-IFC, CNR-IN, CNR-INO,UNIPI
1.4 FLASH Radiotherapy: preclinical	CNR-IFC, CNR-IN, CNR-INO, UNIPI
1.5 FLASH Radiotherapy – from preclinical to clinical	CNR-IFC, CNR-IN, UNIPI
1.6 In situ advanced diagnostics of radiation deposition and conformality	CNR-IFC, CNR-IN, CNR-INO, INFN, UNIPI
1.7 Synthesis and production of tumor-targeted radionuclides, radiotracers and radiopharmaceuticals for experimental studies	CNR-IFC, CNR-IN, UNIFI
1.8 Synthesis and production of tumor-targeted radionuclides, radiotracers and radiopharmaceuticals for clinical use	CNR-IFC, CNR-IN, UNIFI, UNIPI

Total budget of THE: 110 MEur
[including 15 MEur for cascading calls for Southern Italy]

INFN budget: 540 kE
- 280 kE (Staff personnel)
- 170 kE (People to hire)
  - 1 TD for 2 years
  - 1 AdR for 2 years
- 57 kE (Indirect costs)
- 33 kE (Consumables)

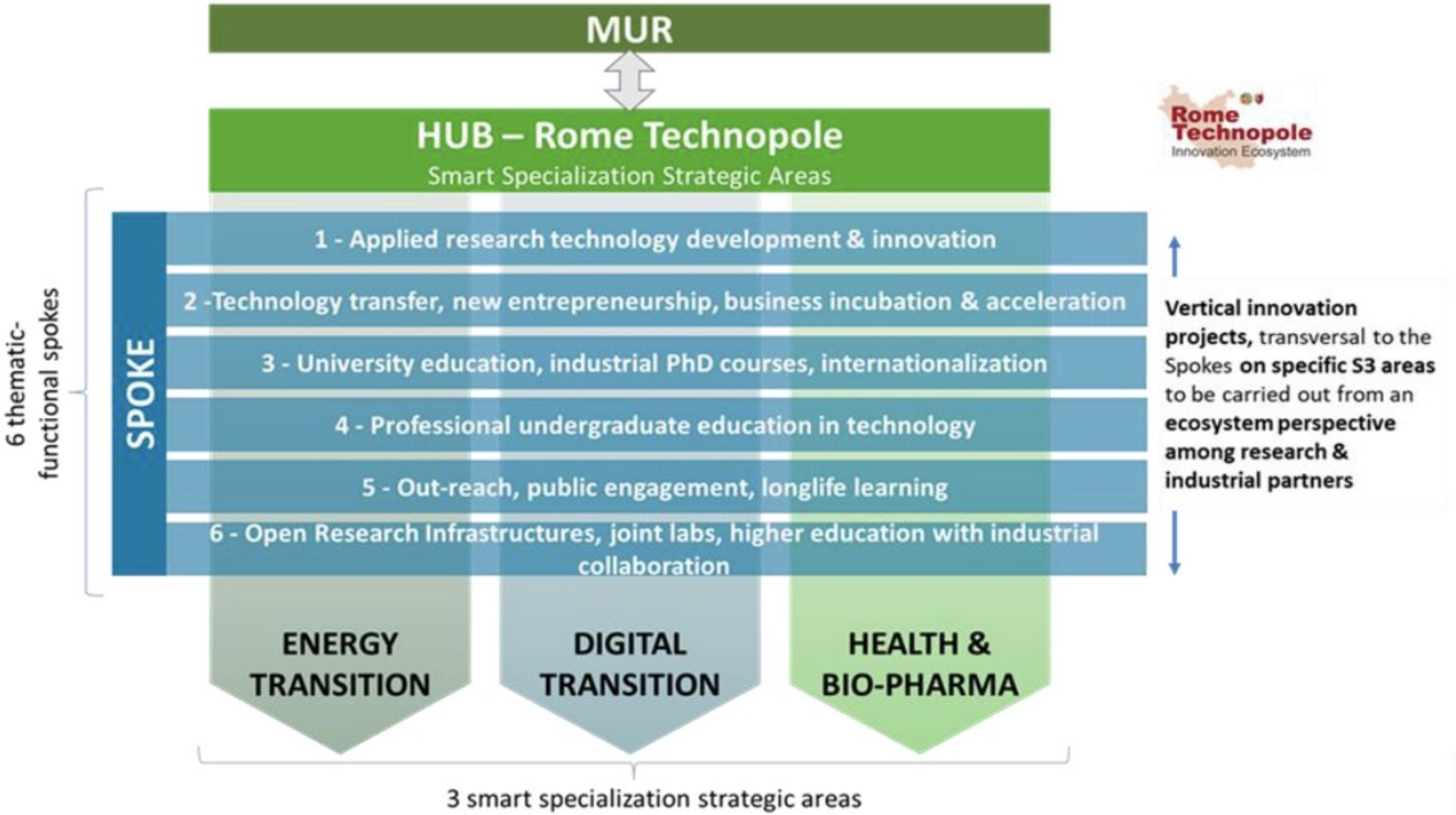
INFN people involved:

Nome	Ruolo	Mesi uomo		
Retico Alessandra	**Primo Ricercatore**	3	3	3
Kraan Christine Aafke	Ricercatore	3	3	3
Boccali Tommaso	Primo Ricercatore	1	1	1
Arezzini Silvia Silvia	Primo Tecnologo	3	3	3
Formuso Antonino	Tecnologo	3	3	3
Mazzoni Enrico Enrico	Tecnologo	1	1	1
Moggi Andrea	Tecnologo	1	1	1

Rome Technopole

«Rome Technopole» è un progetto che «nasce» prima del PNRR con lo scopo di:

- potenziare **l'attrattività del sistema regionale di formazione**, **ricerca**, **innovazione**, **produttività industriale** con riferimento a tre temi principali:
  - **Transizione Energetica e Sostenibilità**
  - **Trasformazione Digitale**
  - **Bio-Farmaceutica e Salute**
- implementare un **modello pubblico-privato eccellente** per le **partnership** stabili tra **Ricerca e Impresa**
- **co-progettare i percorsi accademici** per **allineare le competenze** dei laureati alle esigenze dei **profili professionali più richiesti**
- offrire sul **territorio nazionale** un ulteriore **polo di attrazione per le grandi imprese** delle principali filiere innovative
- dotare il Lazio di **una Infrastruttura di ricerca aperta alle imprese e agli stakeholder** per sostenere innovazione e crescita competitiva


MUR
HUB – Rome Technopole
Smart Specialization Strategic Areas
Rome Technopole
Innovation Ecosystem
6 thematic-functional spokes
SPOKE
1 - Applied research technology development & innovation
2 -Technology transfer, new entrepreneurship, business incubation & acceleration
3 - University education, industrial PhD courses, internationalization
4 - Professional undergraduate education in technology
5 - Out-reach, public engagement, longlife learning
6 - Open Research Infrastructures, joint labs, higher education with industrial collaboration
Vertical innovation projects, transversal to the Spokes on specific S3 areas to be carried out from an ecosystem perspective among research & industrial partners
ENERGY TRANSITION
DIGITAL TRANSITION
HEALTH & BIO-PHARMA
3 smart specialization strategic areas

Spoke	1 - Applied research, technology development and innovation Leader: Uni. Sapienza	2 - Technology transfer, new entrepreneurship, business incubation and acceleration Leader: Uni. Tor Vergata	3 - University education, industrial PhD courses, internationalization Leader: Uni. Roma Tre	4 - Professional undergradute education in technology Leader: Uni. Cassino	5 - Out-reach, public engagement, lifelong learning Leader: Uni. Tuscia	6 - Open Research Infrastructures, joint labs, higher education with industrial collaboration Leader: Uni. Sapienza
Task 1	1.1 Fundamental research	2.1 Valorization of research results for industrialization	3.1 Transdisciplinary university courses	4.1 Student guidance and attraction toward professional courses	5.1 Dissemination and Exploitation of technical and scientific results	6.1 Open research infrastructure for innovation
Task 2	1.2 Industrial and applied research	2.2 Valorization of technologies for industrialization	3.2 International university courses	4.2 ITS professional courses	5.2 Knowledge exchange with stakeholders	6.2 Joint labs
Task 3	1.3 Pre-competitive development	2.3 Business incubation, promotion of new start-ups and spin off	3.3 Apprenticeship university courses and internship:	4.3 Bachelor professional courses	5.3 Visibility and impact on society	6.3 Open labs and co-creation
Task 4	1.4 Technology development and innovation	2.4 Business acceleration and venture capital	3.4 PhD courses in partnership with industries, apprenticeship and international PhD courses	4.4 Network for professional education (ITS, schools, Universities and Enterprises)	5.4 Lifelong learning	6.4 Higher education with industrial collaboration
Task 5	1.5 IPR and joint foreground	2.5 Training in technology transfer	3.5 Attraction of excellence students and foreign students	4.5 Transition between professional and university courses for dropout reduction	5.5 Secondary School students' engagement	6.5 Vocational training for technologies and innovation
Task 6	1.6 Project management & communication	2.6 Patenting & licensing	3.6 IPR and agreements with industrial stakeholders	4.6 Placement of students coming form professional courses	5.6 Placement	

Un ringraziamento
a tutte le colleghe e i colleghi
che hanno contribuito a questi progetti

Un ringraziamento particolare
ad Alessia D'Orazio
e a Veronica Valsecchi