Call for tender for the presentation of proposals for the Strengthening of research structures and creation of R&D "*innovation ecosystems*", set up of "*territorial leaders in R&D*" — to be funded under the National Recovery and Resilience Plan (NRRP), Mission 4, Component 2 Investment 1.5, funded from the European Union - NextGenerationEU.

Annex 1 - Project proposal

(Article 10, paragraph 3 and Article 12 of the Call)

NAME OF THE INNOVATION ECOSYSTEM: Rome Technopole

DURATION OF THE RESEARCH AND INNOVATION PROGRAM (months): 36

NAME OF THE PROPOSER: Università La Sapienza

IMPLEMENTING BODY - HUB: Rome Technopole

chosen legal form: Foundation of participation (Fondazione di partecipazione)

Parties involved:
Università La Sapienza
Università di Roma Tor Vergata
Università degli Studi Roma Tre
Università degli studi di Cassino e del Lazio Meridionale
Università degli Studi della Tuscia
CNR – Consiglio Nazionale delle Ricerche
Luiss - Libera Università Internazionale degli Studi Sociali Guido Carli
INFN - Istituto Nazionale di Fisica Nucleare,
ISS – Istituto Superiore di Sanità,
ENEA - Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile
Università Campus Bio-Medico di Roma- UCBM
Airbus Italia S.p.A.
Almaviva – The Italian Innovation Company S.p.A.
BV Tech S.p.A.
Catalent Anagni S.r.l.
Coima REM S.r.l.
ENI S.p.A.
Leonardo S.p.A.
Lventure Group S.p.A.
Maire Tecnimont S.p.A.
MBDA Italia SpA
Takis S.r.l.
Thales Italia S.p.A.
Unicredit S.p.A.
Unidata S.p.A.
Unindustria – Unione degli Industriali e delle imprese Roma, Frosinone, Latina, Rieti, Viterbo
Regione Lazio
Roma Capitale

Lazio Innova S.p.A.

Inail Istituto Nazionale per l'Assicurazione contro gli Infortuni sul Lavoro

Camera di Commercio Roma

Camera di Commercio Frosinone Latina

Confindustria Dispositivi Medici

Aeroporti di Roma S.p.A.

Acea S.p.A.

Capgemini Italia S.p.A.

GALA S.p.A.

Wsense srl

Westpole S.p.A

SPOKE AND AFFILIATE WITH THE SPOKE PERFORMING PARTIES:

Participant 1 - Università La Sapienza (Spoke 1 & Spoke 6 Leader)

Participant 2 - Università Roma Tor Vergata (Spoke 2 Leader)

Participant 3 - Università degli Studi Roma Tre (Spoke 3 Leader)

Participant 4 - Università di Cassino (Spoke 4 Leader)

Participant 5 - Università degli Studi della Tuscia

Participant 6 – CNR – Consiglio Nazionale delle Ricerche

Participant 7 - Luiss - Libera Università Internazionale degli Studi Sociali Guido Carli

Participant 8 – INFN - Istituto Nazionale di Fisica Nucleare,

Participant 9 – ISS – Istituto Superiore di Sanità,

Participant 10 – ENEA - Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile

Participant 11 - Università Campus Bio-Medico - UCBM

Participant 12 - Airbus Italia S.p.A.

Participant 13 – Almaviva – The Italian Innovation Company S.p.A.

Participant 14 - BV Tech S.p.A.

Participant 15 - Catalent Anagni

Participant 16 – Coima REM S.r.l.

Participant 17 – ENI S.p.A.

Participant 18 – Leonardo S.p.A

Participant 19 – Lventure Group S.p.A.

Participant 20 - Maire Tecnimont S.p.A.

Participant 21 – MBDA Italia SpA

Participant 22 – Takis S.r.l.

Participant 23 – Thales Italia S.p.A.

Participant 24 – Unicredit S.p.A.

Participant 25 – Unidata S.p.A.
COST OF THE PROGRAM: *120.000.000,00*
NRRP THEMATIC AREA: *Corresponding area according to the National Research Plan – PNR 2021-2027 :* *4. Digitale, industria, aerospazio: Transizione digitale – i4.0, Aerospazio* *Additional areas involved:* *5. Clima, energia e mobilità sostenibile: Energetica industriale, Energetica ambientale* *1. Salute: Tecnologie farmaceutiche e farmacologiche, Biotecnologie, Tecnologie per la salute*
TERRITORY OF REFERENCE: Lazio Region

PROJECT PROPOSAL

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TABLE OF CHANGES

Paragraph	Page or aspect of intervention	Reason for change	Suggested change
SECTION B	p.15 "converging regional policies"	Evaluation form– Part A - Comment no. 3 'some perplexities remain concerning the interaction of Rome Technopole with the Lazio DTC	Even though DTC will not be directly linked with the thematic lines developed within Rome Technopole, it represents an organizational guiding model for the implementation of a regional ecosystem bringing together all the relevant local actors;

SECTION B	p.16	Evaluation form– PART A – Comment no. 1 – "More detailed explanation of objectives of the Consortium"	The objectives of Rome Technopole, as required by the reviewer have been better explained and focused.
SECTION B	p.17	Amended upon request during negotiation	Text revised in order to include among the objectives the support and growth of southern Italian regions, in line with the 15 Million of budget allocated to this geographic area, as requested by MUR
SECTION B	p.17	Amended upon request during negotiation	Updated details on the scientific and technical objectives of the projects.
SECTION B	p.19 "Methodology and project implementation: functional spokes, thematic vertical specialisation areas, flagship projects"	Evaluation form– PART B – Comment no. 1 "The areas covered by spoke 1 and 2 would benefit from some more details";	The description of the Spoke have been enhanced to further present their topics, the paragraph have been complemented with more information and details
SECTION B	p.19	Evaluation form PART C – Comment no. 2 "The educational activities could be more ambitious and novel, with a focus for example on digital technologies..."	A wide use of digital technology in high education will be strategic and fully supported in order to promote and enhance internationalization, through the development of innovative courses making use of MOOCs, interactive labs, team working experiences, collaborative and co-creation labs. A wide use of digital technology in high education will be strategic and fully supported in order to promote and enhance internationalization, through the development of innovative courses making use of MOOCs, interactive labs, team working experiences, collaborative and co-creation labs
SECTION B	p.19 "Methodology and project implementation"	Evaluation form – Part B – Comment no. 1 – "More detailed explanation of objectives of the Consortium" – addressing also; Part C Comment no. 2 and Part C Comment no. 4	Enhanced description of the objectives of each Spoke, inclusion of more details on the educational activities.
SECTION B	p.23	Material error	Modification of the participation of "Takis Biotech" in Spoke 1 and 6
SECTION C	p.55 Critical Mass	Material error	Updated table with revised numbers of CVs uploaded on GEA
SECTION C	p.62-65-68-71-74-77	Evaluation form – Part B – Comment no. 1 – "More detailed explanation of objectives of the Consortium"	Inclusion of detailed GANTT charts for each Spoke, with a detailed visualization of the Milestones
SECTION C	p.64	Evaluation form – Part C – comment no. 1	To be performed in collaboration with industrial partners, based on their technology and innovation needs.

			Involvement and collaboration with external partners and enterprises not member of Rome Technopole, will be supported through open call for collaborative research and development projects
SECTION C	p.64	Material error	Inclusion of "Hiring of Research Programme Manager."
SECTION C	p.64	Material Error	Deliverables D6.2 and D6.3 were included in Spoke 1 for coherency and consistency with the themes of the Spoke
SECTION C	p.64	Amended upon request during negotiation	To specify that open call will have a dedicated budget to southern italian regions.
SECTION C	p.64	Amended upon request during negotiation	To specify that open call will have a dedicated budget to southern italian regions.
SECTION C	p. 64	Amended upon request during negotiation	To specify that open call will have a dedicated budget to southern italian regions.
SECTION C	p.65	Amended upon request during negotiation	To specify that open call will have a dedicated budget to southern italian regions.
SECTION C	p.67	Amended upon request during negotiation	To specify that open call will have a dedicated budget to southern italian regions.
SECTION C	p.67	Amended upon request during negotiation	To specify that open call will have a dedicated budget to southern italian regions.
SECTION C	p.70	Evaluation form -PART C – Comment no. 2 "The educational activities could be more ambitious and novel, with a focus for example on digital technologies..."	Wide use of digital technology in high education will be strategic and fully supported in order to promote and enhance internationalization, through the development of innovative courses making use of MOOCs, interactive labs, team working experiences, collaborative and co-creation labs.
SECTION C	p. 67	Evaluation form – Part D Comment no. 1—""...transfer the innovative results obtained to external stakeholders ."	Revised text with 3 additional quotes: "results with respect to both internal and external entities and stakeholders; with specific focus on the involvement of the stakeholder boards through the creation of communities on the three smart specialization areas (EnT, DgT, H&BP) and of focus groups on specific subtopics;Creating of communities and focus groups involving external stakeholders in order to promote and support technology transfer.[MS1]
SECTION C	p.68	Amended upon request during negotiation	To specify that open call will have a dedicated budget to southern italian regions.
SECTION C	p.73	Evaluation form -PART C – Comment no. 2 "The educational	Promoting collaborative and interactive labs, team working experiences, co-

		activities could be more ambitious and novel, with a focus for example on digital technologies..."	creation labs.[MS1] , also through the exploitation of innovative digital technologies[MS1]"
SECTION C	p.79	Evaluation form – PART C comment no. 4	The availability and strengthening of the open research infrastructure IARI, with top-level instrumentation, is strategic in order to promote attractiveness of early-career researchers, post-PhDs and top scientists coming from all the country and abroad.
SECTION C	p.79	Amended upon request during negotiation	To specify that open call will have a dedicated budget to southern italian regions.
SECTION C	p.82	Amended during negotiation	New definition of milestones as agreed during negotiation
SECTION C	p.90	Material error	Inclusion of spoke 2 in row 6 of the table "No. of young researchers attracted"
SECTION C	p. 92	Amended upon request during negotiation	Table "Qualitative-quantitative indicators for monitoring activities and for ex-post evaluation" amended to include updated figures after negotiation
SECTION C	p.96 "Workplan"	Material error and amended after negotiation	Inclusion of Task 2.6 'Patenting and Licensing' in the workplan table and updated information included on milestones
SECTION C	P.86 BUDGET	Amended after negotiation	All budget has been updated according to the total financing and total cost agreed during negotiation and to the request of having at least 15 Millions of euros on the south.
SECTION C	p.106	Amended after negotiation	Details on specific actions for engagement of local authorities are provided.
SECTION C	p.105	Evaluation form – PART C - point 4 "More details are needed on how early career researchers at the post-doctoral level will be attracted...";	Additional paragraphs included on Attraction of early-career researchers to the region
SECTION C	p.106	Evaluation form – PART C - point 4 "More details are needed on how early career researchers at the post-doctoral level will be attracted..."	Engagement with the local authorities
SECTION C	p.107	Evaluation form – PART B – comment no. 3 "While the proposed team has prominent national and international presence, this aspect could have been better highlighted in the proposal."	Additional paragraphs inserted: "The internationalization strategy",
SECTION C	p.107	Evaluation form – PART D – comment no. 5 "It is not clear what type of specific activities will cover the knowledge transfer between the	Additional paragraphs inserted: "SME engagement and impact"

		activities in the proposal and the SMEs.	
SECTION C	p. 111	Amended after negotiation	Details on specific actions for engagement of local authorities are provided.
SECTION D	p.113	Evaluation form - PART D – comment no. 2 "... clarify ... modes of cooperation in order to avoid overlapping ..."	Additional paragraph to address the comment and specify the modes of cooperation

A) AREA OF SPECIALIZATION / SCIENTIFIC AND TECHNOLOGICAL FOCUS

The Rome Technopole Ecosystem

Rome Technopole project is the response of the universities and the production system present in Lazio, but of primary national interest, **to the strong demands that come from the need for relaunch and from the opportunities offered by the Next Generation EU plan** and is coherently inserted along all three the strategic axes of the National Recovery and Resilience Plan shared at European level: digitization and innovation, ecological transition and social inclusion.

The objective is to respond to the policy objectives aimed to make the Italian country an innovation leader. With the creation of Rome Technopole we mean:

- to equip the central area of the Italian country a transdisciplinary multitechnological hub for training, research, technology transfer contributing, integrating knowledge and capabilities of the universities and research community with the needs of the industrial sector;
- to increase investments in research and development, both public and private;
- to compete nationally and internationally on the technological frontier, on dimensional growth in particular in technology transfer and in strategic European value chains, with a strong involvement of companies, focusing on the most advanced supply chains;
- to promote the policy of social inclusion and the mission of social elevator of the university education system, making it easier for all young people and women to access new quality job opportunities in the driving sectors the ecological and digital transitions and of agro-bio pharmaceutics.
- to make the offer of STEM university education in the Center-South of Italy stronger and more structured in thematic areas that are absolutely complementary to those of the well-established Polytechnics in the North of Italy (Milan and Turin).

Key-actions that will enable Rome Technopole as Innovation Ecosystem of Lazio Region are:

1. Development of policies and new framework for strengthening the international integration between universities, industries, regional and national institutions in order to strengthen professional education, industrial research and technology transfer in partnership in the thematic areas of energy transition, digital transition and biopharmaceutics, through actions aimed at reforming procedures, creating a new operative framework and guaranteeing efficiency and resilience to the system.
2. Development of new programmes and tools to integrate transdisciplinary curricula in existing university courses focused on technologies for energy transition, digital transitions and biopharmaceutics, aimed at fulfilling industry employment needs of highly qualified manpower.
3. Promotion of the social mission of the university as a means of breaking down inequalities, equipping it with operational tools and resources necessary to attract young people who start from social conditions preclusive of university studies, breaking down barriers and inequalities that the pandemic has accentuated.
4. Development of new approach to intellectual property of research results, as a tool to enhance the competitiveness of the country's industrial and production system, in order to favor the integration between the university world and public research and the industrial world, with a view to equal relationship of skills and knowledge, also with consideration of the issue related to PhD students.
5. Promotion of the attractiveness of the regional and national system of university education and higher education, and for structuring relations between universities and European focal points in order to improve the institutional presence in the European community.

The Regional territorial framework

❖ Regional industrial and entrepreneurial system in the national contest

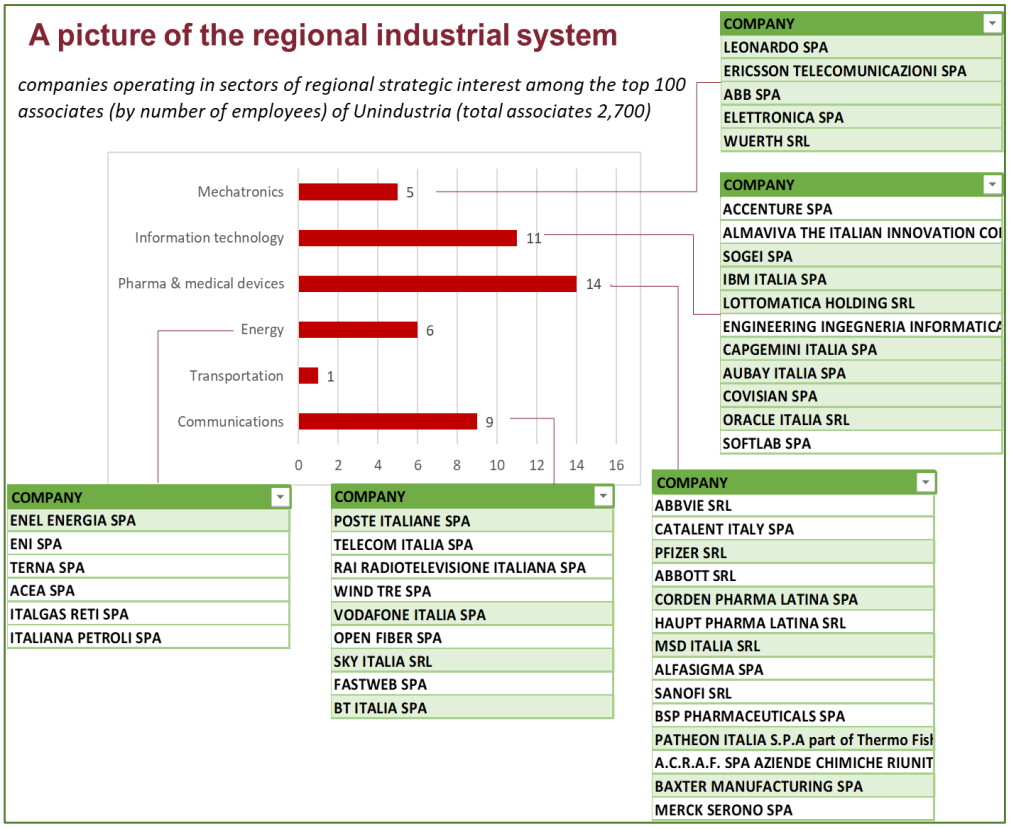
The definition of the sectors on which the activities of the Rome Technopole project will be directed derives mainly from the analysis of the productive vocations of the territory which photographs the liveliness, the capacity for innovation and the performance of the sectors considered most strategic for the regional economy, but which also boast a leadership in the national context.

From the analysis of the data provided by Unindustria, the territorial association of the Confindustria System to which approximately 3,000 companies active in the Lazio region in all the main industrial sectors adhere, it emerges that there are several important companies in the area potentially interested in investing in research activities with a partner such as Rome Technopole.

Among the first 100 members of Unindustria, who is one of the promoters of the Rome Technopole project and is representative of the main industrial players in the area, there are (as shown in the figure below):

the 90% of the major brands operating in Europe, in the **bio-pharmaceutical sector**;
all the major European information technology companies in the **digital transition** sector;
the almost total concentration of the major companies operating in the energy sector.

For this reason it is believed that Rome represents the best location for a **"transdisciplinary multi-technological innovation ecosystem"** of national and international reference.



The regional and national policy framework and initiatives

❖ Challenges and needs

Inclusive, knowledge-based development models require the ability to respond to, and often anticipate, a rapidly evolving demand for skills as a result of technological change and emergencies, particularly climate and health. In addressing these transitions, particularly the digital one, the Italian production system suffers from a low demand for skills and a low supply. The small size of Italian companies limits their ability to interact with universities; at the same time, universities lack the flexibility to enter into partnerships with private companies to promote research and technology transfer. These conditions add difficulties to the development of an adequate training system, contribute to the stagnation of productivity and do not increase the ability to enter to innovate and compete with the changing environment, characterized by rapid technical progress.

The idea of the Rome Technopole was born to respond, in particular, to these criticalities well exposed in the premises of Mission 4 "Education and Research" of the National Plan for Recovery and Resilience.

The Rome Technopole has the main objective of enhancing, with even greater incisiveness, the national excellence of university education in Rome with an increasingly close and productive sharing with the industrial world, starting with those established in the territory that operate in knowledge-intensive sectors and considered strategic in the context of sustainable development and international competition: technologies and solutions for health and medicine, digital transition, energy transition and sustainability.

The Rome Technopole in the medium term should become a national and European point of reference for research in **partnership with industries**, the transfer and sharing of knowledge between academia and industry, the training of graduates and researchers in technical disciplines with skills that are always up to date with the challenges of industry.

On the other hand, "intellectual capital" is increasingly the variable that positively differentiates the economy of a country or a territory. Where the economy grows the most, there are companies with high added value that are closely linked to the educational system: companies that create innovation in many sectors and employ people with very high levels of education.
A recent study published in the Journal of Regional Science examined the role of universities in supporting local development in our country, testing the existence of a relationship between the performance of universities and the economic development of the areas where they are located.
Positive knowledge effects are also realized for areas geographically close to efficient universities.
The Rome Technopole was created with a view to increasing the efficiency of the university offer and specializing the research areas, enhancing the excellence of generalist universities, the most strategic productive vocations and the complementarity of the other technical-scientific research and innovation poles present on the national territory.
Companies are increasingly evaluating their investments in the territory also on the basis of the availability of talent in line with the needs of business development and, consequently, young people choose to study where they find better jobs. Proximity, at this juncture, assumes a positive and decisive value. Strengthening a valid and recognized eco-system of knowledge in a territory means expanding its perimeters of international influence and attracting investment and human capital to the benefit of the entire national economy.
Increasing, in this logic, the number of graduates, especially master's degrees, in STEM disciplines would also allow us to avoid the age-old subtraction of talent in which our educational system has already invested heavily.
The Rome Technopole must contribute to improving the positioning of Italian universities in international rankings in these disciplines.
The Rome Technopole must respond to the need to be a frontier of innovation with courses of study and research that also enhance the applicative part of the disciplines.
In this phase of great changes in geo-economic balances and industrial transformations, the Rome Technopole would be a candidate to be a privileged interlocutor of companies ready to invest in re-inventing production and business, with the result of increasing, on the one hand, the R&D expenditure of the private sector and, on the other hand, increasing the patenting capacity of the territory also thanks to the presence of new laboratory spaces of co-presence of Academy and Industry.
Finally, the presence of the Rome Technopole would be able to relaunch Rome's reputation as an international university city, adding a qualifying element for the entire country in the European panorama of large aggregators/drivers of innovation and knowledge capable of creating innovation, training qualified human capital, launching new visions of development.

❖ The relationship with Lazio S3 and the National Plan for Research (PNR)

The **Rome Technopole thematic areas (EnT, DgT, H&BP)** intersect relevant aspects and development trajectories set out both in the Lazio S3 for 2021-2027 (currently in progress) and in the PNR 2021-2027.
More in detail:

- **Energy Transition**

The Rome Technopole thematic area could support the development of the S3 **Green Economy** pillar, especially regarding the macro-theme "**Energy**" by contributing to the regional objective of defining an eco-sustainable economic development model, aimed at sustaining a low environmental impact, at producing benefits and better solutions, minimizing the environmental risks deriving from pollution, reducing the waste of natural resources and also increasing income e occupation. Rome Technopole will also support the targets of the **Regional Energetic Plan.**
Energy is an important regional value-chain for Lazio that relies on:

- over 40.000 companies that made eco-investments in green products and technologies in the 2015-2019 period
- 319.000 employed in green jobs
- 10.3% concentration of green jobs (out of the total number of green jobs employed in Italy), being second only to Lombardia
- 13.4% the incidence of green jobs on the total economy.

Also the PNR 2021-2027 spots the energy transition among its priority sectors through the research and innovation challenge **Climate, Energy, Sustainable Mobility** with a specific focus on the strategic intervention lines of **industrial energy** and **environmental energy**. Also the **National Cluster for Energy**

represents a potential field for interesting future cooperation especially considering its definition of priority technological road map (2019):

- Smart networks and micro-networks: technologies, systems and methods of management and control
- Energy storage: technologies and management and control systems
- Innovative devices, technologies and measurement methodologies for smart grid applications
- Energy efficiency and renewable energy sources
- Smart energy.

Finally, in the EC working document "**Guidance to Member States Recovery and Resilience Plans**" some objectives to be pursued under the Green Transition component, with a high degree of complementarity with Rome Technopole, are indicated: i) reduce greenhouse gas emissions; ii) improve the carbon tax; iii) improve the energy efficiency of resources and public infrastructures; iv) improve the energy performance of the building stock with a wave of renovations; v) support the spread of clean energy, in particular through renewable energy, smart grids and storage infrastructures.

- **Digital Transition**

Lazio has included the **ICT enterprises** in its S3 within the wider specialization area named **Creative and digital industries**. In this sense, the activities of Rome Technopole could support, through open calls and other specific initiatives, the local SMEs towards their digital transition. In fact, compared to some years ago, this transition to digital technologies capable of determining innovation processes, even disruptive, is no longer a prerogative of large companies: there is a constant growth in public institution and SMEs which benefits from innovative and emerging technologies to improve the productivity of internal processes and the level of competitiveness. As a consequence, ICT investments (31 billion euros in 2019, up 2.3% compared to 2018) have shifted from traditional solutions and services towards more innovative solutions and with greater added value. In this context, the Assintel report 2020, carried out prior to the outbreak of the COVID-19 pandemic, projected a distribution of ICT expenditure on the national territory with 8.6 billion euros for Central Italy (27.2% of the total national ICT), with Lazio Region in a dominant position.
The digital transition supported by Rome Technopole is also perfectly aligned with the strategic intervention lines of PNR 2021-2017 defined under the research and innovation challenge **ICT, Industry and Aerospace,** namely **digital transition - Industry 4.0**, **HPC and big data**, **artificial intelligence**, **robotics** and **quantum technologies**.
Possible synergies on the topic are also linked to the national **Industry 4.0 plan** that supports big companies and SMEs towards innovation (e.g. patent box) and digitalization and - in this context - Rome Technopole could interact with the local **Digital Innovation Hubs** as well as with the 8 National Competence Center to support this transition.

- **Health and BioPharma**

Life Sciences are one of the main drivers of development, competitiveness and public-private partnerships within Lazio Ecosystem and, to this regard, Rome Technopole actions and plans on **Health and BioPharma** specialization area perfectly match with the need and the strength of the territory, based on 4 main sectors: i) **biotechnology**; ii) **medical devices**; iii) **pharmaceutical and nutraceutical** and iv) **ICT for health**.
As for regional data, Lazio is at the top of efficiency production in Italy and Europe in the biotech and pharmaceutical sectors. It is the second largest Italian pole and one of the most important in Europe for the life sciences industry, that is characterized by major international players and local innovative SMEs that operate in synergy with the public research network. The productive processes are of high added value, including: the production of innovative drugs, the testing of new vaccines (one of the most effective anti-Ebola vaccines has been developed in Lazio) and the biomedical production.
Rome Technopole also intersects with the strategic intervention lines of PNR 2021-2017 defined under the research and innovation challenge **Health**, namely **pharmaceutical and pharmacological technologies**, **biotechnologies** and **ICT for health** thus enabling future opportunities for cooperation with the **National Technology Clusters** for Life Sciences (ALISEI) and **Ambient Assisted Living** (TAV).
Last, but not least, Rome Technopole will also be consonant with the **European Green Deal**, as the Commission aims - among other things - at the protection and improvement of human health. In this framework, a courageous and comprehensive political response is required to seek to maximize health benefits, beyond quality of life, resilience and competitiveness.
The following table summarizes how the Rome Technopole intersects with the priority defined in the Lazio S3 as well as in the PNR 2021-2027, also underlining the potential impact of each specialization area on the UN Sustainable Development Goals (SDG).

Rome Technopole Specialization Areas	S3 Region Lazio	PNR 2021-27	UN SDGs
Energy Transition	**Green economy** - Energy	**Climate, energy and sustainable mobility.** - industrial energy - environmental energy	
Digital Transition	**Creative and digital industries** - ICT enterprises	**ICT, Industry and Aerospace** - digital transition - I4.0 - HPC and big data artificial intelligence robotics - quantum technologies.	
Bio-pharma & health	**Life Sciences** - biotechnology - medical devices pharmaceutical and nutraceutical - ICT for health	**Health** - pharmaceutical and pharmacological technologies - biotechnologies - ICT for health	

❖ Converging regional policies

The **priorities of regional policies for innovation are already oriented towards sustainable development, smart specializations, requalification and relaunching of companies** that must be put in a position to compete in a post-pandemic economic system that still presents great uncertainties in terms of "traditionally" known business profitability.

In order to **support a process of territorial growth in an international competitive context** based on the integration between research and business, the Lazio Region has already made a series of strategic investments, among which deserve explicit mention:

i) "**Strategic Projects" in the thematic areas of the smart specialization areas of the Region (Aerospace, Health Sciences, Green Economy),** with the aim of creating synergistic communities of researchers and entrepreneurs capable of promoting applied research and technology transfer in territorial strategic sectors;

ii) **Centre of Excellence of the Technological District on Cultural Heritage of Lazio Region (DTC Lazio), which is the largest cultural heritage technology district in Italy and Europe** - consisting today of a community of over 700 researchers, 100 stakeholders, 450 learners in attendance of the high training courses offered by the center in its first year of activity, about 20.000 participants in the training courses delivered remotely in open mode, a research infrastructure consisting of 12 thematic networks and about 250 highly qualified laboratories. DTC Lazio the most recent example of success, in our region, of the collaboration between the regional statal universities, the major public national research centers, local and regional institutions and enterprise. It demonstrates that the creation of a system of technical-scientific, entrepreneurial and institutional resources, connecting and enhancing existing research, training and technology transfer of skills and going beyond jeopardization of competences, is the key to the relaunch, growth and internationalization of a sector of strategic relevance in pur region. Rome Technopole initiative is fully complementary with respect to DTC Lazio, because it focuses on completely different regional smart specialization areas. At the same time, it is intrinsically different from it, because it has the specific scope of reconnecting large industries to our university system, implementing a real regional innovation ecosystem, which brings together all the relevant local actors, large companies and holding that invest annually relevant resources in research, technology transfer education;

iii) **Projects for the creation of Open Infrastructures for Research in the Key Enabling Technologies (KET)**

iv) **Projects for the strengthening of the PNIR research infrastructure** to increase the rate of innovation of the regional productive fabric; the co-financing plan of industrial doctorates in partnership with local companies.

Moreover, the recent set of successful actions taken by Lazio Region aimed at establishing a network of local SMEs connected to the University and Research Centers at a regional scale represent an important first step in tacking a Smart Specialization Strategy. These actions have been focused on **innovative research projects on themes selected by Lazio Region and performed by young researchers within University PhD programs**. The continuation and extension of this kind of actions is clearly a pivot feature of the Rome Technopole.
In this framework, a virtuous and sustainable ecosystem will provide unprecedented opportunities to all its components, resulting in a well-connected and growing scenario.
Moreover, a specific effort will be devoted to easing the transition of the Lazio industrial sector toward the industry 4.0 (I4.0) and smart manufacturing paradigm, especially dealing with Small and Medium Enterprises (SMEs).

B) OBJECTIVES AND SCIENTIFIC QUALITY

Project Objectives

Rome Technopole project is aimed at creating a **regional innovation ecosystem** through which to **achieve the three priority macro-objectives for Lazio's smart specialization path**:
1) to favor a **process of repositioning the regional industrial and productive realities towards segments and markets with greater added value**, through processes of adaptation of know-how and technologies of excellence;
2) to **make Lazio a "great European region of innovation"** with an international dimension, which allows local players to become part of the international value chain;
3) to **guide Lazio along internationalization paths**, which orient the renewed competitive capacity of the industrial sector, to markets of strategic interest.

Therefore, **Rome Technopole** is the R&D project proposed by the regional system of public and private universities and EPR, industrial association, industries and companies, Lazio Region, Rome Municipality, the regional chambers of commerce, **aimed at generating a quantum leap in Lazio Region in all the innovation processes oriented towards sustainable development, smart specializations, requalification and relaunching of the industrial sector**, with specific focus on three thematic areas characterized by the highest qualification and strongest industrial presence over the regional territory: **Energy Transition (EnT), Digital Transition (DgT), Health and Bio-Pharma (H&BP)**.

The creation of "Rome Technopole" **responds to the needs** of:

- **Enhancing,** at both national and international levels, the **attractiveness of the regional system** of training-research-innovation-technology transfer-industrial productivity with reference to the three strategic sectors of reference (Energy Transition, Digital Transition, Health & Bio-Pharma);
- **Implementing an excellent public-private model for collaboration and stable partnerships** between research and enterprise in Rome and in Lazio region;
- **Offering a strong pole of attraction in Rome for large companies** operating along the main technological drivers of particular relevance in the regional context.

Therefore, the **main objectives of Rome Technopole** are:

1) To **create a multi-technological transdisciplinary hub, acknowledged at international level,** which foster and sustain the regional innovation ecosystem through cross-development and integration of high education, research of excellence, technology transfer, industrial development, out-reach and scientific dissemination;
2) To **unleash the potential of fundamental and industrial researches** on the three smart specialization areas related to EnT, DgT, H&BP, and **interconnect it with the regional industrial sector** in order to **advance the frontiers of knowledge and drive revolutionary innovation in industrial processes and products**, with particular attention also to sustainable development and human capital, also through the promotion, creation and development of permanent joint labs between research partners and industrial subjects, open-labs and innovation labs, innovative start-ups;
3) To **relaunch the economy and territorial development of Rome and Lazio Region**, in view of strengthening the central Italy after the pandemic crisis, enhancing and strengthening the industrial and entrepreneurial system through the reform of the collaborative system university - business - regional

administration that is based on the integration of skills, competences and needs and acts as an attractor and growth driver, a reference point at national and international levels;

4) To **increase the number of graduates in Rome and Lazio** in order to fulfill the request and needs of industries and enterprises in the driving sectors of EnT, DgT, H&BP, also with reference to the new competences and profiles deriving from the actuation of the Next Generation EU plan;
5) To **push awareness of society** about the high quality and efficacy of the regional university system with respect to **job placement and hiring in top level companies**, in particular with specific reference to the three sectors of EnT, DgT, H&BP.
6) To **promote collaborations and synergies with organizations and companies located in the southern Italian regions**, so that Rome Technopole will contribute to be a driving force for innovation also in those regions, outside Lazio, that represent a strategic objective of growth in the European programming.
7) To **develop ecosystem innovation projects** (the so called "Flagship Projects" - FP), within the specific S3 areas, in order to integrate research capabilities, innovation needs, educational and training demands, technological development in a common platform involving universities, research & industrial partners.

The **scientific and technical objectives** of the specific seven Flagship Projects that will be developed within Rome Technopole are **detailed in the Annex A "Flagship Project summary sheet".**

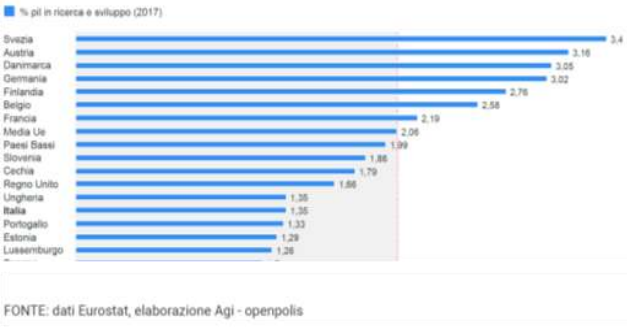
Specific **target indicators** that will be monitored in order to assess the efficacy of the proposed action plan and of the structural interventions aimed at establishing the innovation ecosystem "Rome Technopole", in line with the aforementioned objectives are **the increase at regional level of the number of:**

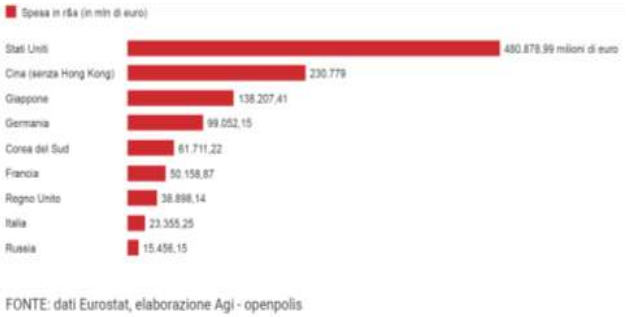
- researchers and excellence in university research and higher education;
- PhDs who have completed third-level training and transdisciplinary research in collaboration with industries and businesses (industrial doctorates);
- graduates in the thematic areas of interest of Rome Technopole, in response to the demand of companies and industries participating in the project;
- young-scientists hired by Rome Technopole, with specific reference to promote gender balance and excellence;
- foreign students who choose Rome and Lazio for their undergraduate and postgraduate education, with reference to students from both the Mediterranean basin and Europe;
- visiting researchers and top-scientists who choose Rome and Lazio as the location for the development and continuation of their research activities;
- industrial research and technology transfer laboratories integrated between universities and companies for the development and strengthening of process and product innovation capabilities;
- international patent applications;
- expenditure in public and private research and development
- research and academic start-ups founded and accelerated.

Context

❖ Policy area

The Rome Technopole project is the response of the universities and of the production system in Lazio region to the strong demands of creating an Innovation Ecosystem aimed at reducing the gap between research - higher education - technological development - technology and knowledge transfer - new entrepreneurship - innovation, growth and internationalization of the regional industrial and production system, exploiting the model of "Innovation Ecosystem", which is well known and established in the most advanced countries of northern Europe or overseas, in which the investment of the public and private sectors in research as shown in the figure below.





This plan is coherently inserted along all three strategic axes of the National Recovery and Resilience Plan shared at European level: digitalization and innovation, ecological transition and social inclusion. The project responds to policy objectives to make the regional system and the country a leader in innovation. With the realization of Rome Technopole we intend to:

- increase investment in research and development, both public and private,
- compete nationally and internationally on the technological frontier, on dimensional growth in particular in technology transfer and in strategic European value chains, with a strong involvement of businesses, focusing on the most advanced supply chains;
- promote the social inclusion policy and the social elevator mission of the university education system, making it easier for all young people and women to access new quality job opportunities in the leading sectors of the ecological and digital transition and in agro-bio-pharmaceuticals;
- make the offer of STEM university education in the Central-Southern area stronger and more structured in areas that are absolutely complementary to those of the historical Polytechnics of the North (Milan and Turin);

In this logic, the constitution of the Rome Technopole perfectly captures the integrated and horizontal approach of the PNRR that aims at women's empowerment, the growth of skills, capacity and employment prospects of young people and territorial rebalancing.

❖ Mission

The mission of the Rome Technopole project is to establish a center of aggregation and integration of skills in the field of "Key Enabling Technologies" (KET), which has the following characteristics:

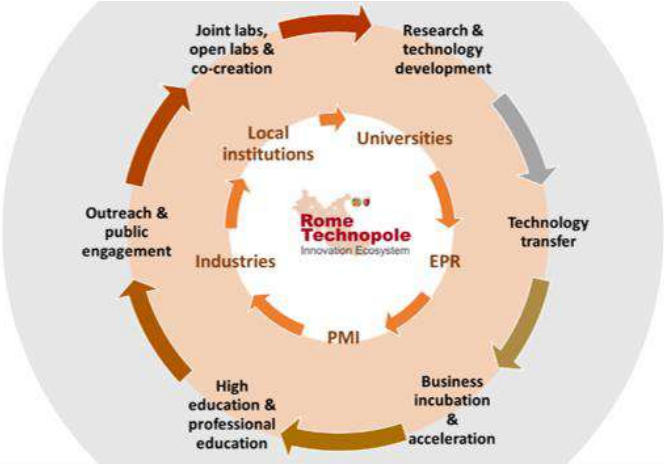
- is sustainable and stable over time
- has a transdisciplinary profile and is able to promote innovation on a strongly multidisciplinary and technological basis, with reference to the three main areas of strategic interest identified and also perfectly in line with the regional and national Intelligent Specialization Areas;
- enhances and systemizes existing excellence, promoting new training initiatives and new ways of collaboration and integration of knowledge that meet the needs of local and national development and the needs of the productive fabric;
- has an international profile as it is capable of constituting the critical mass necessary to be recognized as a competitive technological center of excellence at European level;
- promotes and offers new transdisciplinary training courses, including international ones;
- promotes and supports the process of reconstruction and attraction of large enterprises and multinational companies;
- is capable of promoting, creating and supporting initiatives for the qualification and specialization of human capital;
- is constantly oriented towards the transfer of technology and knowledge and the support of innovation processes for the improvement of quality in companies and institutions operating in the sector;
- is able to assist the processes of networking of technical-scientific, entrepreneurial and institutional resources, improving the overall effectiveness of investments in the sector;
- is constituted by a broad partnership, including regional state universities, business associations, industrial stakeholders, regional administration and national institutions.

The objective is to coordinate the existing skills and excellence already present on the regional territory and recognized in Italy and abroad, creating a new European pole of the so-called knowledge economy, also pooling the great potential for international recognition of the city of Rome, able to stand out as a productive-

technological pole with high attractiveness for large companies, at the forefront in the fields of energy, energy sustainability, digital and life sciences.

Methodology and project implementation: functional spokes, thematic vertical specialisation areas, flagship projects

An innovation ecosystem is defined as a structure that is formed between actors that pursue technology development and innovation as one of their objectives. Rome Technopole is the technology-push innovation ecosystem of Lazio region, made up of actors coming from the worlds of research, high education, enterprise and local administration, who all play a role in taking a great idea to transformative impact at scale, through the implementation of a network of relationships aimed at enhancing and generating knowledge, technology and new value through valorization of human capital and resources.
In order to accomplish its mission and goals, Rome Technopole implements the supply chain of research – technology transfer – business acceleration and incubation – high education – outreach and public engagement – joint labs and open labs, as sketched in the figure.



According to this methodology, the Hub& Spoke structure of Rome Technopole project is organized in **6 thematic functional spokes**, widening the full range of activities of the innovation ecosystem and representing the building blocks of the innovation ecosystem:

Spoke 1. Applied research technology development and innovation.
This spoke focuses on research activities on vertical research and innovation projects build up in collaboration between research and industrial partners, such as the specific vertical ecosystem projects detailed below, starting from fundamental research to foster disruptive innovation and frontiers research, up to the industrial research, precompetitive development and technology development to promote and sustain innovation. A specific task deals with IPR issues and joint foreground regulation. In particular, vertical flagship, as detailed in the following, will be developed in collaboration among research and industrial partners in order to support the competitive and inclusive development of Lazio Region, fostering green transition and sustainability in urban and building regeneration, energy efficiency, digital transformation and digital twin in advanced industrial and engineering applications, innovative healthcare system based on the design and testing of innovative medical devices, new drugs based on innovative bio-tech green technologies. Specific investments will be dedicated to the attraction and recruitment of early-career researchers, through national and international open calls, in order to engage young people with an excellent scientific profile.

Spoke 2. Technology transfer, new entrepreneurship, business incubation and acceleration. This spoke focuses on i) scale up and valorization at industrial level of the research results carried out by Rome Technopole raising TRL above 5; ii) technology transfer; iii) development and support to creation of new forms of entrepreneurship; iv) business incubation and acceleration, including IPR management and open innovation. Specific focus is on promoting patenting, licensing, valorization and exploitation of research products through the synergic and integrated collaboration among research, industrial and business partners and thanks to the support of regional institutional partners, chambers of commerce and the regional largest industrial association partners of Rome Technopole. Technology and knowledge transfers between Rome Technopole activities and SMEs will be promoted through open calls finalized to support collaboration with the research partners and SMEs in the innovation ecosystem.

Spoke 3. University education, industrial PhD courses, internationalization. Strengthening high education, PhD and international courses is a key factor within a, innovation ecosystem in order to provide the territory and the local industrial system with high quality human resources. Therefore, universities will develop new interdisciplinary modules aimed at integrating in existing traditional courses new technological skills and soft skills, according to the specific needs related to the strategic areas of energy transition (EnT), digital transition (DgT), health and bio-pharma (H&BP). A wide use of digital technology in high education will be strategic and fully supported in order to promote and enhance internationalization, through the development of

innovative courses making use of MOOCs, interactive labs, team working experiences, collaborative and co-creation labs.

Spoke 4. Professional undergraduate education in technology. This spoke focuses on education of professionals in order to answer to the need of creating over the Lazio territory a network of undergraduate professional institutes in the different technological areas related to energy transition, digital transition, health & bio-pharma, well connected with the industrial contest and integrated with the professional bachelor courses of the new professional Laurea degree.

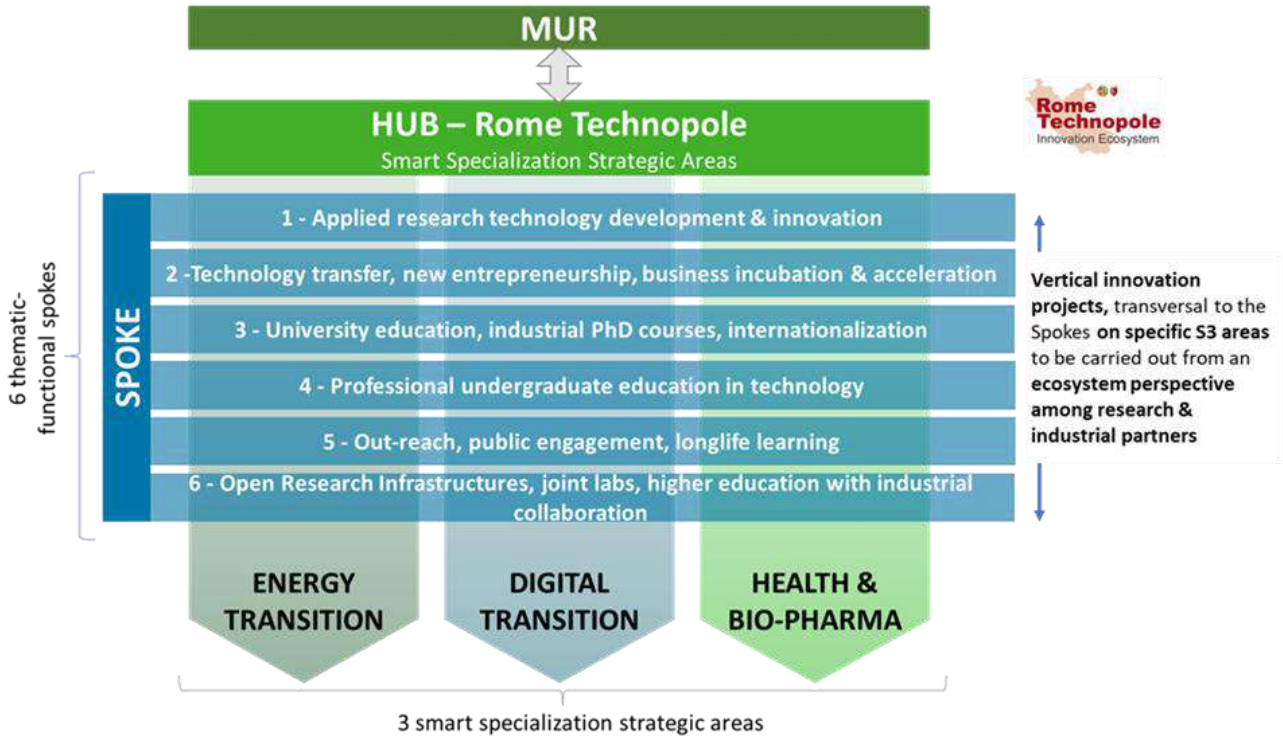
Spoke 5. Out-reach, public engagement, long-life learning. This spoke is aimed at promoting and fostering application, valorization, dissemination, and transfer of knowledge, know-how, and technologies for social changes in line with the Sustainable Development Goals (SDGs) of UN Agenda 2030 "4 – quality education" and "11 – sustainable cities and communities" and Lazio Region Smart Specialization Strategy (S3). Moreover, it focuses on the promotion of the brand of Rome Technopole and on student engagement and placement. Activities include job orientation activities, soft skills and employability skills development, co-design of training activities, development of internship and job opportunities, operational linking of labour supply and demand; the set of instruments are career/recruitment events, open days, consultation tables, training activities, digital platforms, etc.; the activities are carried out in collaboration with companies, associations, institutions, etc.

Spoke 6. Open Research Infrastructures, joint labs, high education in cooperation with industries. All research and training activities of Rome Technopole will get advantage of the Open Research Infrastructure for Innovation of Lazio (IARI), which is a joint RI made by the networking of the main large labs and scientific RI over the territory. This spoke will then focus on all the research and training activities carried out jointly by research partners and industrial partners, also involving undergraduate and PhD students, through the realization of joint labs, open labs and novel high education courses.

The activities within each spoke are declined across **3 of the principal strategic specialization areas** of Lazio Region:

S1 - Energy transition (EnT)
S2 - Digital transition (DgT)
S3- Health and bio-pharma (H&BP)

according to the sketch in the figure below.



Vertical innovation projects (the so called "Flagship Projects" - FP), within a specific S3 area and transversal to the spokes, are developed from an ecosystem perspective, thus integrating research capabilities, innovation needs, educational and training demands, technological development in a common platform involving universities, research & industrial partners.

Seven FPs are activated within the start-up plan of Rome Technopole, according to the strategic development plans of the industrial partners and the development strategies of local administration.

❖ FP1 - Decarbonization and digitalization in research on new green energy sources

Strategic specialization areas: EnT; DgT

This Flagship project **covers every aspect of the value chain**: i) **Processes Decarbonization**: to reduce, capture, transform or store CO_2, increasing energy efficiency, reducing emissions and promoting decarbonized energy vectors; ii) **Circular & Bio products**: to reduce, recycle and reuse products and by-products, transforming wastes to valuable products for bio-refinery, sustainable mobility and green/circular chemistry. iii) **Renewables & New energies**: to sustain the development of renewable energies and storage solutions and developing breakthrough energy technologies such magnetic fusion.

FP1 involves activities starting from fundamental and applied research, up to development of: training programs focused on the theme of sustainable entrepreneurship through the collaboration with ENI Joule; training programs capable of vertically specializing the best talents and developing resources through an innovative training offer, focused on the new skills needed for green jobs; virtual reality tools, which have the ultimate goal of supporting the energy transition; specific programs with activities that involve employees of partner companies and / or selected companies that correspond to the Technopole mission on intrapreneurship issues, favoring a "contamination" of experiences between the same participants from different companies. **Eni Gazometro Ostiense area** has been identified as a possible space for the development of the initiative within a **dedicated Join Lab**.

Industrial partners: companies with DgT and EnT specializations (section C- “Critical mass involved”).

❖ FP2 - Energy transition and digital transition in urban regeneration and construction

Strategic specialization areas: EnT; DgT

This project focuses on development and application of digital and green technologies to urban regeneration and building construction, according to the green city approach which assumes ecological quality as a strategic priority in order to ensure sustainability and resilience of programs and intervention projects in the era of the climate crisis, soil scarcity and other natural resources. The project cover all aspects of the open-innovation chain including: i) **Technology development and innovation** aimed at implementing digital transition and zero-emission in construction and urban regeneration; ii) **Scale-up of technology** in order to enhance TRL of these technologies and apply it to the design of the new campus and headquarter of Rome Technopole, as a case-study for technology exploitation; iii) Development of a model of sustainable mobility integrated in the project of green urban regeneration; iv) **Educational and training activities** on these technologies to be integrated as “minor” courses in the existing ones. v) **Outreach and public engagement** aimed at disseminating the culture of digital transition and green technology for urban regeneration in society.

Industrial partners: companies with DgT and EnT specializations (section C- “Critical mass involved”).

❖ FP3 - Digital transition in the decarbonization process and in waste recycling processes

Strategic specialization areas: EnT; DgT

The project will involve several building blocks of the innovation ecosystem being truly multidisciplinary, and it is transversal to both the areas of digital transition and energy transition. Main research and technological innovation lines are: i) **Development of AI-based predictive model** to forecast the characteristics of the inbound waste as feedstock; ii) **Advanced waste sorting and characterization based on mechatronic** to map waste characteristics and to optimize the control strategies of the gasification reactor; iii) **Thermodynamic simulation of gasification reactor** to optimize the design and its working conditions depending on waster variances; iv) **Blockchain-based plastic credits certification** to track the quantity of plastics removed from environment by converting waste into chemicals.

Industrial partners: companies with DgT and EnT specializations (section C- “Critical mass involved”).

❖ FP4 - Development, innovation and certification of medical and non-medical devices for health

Strategic specialization areas: H&BP

This project implement the ecosystem chain related to the process of designing, certifying and applying medical devices, starting with professionals and arriving at patients, in the consideration that every activity in the health sector provides for the use of a medical device. The objective is to implement inside Rome Technopole, thanks to the multidisciplinary and wide range of expertise and partnership, the whole value chain involves: i) **development of new medical and non-medical devices** for heath application and healthcare: this include all steps starting from applied research to technology transfer and scale-up of technologies; ii) **experimental testing and validation of the devices**, including the various stages of certification and clinical investigation

(e.g. approval by the committee ethics, conducting clinical investigations, etc.). iii) **Creation of a new Joint Lab for assist companies in all process of development, testing and certification** of medical and non-medical devices, including training for technician and longlife learning.
Industrial partners: companies with H&BP specializations (section C- "Critical mass involved").

❖ **FP5 - Digital transition through AESA (Active Electronically Scanned Array) radar technology, quantum cryptography and quantum communications**

Strategic specialization areas: DgT
The project will focus on the development of innovative processing architectures and AESA radars and on new technologies for quantum cryptography & communications, from satellite to ground. Digital transition of the leading theme across this project and it is declined through the following main topics: i) **Neural processing, compressive sensing, waveform optimization, micro doppler detection, sustainability, virtualization, digital twin**, with the scope also to set up a domestic line of production and overcome risks connected to a technological dependency and supply shortage, improve costs/performance ratio and increase the competitiveness of the national industry; ii) **Multisensor and distributed processing** (considering also cyber resilience); iii) **Artificial intelligence evolution and big data analytics**. Moreover, in the perspective of innovation ecosystem, a **Joint Lab will be set up with the scope of analyzing and validating the performance of network components and key exchange protocols** in relation to the physical characteristics of the quantum signal, with a view to realize integrated terrestrial / satellite networks. **Specific innovative curricula will be activated in existing university courses** in order to strengthen and widening knowledge of students in ICT and big-data engineering.
Industrial partners: companies with DgT specializations (section C- "Critical mass involved").

❖ **FP6 – Artificial intelligence, virtual reality and digital twin for advanced engineering and aerospace**

Strategic specialization areas: DgT
This project is centered within the digital transition stream and involved different activities in the innovation ecosystem perspective: applied research, technology development and innovation; Open Research Infrastructures; higher education with industrial collaboration. The scope is to create a **Join Lab to promote a stable cooperation** between universities, research centers and industries to develop proof-of-concept level activities in the field of advanced engineering, including space applications, aerospace, satellite technologies, exploiting digital technologies: i) **Artificial intelligence** (Machin & Deep learning) and **big-data analytics**; ii) **Virtual and augmented reality**; iii) **Robotic collaboration**; iv) **Virtual testing and simulation**; v) **Co-design and co-engineering thinking** to discover new innovative and creative solutions to be tested, validated and integrated.
Industrial partners: companies with DgT and EnT specializations (section C- "Critical mass involved").

❖ **FP7 - Advanced and automated innovation labs for diagnostic and therapeutic biopharma solutions**

Strategic specialization areas: H&BP
The project is aimed to contribute to the development of an advanced open innovation Joint Laboratory focused on the **accelerated development of biopharma solutions** for enabling innovative characterization and large-scale production of **high-affinity monoclonal antibodies for diagnostic and therapeutic applications, and other emerging solutions for relevant pathologies**. This laboratory will be directly shared as Joint Open Lab with the research partners of Rome Technopole specialized on the specific area of bio-pharma and with all the other interested Rome Technopole partners and stakeholders for technology transfer, innovation and training activities.
Industrial partners: companies with H&BP specializations (section C- "Critical mass involved").

The partnership

Rome Technopole partnership is made up of public and private universities, public research centers and industries having a profile of excellence in the three focused smart specialization areas (i.e. energy transition, digital transition, health & bio-pharm) operating in the regional territory of Lazio.
In fact, Lazio is home to one of the main production poles of the European pharmaceutical industry: Italy is the leading producer of pharmaceuticals in Europe, and the Lazio region accounts for 39% of national exports in this sector (average for the last three years). In the industrial sector of ICT, Rome ranks first, together with Milan, with 83.000 employees (17% of the total in Italy; 18% in Milan), and over 4 billion Euros of ICT services exported (51% of the national total). Finally, in the field of energy and green, Rome is the first province in Italy for employees in the energy sector: 7,600 employees corresponding to 13% of the national total. The capital,

together with Milan, clearly leads the ranking of companies that invest in green technologies (30,400 companies).
Therefore, the Rome Technopole HUB is composed of the following members:

- **25 members constituting the Spokes and affiliates** in the framework of the current proposal, actively involved in research activities and receiving funding, which include:
  - 3 largest public universities of Rome (i.e. Sapienza Univ. of Rome, Univ. of Rome Tor Vergata, Univ. of Roma Tre);
  - 2 public universities of Viterbo (Tuscia Univ.) and of Cassino (Cassino and Southern Lazio Univ.);
  - 2 largest private universities of Rome having specific expertise in digital and health (Luiss Univ. and Univ. of Bio-Medical Campus)
  - 4 Public research entities (EPR) all active in the field of EnT, DgT, H&BP.
  - 13 among largest industries and multinational corporations having headquarters in Lazio, active in the field of EnT, DgT, H&BP.
  - 1 SME having headquarters in Lazio, active in the field of bio-pharma.
- **6 institutional partners,** not directly involved in the research activities and thus not receiving funding in the framework of the current proposal, acting in the role of advisors and supporters of the activities of Rome Technopole (i.e. Lazio Region, Rome Capitol, Chamber of Commerce, Industry, Handicraft and Agriculture of Rome and of Latina and Frosinone, a regional industrial association)
- **14 additional partners,** mainly private companies from the digital, energy and health industries, not directly involved in the research activities and thus not receiving funding in the framework of the current proposal, supporting the activities of Rome Technopole and participating to the definition of the future development strategies of the ecosystem.

In addition to the Hub members, but not participating in the governance structure, Rome Technopole foresees the creation of **a stakeholder board, which includes SMEs, IRCSS (scientific hospitalization and treatment institutes), other foundations and relevant associations active in the Region**, which will have a complementary role in dedicated activities of the Rome Technopole project (Out-reach, lifelong learning, placement etc) .
Affiliation of the funding partners to the spokes is summarized in the table below.

Spoke / Subject	Spoke 1 Applied research, technology development and innovation (Università degli Studi La Sapienza)	Spoke 2 Technology transfer, new entrepreneurship, business incubation and acceleration (Università degli Studi Tor Vergata)	Spoke 3 University education, industrial PhD courses, internationalization (Università degli Studi Roma Tre)	Spoke 4 Professional undergradute education in technology (Università di Cassino e del Lazio Meridionale)	Spoke 5 Out-reach, public engagement, lifelong learning (Università degli Studi della Tuscia)	Spoke 6 Open Research Infrastructures, joint labs, higher education with industrial collaboration (Università degli Studi La Sapienza)
Università La Sapienza	✓	✓	✓	✓	✓	✓
Università Roma Tor Vergata	✓	✓	✓		✓	✓
Università Roma Tre	✓	✓	✓	✓	✓	✓
Università di Cassino	✓	✓		✓		
Università della Tuscia	✓	✓	✓	✓	✓	✓
CNR	✓	✓	✓		✓	✓
LUISS	✓	✓				
INFN					✓	✓
ISS	✓	✓	✓	✓		✓
ENEA	✓	✓				✓
UCBM - Università Campus BioMedic	✓	✓	✓			✓
AIRBUS Italia	✓					
Almaviva		✓				✓
BV TECH S.p.A.	✓		✓			✓
Catalent Anagni s.r.l.		✓	✓	✓		
Coima	✓					
ENI			✓			
Leonardo	✓					
LVenture Group S.p.A.		✓				✓
Maire Tecnimont	✓					
MBDA	✓					
Takis Biotech	✓					✓
Thales	✓					✓
Unicredit						✓
UNIDATA SPA	✓					

Profiles of Spoke partners and affiliates

The following paragraphs will provide a short profile of each Spoke and Affiliate, highlighting previous experience and research collaborations that are relevant to the project scope.

❖ Participant 1 - Università La Sapienza (Spoke 1 & Spoke 6 Leader)

Profile

Sapienza University of Rome, founded in 1303, is one of the oldest universities in the world, and a top performer in international university rankings. Since its foundation, Sapienza has constantly played a significant role in Italian history and has been directly involved in key changes and developments in society, economics and politics. Merging centuries of tradition with cutting-edge didactic activities, research and innovation, Sapienza provides top quality education and research opportunities. The main campus is a real city within the city located in the heart of Rome. Sapienza University is an extraordinary place for students and teachers from around the world to meet, exchange and develop new ideas and philosophies. And it all takes place in one of the most astonishing cities in the world.

Such a heritage makes Sapienza greatly able to manage its outstanding numbers: about 117.000 enrolled students, 10.000 of them coming from outside Italy, 11 faculties which cover any kind of scientific and social area with their 58 departments, 3 university hospitals and more than 3.300 professors and researchers.

Sapienza offers a vast array of courses: around 290 degree programmes at Bachelor and Master level, 87 PhD courses, 196 advanced professional training courses and several degree programmes entirely taught in English (including a full 6-year long lasting degree in Medicine and Surgery), plus many English-taught single courses in various disciplines.

Previous experiences, national and international collaborations

Sapienza is highly involved in research programmes and projects at European, national and regional levels.

In this context, only in 2020 Sapienza has obtained **39 H2020 funded projects**, with an overall funding of **over 11 million**. Among these, under H2020 third pillar (societal challenges - SC) there were:

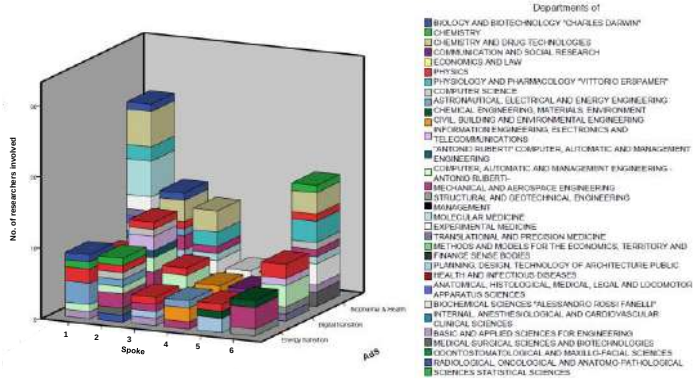
- 1 project funded under the SC Health demographic change and well-being
- 2 projects funded under the SC Secure, clean and efficient energy
- 1 project funded under the SC Climate Action, Environment, Resource Efficiency and Raw Materials.

Furthermore, Sapienza has gained a pivotal role in supporting the entire research and innovation value chain on national and regional initiatives in cooperation with the universities and the companies involved in "Rome Technopole". The most relevant could be summarised as follows:

- **DTC Distretto Tecnologico del Lazio**, funded in 2018 with regional structural funds and coordinated by Sapienza, is the regional excellence center for training, research and technology transfer about conservation, enhancement and promotion of cultural heritage and activities through technologies (https://dtclazio.it/);
- **Regional Strategic Projects on Lazio S3**, founded in 2019, are based on university networks in support of R&I projects developed by SMEs in collaboration with research institutions on 3 strategic domains: Aerospace, Green Economy and Life Science, the latter being coordinated by Sapienza (https://www.uniroma1.it/it/pagina/progetti-strategici-regione-lazio);
- **Innovative and industrial doctorates**, in collaboration between universities and companies funded under regional (2020) or national (2021) structural funds;
- **IARI Open Research Infrastructure for Innovation of the Lazio Region**, represents the regional network of research infrastructures of public research organisations and universities serving the territory, established in 2021;
- **Cyber 4.0 Competence Center**, funded in 2019 among the 8 national competence centers to support industry 4.0 transition, brings together over 40 public and private research institutions and companies and offers services, R&I actions and training for cyber security (https://cyber40.it/)

Involvement

Sapienza will contribute to all 6 Spokes, 3 specialization areas and 7 flagship projects, due to the wide expertise and human capital participating to the project (as sketched in the figure). Some of the principal thematic upon which Sapienza participants will contribute are illustrated here below.



Spoke 1: Applied research, technology development and innovation

H&BP *Medicinal chemistry, Genomics, Epigenomics, Molecular Biology, Cell engineering, Metabolic, endocrine and nutritional approaches, Regenerative medicine, Infectious diseases, Cancer diagnostics*

DgT *AI, Machine learning, Deep Learning, Big data quality and data integration, Computer vision, Bioinformatics, Cybersecurity, Precision Medicine, Advanced imaging diagnostics, Cardiovascular imaging,*
EnT *Energy storage and efficiency, Biomass Bioconversion, Circular energy transition, Nano-Bio-Photonics, Bio-based materials, Nanocarriers, Niosomes, Water treatment, Photovoltaics, Bio-fueling.*

Spoke 2: Technology transfer, new entrepreneurship, business incubation and acceleration

H&BP *Biosensors for telemedicine; Auxetic Metamaterials for medical devices; Nuclear physics applied to therapy & diagnostics; precision medicine applied to cardiometabolic diseases; novel biomarkers patenting; Smart Personal Devices for biomonitoring and movement analysis; Nanobiomedicine; Nanotoxicology;*
DgT*. IoT, cyber physical systems, integrated optics; nonlinear optical devices; Robotics; Service Design, 4D printing telecommunication, network optimization, network management and control,*
EnT *Battery recycling; photovoltaic panel recycling; Hydrogen Technologies; decarbonization of the industrial sector; sustainability of energy sector; phytoremediation. AI–based hierarchical control of smart grids; AI–based energy storage management, Energy performance of buildings.*

Spoke 3: University education, industrial PhD courses, internationalization

H&BP *Urban Health; Education/Research; Health Determinants, Prevention, Wellbeing, Multidisciplinary Health Programs.; Creative High-Tech-Med-Lab; Medical technology; Innovative surgery; Surgical robotics.*
DgT *Quantum communication, Digital twins in aerospace, Algorithm Theory, Data Science, Economics and Computation, Open Data; Citizen Science; Digital global strategies*
EnT *Nanostructures; semiconductors; Nanotechnology; nano characterization; tomography; materials for energy applications; Off-shore Wind and Marine Renewable Energies, net Zero Energy Building.*

Spoke 4: Professional undergraduate education in technology

H&BP *Nutrition; Infections prevention and treatment; Antimicrobial Resistance; Healthcare-associated infections; Public health; Regenerative medicine; Cardiometabolic education and prevention strategies.*
DgT *GNSS; GPS; Remote sensing; GIS; Geodesy; Geomatic. Digitalization Strategies; Product-Service Systems; Cyber Risk Management in Digital Transition; Project Management; Intelligent Transport Systems*
EnT *Energy Efficiency, Space Transportation Systems, Space Satellite Systems, Space Economy,*

Spoke 5: Out-reach, public engagement, lifelong learning

H&BP *Urban Health; Public engagement in the new technologies for medicine; Environmental exposures; Oncology; Medical physics; Health Economics; Health policy; Health technology assessment;*
DgT *Optical, Neutron and x-ray spectroscopies, energy plasmonics; biosensors; nanotechnologies.*
EnT *Renewable energies; smart energy systems; energy efficiency; energy modelling; energy forecasting*

Spoke 6: Open Research Infrastructures, joint labs, higher education with industrial collaboration

H&BP *Multi-Omics Integrated Platforms; Microbiota platform; Integrated Oncology; Cell-based therapies infrastructures;Neuroscience & neuropsychopharmacology; Biosensor factory; Organ-on-chip*
DgT *Digital health, quantum computing; quantum metrology. Cybersecurity; Privacy in the digital society; Cyber physical systems, vulnerability detection; malware analysis; reverse engineering; Performance profiling; distributed computing platforms, machine learning for networking.*
EnT *Energy harvesting, Green Space Transportation Systems, green Space Satellite Systems; Biomass; gasification; phytoremediation; Syngas production; hydrogen from biomass and/or renewables; Biofuels*

❖ Participant 2 - Università Roma Tor Vergata (Spoke 2 Leader)

Profile

The University of Rome Tor Vergata (UniRM2), established in 1982, covers a vast 600-hectare campus also hosting one of the most modern hospitals in Italy, the "Policlinico of Tor Vergata", a medical and research reference point for the whole Lazio region and where our Medical School is active as well. The campus area also hosts the CNR (Research National Counsel) and ASI (Italian Space Agency) research centres, the "Tor Vergata Botanical Garden", one of the largest in Europe, as a structure available to civil society and stakeholders in the field of biodiversity and the environment, the APR archeological museum and the congress center Villa Mondragone. In the surrounding the INFN (National Institute for Nuclear Physics) and Inaf Rome Astronomical Observatory are also established. Tor Vergata's six Schools (Economics, Engineering, Humanities and Philosophy, Law, Medicine and Surgery, and Mathematical, Physical and Natural Sciences) are each provided with its own library, teaching and research facilities, reading rooms, laboratories, canteens, and green areas (a total number of 6 Libraries, 350 classrooms, 29 computer labs). The University structure concerns: 18 Departments, 6 of evaluated as "Departments of Excellence" (them (Mathematics; Economics and Finance; Chemical Science and Technologies; Civil Engineering and Computer Science Engineering; Department of History, Humanities and Society; Physics); 113 degree courses; 140 postgraduate courses; 47 specialization schools. The University has 30,000 students, with 7% of international ones from above 120

countries, managing a high level of internationalization as 18 of its courses and several of its 32 PhD programmes are entirely taught in English, offering one of the highest teaching and research quality in Italy. Tor Vergata is recognized for its English-based teaching activities and is 5th in the Italian Ministry of Higher Education (MIUR) statistics for number of undergraduate and graduate courses in English language. The University is fully engaged in promoting an international dimension of studies and networking. It is recognized for its prestigious international memberships.

Previous experience, national and international collaborations

Among the initiatives related to research infrastructures, networks and centres in which UniRM2 is involved, are: i) Technological Innovation in Cultural Heritage (TICHE) ii) NanoMicroFabr, "Progetto Infrastruttura Regione Lazio"; iii) Center for TeleinFrastructure (CTIF); iv) "Centro interdipartimentale Nanoscienze & Nanotecnologie & Strumentazione" (NAST); v) Manufacturing Technology Health and Regulation (Ma.T.He.R); vi) "Centro di Eccellenza Dtc Lazio per il settore dei beni culturali" (DTC); vii) Divertor Tokamak Test (DTT); viii) "Centro Interuniversitario di Ingegneria delle Microonde per Applicazioni Spaziali"(MECSA); ix) "Centro di Biomedicina Spaziale"; x) Energy oriented Centre of Excellence for computer applications (EoCoE); xi) "Centro interdipartimentale per: La medicina comparata, L'acquacoltura e le Tecniche alternative" (CIMETA) including the laboratory "Laboratorio Integrato di Microbiologia e Tossicologia" (LIMeT); xii) "Centro di Ricerca Interdipartimentale di Medicina Rigenerativa" (CIMER); xiii) Tor Vergata Oncoscience Research centre (TOR); xiv) Italian Research Infrastructure For Cultural Heritage (CoIRICH) xv) "Protonterapia a "Tor Vergata""; xvi) ESA@TOV; iv) ISIS@MACH – Roma "Tor Vergata" part of ISIS Pulsed Neutron and Muon source - Science Technology Facility Council (STFC) - Rutherford Appleton Laboratory; xvii) "10 km di scienza: per una città policentrica sostenibile e coesiva della conoscenza"; xviii) Einstein Telescope (ET); xix) EuPRAXIA@SPARC_LAB; xx) "Polo Solare Organico della Regione Lazio" (CHOSE) part of the European Energy Research Alliance (EERA); xxi) Agreement for the realization of an open regional research infrastructure, "Infrastruttura Aperta di Ricerca per l'Innovazione" (IARI); xxii) "Centro di ricerca PaTer" (Landscape and Territory) of the Macroarea of Letters and Philosophy.

Start Cup Lazio (SCL) - The University of Rome Tor Vergata coordinates for several years the Start Cup Lazio. The SCL is an open association at the regional level supporting brokerage and technology transfer projects in the form of a collaborative network called "Network SCL".

Proof of Concept - UniRM2 actively participates in the activities related to the call for tender "Call for the realization of programs for the enhancement of patents through the financing of Proof of Concept projects (PoC)" managed by invitation on behalf of the Ministry of Economic Development. The activities consist of the presentation of a valorization program and the support to the research groups for the realization of foreseen projects' work plans for the transition of technologies from a TRL 3-4 to a TRL 5-6 and the exploitation of patents.

Spin-off - UniRM2, through the action of the Technology Transfer Offices, carries out activities of valorization of innovative research processes and/or products. These activities consist of the definition, the structuring, and the implementation of a methodology to support the reduction of time to market of technologies and findings by launching innovative spin-offs/start-ups. The organization takes care of the administrative aspects related to the set up of a new start-up and verifies the compliance of the entrepreneurial project with the requirements of the University regulations.

The University of Rome Tor Vergata, since 2008, is a member of the Enterprise Europe Network (EEN), a program financed by the European Commission, as well as member of Netval, a recognized Association, which brings together Universities, Public Research Institutions (EPR) Institutes of Hospitalization, and Cure to Scientific Character (IRCCS), foundations, and agencies that work in the exploitation of research results. Contributing by making available useful information to strengthen opportunities for research cooperation on patent issues and patentable results, including to identify conditions to increase the economic impact of research results, both through licensing and evaluating the conditions for the creation of spin-offs and business incubation.

UniRM2 participates in the Europe Commission's YUFERING Transforming Research and Innovation through Europe-wide Knowledge Transfer project which, among several objectives, aims to address "the necessary transformations in Research and Innovation (R&I) that will include the promotion of citizen science and societal engagement, the mainstreaming of Open Science practices, the fostering of brain and knowledge circulation, strengthening of academia-business collaboration and embodiment in a glocal Research and Innovation ecosystem".

Involvement

UniRoma2 will lead the activities of Spoke 2, detailed in section C of the proposal and building on its extensive experience in the field.
The specific Flagship project of interest: FP1 - Digital transition in energy efficiency and network management, FP2 - Energy transition and digitalization in research on new green energy sources and for decarbonization, FP4 - Digital transition in decarbonization and recycling processes, FP5 - Development, innovation and certification of medical and non-medical devices for health, FP6 - AI, virtual reality and digital twin for advanced engineering and aerospace. Furthermore, it will cooperate with project partners and stakeholders on fundamental research projects focused on the most innovative research trends related to the three identified specialization areas. Fundamental research activities will be carried out by UniRM2 involving research groups mainly in the following scientific fields, strongly related to the three specialization areas:
Hybrid and Organic Solar Energy; Energy Efficiency in Buildings; Sustainable materials and processes; Innovative materials for energy efficiency; Cybersecurity; 5G; Cloud computing and multi-core computing; Human Health monitoring by sensors; Neuroscience; Unstructured information management in health systems; Machine Learning applied to Medical Applications;
Applied research activities in collaboration with companies and research groups and centers outside the hub, to promote growth, innovation, and technological development. Activities foreseen are based on:
i) recognize the rapid qualitative and quantitative evolution of industry demand for research;
ii) manage the strong national and international competition of universities and research bodies on technology transfer activities;
iii) rapidly adapt and update the university's industrial research based on the evolution of the market;
iv) make the quality and effectiveness of the industrial research activities carried out by the university researchers recognizable for the companies;
v) support researchers with university regulations and services designed to enhance their technology transfer capacity;
vi) provide an efficient university policy that makes the relationship with companies direct and equal to spread the university TT on the market.
Laboratories and facilities will be made available to stimulate participation in competitive tenders and technology transfer activities aimed at bringing technologies' TRL up to 5-6 working directly within industrial requirements for both new products and processes development.
Contribution to the promotion of the use of infrastructures of research and innovation present in the regional territory, which can be accessible by companies or private research groups.
It will also be involved in Spokes 3, 5 and 6. To this end, the activity planned within the spoke will concern the three specialization areas, with specific target on Flagship Projects FP2, FP4, FP5, and FP6.

❖ Participant 3 - Università Roma Tre (Spoke 3 Leader)

Profile

The University of Roma Tre (Università degli Studi Roma Tre) was established in 1992 and nowadays it represents a central point of reference in the academic scenario at both local and national level thanks to its quality teaching and research programmes. The University has 13 Departments (including Architecture, Economics, Business Economics, Philosophy, Communication and Performing Arts, Law, Engineering, Industrial Electronic and Mechanical Engineering, Foreign Languages, Literatures and Cultures, Mathematics and Physics, Science, Education Sciences, Political Science, Humanities), 8 specialized Libraries and 10 Centres. The University hosts about 970 teachers (553 Full and Associate professors, 353 research assistants and 36 language experts) and nearly 40,000 students.
Since its constitution, Roma Tre has placed particular emphasis on international cooperation, and it is an active participant in the European Union exchange programs. Roma Tre wants to ensure that the research they fund and support in various ways has the greatest possible research impact. As a means of achieving this, Roma Tre is adopting a set of principles and a range of practices through which research outputs are distributed online, free of access charges or other barriers.
Roma Tre University envisages the central role of research for the advancement of knowledge and the achievement of significant scientific, cultural, social and economic objectives. In this sense it considers research as a primary function, fostering its development as well as its essential connection with teaching. Roma Tre promotes and supports basic research in all its scientific-disciplinary areas, enhancing its original and innovative contents. Roma Tre also promotes applied research focused on the development and transfer of new technologies, always respecting the aims and responsibilities deriving from its public nature.

In April 2018, the Research Agency was established with the aim of pursuing those objectives, providing a well-structured management system devoted to research. The Agency consists of two offices: the National Research Office and the European and International Research Office.
The Research Agency ensures an integrated and efficient advisory system, management and professional support, for the Departments and academic community, necessary for the administration, improvement and enhancement of the research activities through promotional activities, counselling, editing management and support, project dealing and management, both planning and implementation stage, in the reporting and internal audit of financed contracts, as well as information activities and updating regarding new opportunities and funding models in European and international fields.
All Departments, supported by the Research Agency, are equipped with computer labs and most of the University is a free WI-FI zone. Piazza Telematica is a computer centre with 200 multimedia work-stations, designed to function as a University Internet point; linked to all the laboratories, it is an essential tool for facing the new challenges of research and distance learning. In addition to these IT facilities, students have at their disposal efficient libraries and sports facilities.
Each Department has a set of laboratories provided with relevant scientific equipment and benefits of its own autonomy in planning and managing issues. Each Department has dedicated international projects staff in charge of both the administrative tasks (such as: definition of employment contracts for researchers within projects, travel expenses, financial reporting, support to auditing procedures and accountability rules etc.) and support to R&D projects (such as support to scientists in project implementation, report drafting, check of timeliness of activities, etc). The Departments' staff is coordinated and supported by the European Projects Office whose executives are skilled in the overall project cycle management, properly instructing the researchers involved in the preparation and implementation of international projects according to the EU requirements and rules.
Previous experience, national and international collaborations
Among Università Roma Tre previous experiences it is possible to mention **Regional Strategic Projects on Lazio S3**, funded in 2019, are based on university networks in support of R&I projects developed by SMEs in collaboration with research institutions on 3 strategic domains: Aerospace, Life Science and Green Economy the latter being coordinated by Sapienza
Involvement
Being leader of Spoke 3, UniRoma3 will provide coordination of the affiliates and active contribution in all tasks, with detailed activities described in section C. It will also contribute to all the other Spokes, with cross cutting expertise and support to the joint research teams on relevant topics.
In Particular, in SPOKE 2 - the specific Flagship project of interest are: FP1 - Digital transition in energy efficiency and network management, FP2 - Energy transition and digitalization in research on new green energy sources and for decarbonization, FP4 - Digital transition in decarbonization and recycling processes, FP5 - Development, innovation and certification of medical and non-medical devices for health, FP6 - AI, virtual reality and digital twin for advanced engineering and aerospace.

❖ Participant 4 - Università di Cassino (Spoke 4 Leader)

Profile
The University of Cassino and Southern Lazio (Unicas) was established in 1979 and acts as a meeting point between the cities of southern Lazio, Campania, Molise and Abruzzo, from which most of its students come from.Unicas has presently 267 professors and 253 administrative staff units, serving 7269 students. The small dimensions favour the direct and continuous interaction between professors and students in all phases of their career and the profitable frequency of laboratories, libraries and educational facilities. The institutional activities (teaching, research and "third mission") are headed by 5 Departments (Economics and Law; Civil and Mechanical Engineering; Electrical and Information Engineering; Literature and Philosophy; Human Social and Health Sciences), which cover a very broad and articulated set of scientific and areas and interests, also of an interdisciplinary nature. In 2020-2021 the educational offer includes 11 BA courses, 17 MA courses, 1 BA+MA program, 3 PhD courses and numerous "advanced professional training courses" (Italian "masters"). The University also provides courses for teaching qualification. The research activities are supported by nearly 60 highly specialized laboratories, functional to the development of the projects often carried out in the framework of national and international collaborations, and to the provision of technological consultancies to institutions and industries.Since its establishment, the University played a reference role for the local industrial, cultural and socio-economic stakeholders of southern Lazio and northern Campania regions; it carried out an intense activity of transfer of specialized skills to the local production system, as evidenced by numerous

research and third party agreements, patents and spin-offs activated in strategic sectors (such as production and management of energy from renewable sources; materials for aerospace applications; robotics; geotechnical applications...).

Previous experience, national and international collaborations

Università di Cassino has 10 patents in fields relevant to project scope, along with 7 spin-off companies created, and more than 20 projects, including:

Regione Lazio POR FESR 2014-2020 "Zero emissions distribution & logistics" Euro 269,965.80

Regione Lazio POR FESR 2014-2020 - Circular economy ed Energia "Energia-servizi connessi alla gestione aggregata delle risorse nel sistema elettrico" Euro 257,937.15

MIUR PRIN 2015 "Handwriting analysis against neuromuscular disease" Euro 152,000.00

MIUR PRIN 2017 "Holistic approach to EneRgy-efficient smart nanOGRIDS" Euro 147,083.00

UE H2020 EMPIR Call 2020 "Sustainable advanced flow meter calibration for the transport sector" Euro 90,000.00

Regione Lazio POR FESR 2014-2020 "BiBiNet: Big Biocancer Networks - Analisi di network biologici per l'identificazione di marcatori e riposizionamento di molecole attive" Euro 84,800.00

Regione Lazio POR FESR 2014-2020 "Metodi e strumenti per la gestione ed il controllo delle Comunità di Energia Rinnovabile" Euro 79,808.40

Regione Lazio POR FESR 2014-2020 Progetti strategici 2019 "Sistemi INtegrati di produzione e immissione in rete di BIOmetano e gas sintetici da fonti rinnovabili" Euro 75,616.40

Regione Lazio POR FESR 2014-2020 "Energy Accounting and Diagnosis for Smart Buildings" Euro 69,759.12

DTC Lazio "Centro di Eccellenza Distretto tecnologico per le nuove tecnologie applicate ai beni e alle attività culturali" Euro 62,937.60

SNA Avviso SNA del 16/12/2019 "Realizzare la trasformazione digitale" Euro 58,478.00

Involvement

Unicas is fully involved in the project at different levels: as responsible for Spoke 4, and as an affiliate to the Spokes 1 and 2, with cross cutting expertise and support to the joint research teams on relevant topics.

In particular, with regards to Spoke 2, UniCas will contribute with its research groups to the definition of common methods and objectives with other partners, both internal to the project and industrial. The aim is to develop new potential products in all three thematic areas. In the energy transition, innovative projects will concern mainly the energy grids, especially in the electric sector, to design new to be used for smart metering and active users' control with renewable energy sources. To promote digital transitions the AI techniques will be applied to new devices in the fields of emotion recognition for man-machine interactions, digitalization and recognition of ancient manuscripts, artistic products, handwriting documents, and books, of digital narrative geolocation for touristic services. In digital-based health care, the projects will concern virtual reality-based devices and biosensors for monitoring and diagnosis of human health. UniCas will also contribute to business incubation, promotion, and growth of new start-ups and spin-offs by supporting the project activities with specific skills. In particular, the UniCas researchers' expertise in codesign of processes and organizations for innovative ecosystems and SMEs, and in innovative entrepreneurship economics and financing, will support newborn start-ups and spin-offs. Moreover, the existing activities of UniCas in this field, based on constant cooperation with Lazio Innova, will be put in the network of the new ecosystem of innovation so as to amplify their efficacy and, at the same time, the benefit of the new activities promoted within the project by other partners. Lastly, it will contribute to the project with its experience in educational activities which have been established in training for entrepreneurship within specific graduate and post-graduate programs. All the UniCas contributions can be placed in the flagship projects, respectively, FP1 for the energy transition, FP5 for the health care, and FP6 for the digital transition.

❖ Participant 5 - Università della Tuscia

Profile

The University of Tuscia is located in Viterbo, central Italy. It was founded in 1979 and is a multidisciplinary Italian public university that claims a prominent position among the best research and teaching centres in Italy and Europe. UNITUS has bilateral agreements with partners in Europe, USA, Asia and South Africa for the exchange of academic staff, PhD students and post-doc researchers, further enriching its professionalism and collaborations. It has participated in the past and still participates in the Erasmus and Erasmus Plus mobility programmes.UNITUS comprises six Departments:

-Department of Agricultural and Forestry Sciences (DAFNE)

- Department of Ecological and Biological Sciences (DEB)

- Department of Economics, Engineering, Society and Enterprise (DEIM)
- Department of Innovation in Biological, Agri-Food and Forestry Systems (DIBAF)
- Department of Linguistic-Literary, Historical-Philosophical and Legal Studies (DISTU)
- Department of Humanities, Communication and Tourism (DISUCOM)

The University of Tuscia also carries out its research, development and technology transfer activities through 8 interdepartmental University centres and 7 interuniversity centres, including an Interdepartmental Centre for Research and Dissemination of Renewable Energies (CIRDER), an Interdepartmental Centre for Electron Microscopy (CIME) and an Interdepartmental Centre for Large Equipment, as well as a centre for didactic experimental agriculture and a Botanical Garden, the Laboratory for carrying out activities related to marketing, communication and promotion of the University (LABCOM), the Laboratory for Teacher Training (LABFORM), the University Library System - University Centre for Libraries (SBA), the University Museum System (SMA) These Centres boast advanced fine analysis equipment capable of covering all analytical needs for conducting innovative research projects. At the University of Tuscia there is also the Industrial Research and Development (R&D) sector which is supported by a dedicated Office. Among others, Unitus is involved since many years in the Scientific Degree Project of the Italian Ministry of Education (MIUR). Unitus is involved in PCTO projects, short for Cross Curricular Competence and Professional Orientation Paths (for high school students). One of the University's objectives is precisely to create strong interdisciplinary skills capable not only of tackling the design, creation and management of systems, products and services, but also of creating new technologies in specific areas such as bio-medical, energy transition and digital transition.

Previous experience, national and international collaborations

More than 40 companies have believed in the Unitus Advanced Training Courses, which are consolidated throughout Italy. The university has participated in numerous research and innovation projects both nationally and internationally by taking part in research programmes such as the HORIZON EUROPE framework programme, CEF, PRIN. Many of the University's projects deal with topics that are of great importance today on a global level, such as Bio Pharma, Ecological and Digital Transition, Sustainability and the design of new research tools.

Unitus has also created a network of relationships with local and non-local companies, aimed at implementing coherent and effective strategies with respect to the current scenario. With the UTT call for proposals (Call for the funding of projects for the strengthening and capacity building of Technology Transfer Offices), Unitus has strengthened and facilitated relations between the world of research and the national production system. It also promotes technology transfer, patenting and support for entrepreneurship in the creation of start-ups and spin-offs. Lastly, the University is proactively involved in research assessment, support for innovation and university responsibility in order to generate social and economic impact on the territory. Support is provided to professors and researchers in patenting activities, the valorisation of intellectual property and the creation of spin-offs. It also encompasses all liaison activities with the economic and business world in the field of technology transfer of academic research results. At the Research Office, the service for online filing from the Patent and Trademark Office of the Ministry of Economic Development has been activated for all lecturers interested in filing a patent as University of Tuscia.

Involvement

Being leader of Spoke 5, dedicated to Out-reach, public engagement, lifelong learning, Unitus will provide coordination of the affiliates and active contribution in all tasks, with detailed activities described in section C. Unitus will also contribute to all the other Spokes, with cross cutting expertise and support to the joint research teams on relevant topics.

❖ Participant 6 - CNR

Profile

The National Research Council (CNR) is the largest public research organization of Italy. CNR will participate with 8 institutes present in the Lazio Region, namely the IFN, IFT, IMM, INM, ISC, ISM,

NANOTEC, SPIN belonging to the Department of Physical sciences and technologies of matter and the Department of Engineering, ICT, Energy Technology and Transportation. In addition an inter-institute centre Tech4Bio. All of them will participate in synergistic way to the development of science and technology of the ecosystem providing research , technology transfer and open labs as well outreach activities. In particular, the following departments and capabilities will be involved:

Institute for Photonics and Nanotechnologies carries out innovative research in the fields of photonics and of nanotechnologies both in fundamental aspects and applied research. The main activities of IFN are focussed on quantum technologies, photonics, sensors, detectors. It has a strong recognised expertise in micro and

nanofabrication, micromachining and soft lithography, aimed at photonics, electronics and interdisciplinary applications. IFN is part of the NanoMicrofab regional Research Infrastructure of the CNR. Strong collaborations with research institutions and industries have been established in the frame of national and international projects and in education, training and science dissemination activities.
The main activity of the Rome department of the SPIN-CNR Institute deals with the study and development of materials of interest for a green energy transition. NANOTEC's scientific activity mainly focuses on the experimental study of soft matter including neurodegenerative diseases and early detection of pathologies. The techniques developed and applied to these research lines include X-ray tomography, confocal and holographic 3D microscopy. The laboratory mainly involved in the proposal is TomaLab which is dedicated to the development and application of cutting-edge Synchrotron X-ray techniques, as X-ray phase contrast tomography (XPCT), an advance X-ray Tomographic technique. The Institute of Structure of Matter focuses on both fundamental and applied research in the science of materials and technologies of matter. The activity of the Institute concentrates on design, synthesis and analysis of both well-established and new functional nano-, micro-, macro-scale materials to understand their complex properties and to develop frontier scientific concepts enabling sustainable technologies for energy, well-being&health, environment and information communication technology. The Institute of Translational Pharmacology activities cover a wide spectrum of preclinical and translational investigations and development of clinical experimental trials, both observational and experimental; in the operativity clinical services (diagnostic and therapeutic); in the expertises and services of technology transfer and regulatory sciences.
The Tech4Bio diffused laboratory, born in 2013, has been operating for several years in the CNR area of Tor Vergata, and brings together a large number of researchers from different CNR institutes, IFT, ISM, IMM and IFN, with different backgrounds and skills, in the fields of Life Science, Biophysics, Biochemistry, Cell and Molecular Biology, Microscopy and Advanced Spectroscopy, for the development of innovative and sustainable strategies in the fields of Biosensory, Nanotechnology and Regenerative and Personalized Medicine. The activity is aimed at the development of theragnostic platforms, the design of new smart biomaterials, functionalized metal nanoparticles and polymeric devices for imaging, tissue engineering, drug delivery, advanced drug testing and drug discovery.
Previous experience, national and international collaborations
More than 20 EU project for fundamental research (ERC), Emerging Technologies (FET, EIC) and Application driven project (H2020) have been granted as partner and European coordinator by the CNR researchers and structures involved. CNR is steering together with ENEA the European Energy Research Alliance. CNR researcher involved are part of EU Graphene Flagship.
Involvement
CNR, considering its broad field of expertise and availability of research infrastructures, will participate in Spokes 1, 2, 3,5 and 6 in all teh specialization areas and contributing to numerous flagship projects.
Spoke 1
Fundamental research on (ET, FP2) Modelling, synthesis and characterization of new materials for renewable energy production/storage/conversion based on nanostructuring and reduce dimensionality paradigms. Collaboration with Sapienza/ Tor Vergata/ENEA/ENI; (HB, FP5) Advanced material for biotechnology and health: i) nanostructured substrates for label free SERS biosensing and phototherapy, ii) materials development for coatings on biomedical prostheses and as matrices for the local release of drugs and diagnostics of generic pathologies (tumor) Collaboration with Sapienza/Tor Vergata/ISS; (HB, FP5) Advanced multi and hyperspectral microscopy, infrared and near infrared spectroscopy, Raman microscopy for physicochemical vibrational analysis, imaging for Health and bio-pharma Collaboration with Sapienza/Tor Vergata/ISS; (ET, FP2) Development of new architectures and structures for III-generation PV based on organic or hybrid organic-inorganic materials such as Halide Perovskite, Polymers, small molecules and quantum dots on rigid and flexible substrates and for outdoor and indoor light.
Industrial and applied research: (DT, FP7) New neuromorphic processor devices based on spintronic, photonic, materials with very low power consumption and for quantum, technologies, (DT, FP7) New materials, architecture and processes for high frequency band transmission and reception in the range of THz., (HB, FP5) Biosensors based on piezoelectric devices and innovative environment-friendly fabrication techniques; Lab-on-chip and advanced on-chip biological models for bio-target sorting, immuno-oncology and drug testing; (HB, FP5) 2D and 3D cell growth, tissue engineering and study of single cell systems, their interaction with the environment and their evolution over time.
Pre-competitive development: (ET, FP1) new power devices, based on group III-V semiconductors able to reduce losses in power conversion, (ET, FP2) System and devices for environmental control based on

microwave and millimeter-wave systems, including sub-systems and antennas to be developed for satellite and UAV applications, (DT, FP6) Development of prototypes for a new generation of digital devices and hardware accelerators,; (HB, FP5) design of innovative X-ray optics necessary for the X-Ray Phase-Contrast Tomography (XPCT) for real medical instrumentation as the mammographic systems;
Technology development and innovation (ET, FP2) Development rapid prototyping lab for accelerating innovation in Energy Transition, (HB, FP5) Upgrade and certification of the Biosafety Laboratory level 3 (BSL3) and realization of biological biobank for biological products, including those from infectious patients.
In Spoke 6, open and joint labs, activities will be focused on:
Energy Transition: Activities including growth of piezoelectric films and nanostructures, deposition of transparent conductive materials and surface processing for energy harvesting, photovoltaics and concentrated solar power applications; Study and development of materials of interest for a green energy transition; Fundamental and applied research in the science of materials and technologies of matter.; Development of materials and devices aiming to direct energy production (energy harvesting by devices on flexible substrates) and to reduce the energy consumption (low power neuromorphic devices, high efficiency AC/DC converters) and systems for monitoring the planet state of health; In Maritime transport, Marine Environment and Renewable Energy from the sea, including offshore wind and photovoltaic and fosters innovation and competitiveness of the industrial system, both national and international, research and technological solution to public and private sectors.
Digital Transition: development of state-of-the-art devices for cutting edge applications ranging from quantum optics to security, development of an integrated photonic platform for secure communication at telecom wavelengths and devices at THz frequencies for next generation communication; Development of prototypes for photonic devices for information processing and advanced computing for applications to combinatorial optimization problems, machine learning and cryptography.
BioPharma&Health: Preclinical and translational investigations aimed at understanding of the complex mechanisms of disease and related targeted therapy action, with a particular attention to oncology, neurology, infectious and inflammatory diseases, and to their transfer into clinical practice. Synthesis and characterization of complex materials with applications in various technological sectors including health. Study of soft matter including neurodegenerative diseases and early detection of pathologies. The activity of the interdepartmental and multidisciplinary Tech4Bio group is aimed at the development of theragnostic platforms, the design of new smart biomaterials, functionalized metal nanoparticles and polymeric devices for imaging, tissue engineering, drug delivery, advanced drug testing and drug discovery. Tech4Bio is currently involved in numerous projects and collaborations and in recent years has entered into various operating agreements with organizations and structures outside the CNR, including the consortium-Interdepartmental Research Center of Regenerative Medicine (CIMER) of the University of Tor Vergata and the medical-scientific Italian association of laboratory medicine (SIPMeL).

❖ Participant 7 - LUISS

Profile

Luiss - Libera Università Internazionale degli Studi Sociali Guido Carli is an international university specialized in the fields of actionable social sciences, providing a diverse learning environment based on entrepreneurship, responsibility, and sustainability, through its four Departments of Economics and Finance, Business and Management, Law, and Political Science, and five different Schools: Luiss Business School, an international recognized center for postgraduate studies, with long-lasting relationships with the Italian and global business communities; Luiss School of Government; Luiss School of European Political Economy; Luiss School of Law; the School of Journalism. In addition to Departments and Schools, Luiss can rely on 14 research centers, “think tank” structures related to the four Departments and created on the basis of specific quality and economic indicators, with the aim to carry out engaged research project management.
Luiss carries out research in the fields of economics, history, political science, sociology, political theory, government and public organization theory, law and management. What distinguishes Luiss is its privileged relationship with the business world. Over 500 companies, multinationals, and public and private institutions collaborate with the University, offering its degree candidates and new graduates their first real opportunities to step foot in the business world. Luiss University is at the top of the world top 25 in terms of collaboration with the business world as revealed by the 2019 edition of U-Multi-rank, it ranks first among private Italian universities according to “il Sole 24Ore”, the nation’s leading ranking system, based on student services, internationalization, teaching and research. Furthermore, according to World University GreenMetric 2021,

Luiss is among the top 30 universities worldwide in terms of sustainability, confirming itself as the second university worldwide, and the first in Italy, in the "Energy and Climate Change" category.
Overall, Luiss constitutes a strong bridge between the academic and business world through its long-term partnership with Confindustria, where key partners from the corporate, no profit and public sectors are directly engaged in the co-creation of specific programs that aim to advance knowledge, education and research.
Previous experience, national and international collaborations
The UniLUISS team has an extensive entrepreneurship experience, launched startup incubators and accelerators, and has been actively involved in technology transfer projects, entrepreneurship, startup and venture capital ecosystems. Among the witnesses of those skills we mention LUISS EnLabs, developed in joint venture with LVenture Group, and Luiss Alumni4Growth. LUISS EnLabs, one of the main startup accelerators in Europe, has become a true benchmark for innovation in Italy. From 2013 until 31 December 2020, Luiss EnLabs invested €19 million of capital in more than 120 startups and attracted numerous co-investors for €80 million, for an overall total of €99 million. Another previous experience relevant to Spoke 2 is Luiss Alumni 4 Growth (LA4G srl), an Investment Club, fully owned by Luiss, active in the promotion and financial support of Luiss-related startups. Through LA4G, Luiss generates value and develops and consolidates its leadership in startup entrepreneurship, filling a gap in finance for innovation in the post-seed and pre-venture phase. LA4G is focused on startups in post-seed and pre-venture phases, with the objective to support their growth and thereby realize dual goals: grow businesses of the future and generate economic resources to invest back into the community. Serving not only to enhance social mobility, the LA4G projects also aim to attract international talent to Italy while at the same time providing a place where entrepreneurship can thrive. In less than 3 years since its founding (pandemic included), the LA4G portfolio has grown to include 8 promising startups operating in various sectors.
Involvement
In Spoke 1, the main contribution of UniLUISS will be to carry out fundamental and applied research along two different research axes. The first axis is related to the economic aspect of digital transformation: in this area, UniLUISS will study digital transformations in organizations and investigate the modes by which the diffusion of data interferes with and change traditional business models and ways of collaborating within and across different organizations. The second research axis is related to the design, analysis and implementation of algorithms (in particular machine learning algorithms), data science methods and the applications of big data and data-driven approaches to the innovation activities performed in the ecosystem. In addition, UniLUISS will investigate effective and scalable blockchain-based solutions for digital transformations. Most of those research activities will be of great relevance for the ecosystem, as they will have a deep impact in at least two of the flagship projects, namely project FP4 “Digital transition into the decarbonization process and in recycling” and project FP6 “AI, virtual reality and digital twin for advanced engineering and aerospace”. In particular, in FP4 the role of UniLUISS will be to design novel machine learning models for estimating the amount of waste generated, and to implement effective blockchain-based solutions for dealing with recycling and the decarbonization process. There is a great impact envisioned for both research activities, as this will make the recycling process more effective. As far as FP6 is concerned, UniLUISS will contribute to the design of machine learning algorithms for advanced engineering.
In Spoke 2 UniLUISS will bring into the ecosystem its great experience in promoting technology transfer, exploiting research results and supporting the creation and development of startups and spin-offs from research, while promoting venture capital funds and incubation services. In particular, exploiting its longstanding collaboration with the LVenture group, which is another partner in the ecosystem, UniLUISS will bridge activities from research valorization and technology transfer to business incubation, acceleration and new start-ps. All those activities at the intersection between technology transfer and spin-offs will be implemented in close collaboration with LVenture. In more detail, UniLUISS will contribute to several tasks in Spoke 2 along three different dimensions: 1) favoring the promotion of new startups and spinoffs by training researchers in entrepreneurship and increasing the number of entrepreneur-scientists. 2) bringing technologies closer to the market by training scientists in design thinking methods in order to apply technologies to markets ready for adoption and thus reducing the typically long time to market of technologies coming from institutional research; and 3) bring market actors closer to the technology by organising matching events between industry partners, investors, entrepreneurs and scientists who can focus on technology and not only on market needs. The last activity will require also the training of individuals typically working in current Technology Transfer Offices (TTO) and transform them into innovation scouts: innovation scouts would come typically from a technical background and would complement these technical competences with business and entrepreneurship

competences. We envision that these new figures of innovation scouts are not only valuable for TTO's but also for investors, incubators, accelerators, corporations that all contribute to the innovation ecosystem.

❖ Participant 8 - INFN

Profile

The National Institute for Nuclear Physics (INFN) is the Italian research agency dedicated to the study of the fundamental constituents of matter and the laws that govern them, under the supervision of the Ministry of Universities and Research (MUR). It conducts theoretical and experimental research in the fields of subnuclear, nuclear and astroparticle physics. All of the INFN's research activities are undertaken within a framework of international competition, in close collaboration with Italian universities on the basis of solid academic partnerships spanning decades. Fundamental research in these areas requires the use of cutting-edge technology and instruments, developed by the INFN at its own laboratories and in collaboration with industries. Today the INFN employs some 5,000 scientists whose work is recognised internationally not only for their contribution to various European laboratories, but also to numerous research centres worldwide.

To realise world-class scientific experiments, researchers and technicians continuously develop cutting edge technologies in our specialised laboratories, always acquiring new expertise.

Built in 1955, the National Laboratory of Frascati (LNF) were the first Italian research facility for the study of nuclear and subnuclear physics with accelerators and are the largest laboratory of the INFN. The main characteristic of LNF consists in knowing how to build and run particle accelerators. In addition, LNF hosts the SPARC free-electron laser, built in collaboration with ENEA and CNR, and the extremely high power FLAME laser for the study of innovative particle acceleration techniques.

Previous experience, national and international collaborations

INFN is already very active on outreach and public engagement, fostering scientific literacy with specific programs dedicated to students, teachers and the general public. These programs encompass a wide range of activities, addressed to Primary school, High School students and teachers, and general public. Events for the general public, like open days and European Researchers' Night, are meant to engage people with science and inform about the latest issues of the research, bridging science and society. As an example, the LNF open day - before the Covid-19 pandemic - used to host more than 2,000 visitors every year. INFN-LNF researchers guide tours to the experimental sites, technology facilities and the Bruno Touschek Visitor Centre. Before the Covid-19 pandemic, more than 10,000 people per year used to participate in person in these initiatives. Due to the Covid-19 emergency, starting from March 2020 the science education activities have been adapted and carried out online (in Italian and English). The online spread of high-level science contents allowed to expand the reachability. Moreover, digital contents are available on the e-learning platform AccendiScienza, created in 2017, including learning resources like video lessons, presentations and tests for teachers, students and general audience. With relation to research activities, INFN group has an extensive experience in designing, installation, testing and operation of particle accelerators and the related technologies, being involved in local and external particle accelerator projects. The competences range over almost all the technologies related to particle accelerators, including radio frequency, laser, vacuum, magnets and mechanics. The group has also experience and organization for hosting external users, both form industries and from research institutions.

Involvement

The Involvement of INFN in Spoke 5 can be summarized as follows: building on the existing structures, INFN will design and construct immersive tools and exhibits for delivering scientific contents and, by engaging people with hands and body-on installations together with virtual and augmented reality, explain the working principles of accelerators machines, detectors and their applications to everyday life.

INFN will contribute to the SPOKE 6 "Open Research Infrastructures, joint labs, higher education with industrial collaboration" mainly in the WP1 - 6.1 Open research infrastructure for innovation, by operating the existing research infrastructures included in the IARI network located at INFN-LNF (the RadioFrequency and the power laser facilities). These infrastructures will be open for academic and industrial partners; they will perform research and innovation activities in the MEDICAL (HEALTH) thematic area and test of industrial devices through DIGITAL TWIN method (ADVANCED ENGENEERING). The two flagship projects that could benefit of the use of the RI are FP5 – development of medical devices – and FP6 – AI for advanced engineering. The activities will involve mainly resources of the LINAC Group (a team in charge of the design, construction, maintenance and development of the high energy particle linear accelerators subsystems, deeply involved in international projects that aim to implement new acceleration techniques and linear accelerator infrastructures) and of the Laser Group (a team in charge of the laser systems installed in the Accelerator Division and in particular the high power laser systems, working on the study, simulation, realization,

commissioning and operation of the laser systems and related optical transfer lines including all the optical diagnostics). Contributions are also provided by other colleagues from RF and Control Systems Groups.

❖ Participant 9 - ISS

Profile

The Istituto Superiore di Sanità (ISS) is a public research institution (ente pubblico di ricerca), under the guidance of the Ministry of Health. The ISS is the principal research, control, and consultation center on public health subjects in Italy.

The ISS Core Facilities are a centralized, shared collection of resources that provide access to instruments, technologies, and expert consultation to scientific researchers. They operate advanced instrumentation in many technological areas, critical for biomedical research, including next generation sequencing, protein mass spectrometry, reverse phase protein arrays (RPPA), surface plasmon resonance (SPR), cytometry, magnetic resonance imaging and spectroscopy, confocal, high-resolution and electron microscopy, electron paramagnetic resonance (EPR), scientific computing and bioinformatics. The Core Facilities also operate a cell factory for the GMP production of medicinal products for human trials.

Within the present project, the ISS is a major provider of technology and expertise to scientists in the biomedical area. The ISS is endowed with modern instruments and has extensive experience in collaborating with scientists in both the public and private sectors. The instruments in all technological areas have been updated in the last four years, with investments upwards of six million euros. All technological areas are managed and operated in large prevalence by scientists with their own research experience. Thus, they routinely provide not only instrumental services, but follow collaborators throughout their research efforts, including general advice, experimental design, interpretation of results, and publication. The technological areas of the ISS Core Facilities are and will remain up to date thanks to the annual two-million-euro contribution of the Ministry of Health, devoted to the purchase of large instruments. Beginning in 2021, the Core Facilities personnel is being expanded, as part of a multi-year recruitment campaign by the ISS.

Previous experience, national and international collaborations

ISS has participated in more than 20 projects related to the scope of work in past years:

Telethon Italy. “Telethon Proteomics Facility” (2009-2012). 196.600 €.

HORIZON-INFRA-2021-SERV-01 -#101058620 – 2022 – canSERV - Providing cutting edge cancer research services across Europe HORIZON-INFRA-2021-SERV-01. 190.160 €

FISR-AMICA (University of Modena and Reggio Emilia – University of Bologna – ISS) - Argument Mining in Covid-19 Articles – funded by MUR, 2021. 54.681,55 €

2020-2023 EATRIS-Plus project Consolidating the capacities of EATRIS-ERIC for Personalised Medicine, European Commission (4.999.023,75 €, Grant ID: 871096).

POR Lazio Innova ID A0375-2020-36491, 23/10/2020 FedMedAI. Elaborazione di dati clinici con metodologie di intelligenza artificiale per strutture sanitarie federate nel rispetto del GDPR”. 49.970,55 €.

EU Horizon 2020. Coordinating research and evidence for medical devices (CORE-MD). EC Grant Agreement 965246 H2020-SC1-2020-RTD. 2.360.977 €

Ministry of Health. Registro Italiano Protesi Impiantabili (RIPI): realizzazione di una piattaforma che integri i flussi dati per protesi ortopediche, dispositivi spinali, pacemaker e defibrillatori, valvole cardiache. (2019-2022) 575.000 €

EURATOM - H2020. MEDIRAD. Implications of medical low dose radiation exposure. Euratom research and training programme 2014-2018. Grant Agreement No 755523. Ended in Feb. 2022. 10 million €.

2019-2022 ERANET–NEURON EMBED Project (Reference Number: NEURON-132): Impact of Early life MetaBolic and psychosocial strEss on susceptibility to mental Disorders, from converging epigenetic signatures to novel targets for therapeutic intervention; PI Dr. Francesca Cirulli (ISS). Total budget 896.000 €.

Progetto TCAI (AOUC Careggi - ISS – University of Florence, USL Toscana Centro) - (Intelligenza artificiale e tecniche mutuate dalle scienze fisiche per una efficace ottimizzazione degli esami TC - funded by AOUC Careggi, 2019-2022. 198.314,58 €.

INAIL. Sviluppo di strumenti e metodi per la valutazione e la gestione del rischio derivante da esposizione a campi elettromagnetici per la tutela dei lavoratori portatori di dispositivi medici indossabili ed impiantabili – ID28 Bando BRIC 2019. 340.000,00 €.

INAIL. Sviluppo di un SIstema Real time per la segnalazione e per la raccolta di dati utili alla ricostruzione della dose all’operatore in Eventi anomali nella terapia con medicina Nucleare. – ID44 Bando BRIC 2019. 292.000 €.

Italian MoH, Clinical research 2018, project title: “Telemedicine for home-based management of patients with chronic diseases and comorbidities: analysis of current models and design of innovative strategies to improve

quality of care and optimise resource utilization: TELEMECHRON study" (Network project NET-2018-12367206). UO ISS "Assessment of implementation strategies of digital innovations for the continuity of care" (Principal Investigator Mauro Grigioni). 229.000 €.
2016-2021 European Union's Horizon 2020 program, "HERCULES" Comprehensive characterization and effective combinatorial targeting of high-grade serous ovarian cancer via single-cell analysis (Tot. €5.994.868,75, ISS €356.250,00, Grant ID: 667403) EIC/eRD14, PID-Consortium for EIC, DOI-USA, 2016-2020, evolving into EIC/eRD102 in 2022. US $ 300.000,00/year
Italian MoH, Clinical research 2013, project title: "High-end and Low-End Virtual Reality Systems for the Rehabilitation of Friality in the Elderly". 108.150 €
Ministero della salute CO-2013-02359461. Identification of predictive biomarkers in Multiple Sclerosis using a proteomic approach. Role: collaborator Financing: 150.000 Euro
European Community FP7. 2013-2019 European project Human cystic Echinococcosis ReseArch in CentraL and Eastern Societies HERACLES (http://www.heracles-fp7.eu); grant agreement 602051; Total budget 3.879.712 €.
H2020 project TRANSVAC2 – 2017 - "European Network of Vaccine Research and Development". 11.456,25 €
Italian Ministry of Health, APRON: test diagnostico per la ricerca dei prioni (Assay for PRiONs). Sviluppo di un test diagnostico in grado di rilevare i prioni negli animali e nell'uomo in fase preclinica e clinica", grant 111.430 €.
It holds 10 patents in relevant fields and one start-up company, Cardionica srl, providing skills and resources for the design, prototyping, industrialization, and certification of wearable devices for cardiovascular monitoring, for worldwide markets.

Involvement

ISS will contribute to Spoke 1 , 2 , 3, 4 and 6 .
Within the present project, the ISS is a major provider of technology and expertise to scientists in the biomedical area. The ISS is endowed with modern instruments and has extensive experience in collaborating with scientists in both the public and private sectors. The instruments in all technological areas have been updated in the last four years, with investments upwards of six million euros. All technological areas are managed and operated in large prevalence by scientists with their own research experience. Thus, they routinely provide not only instrumental services, but follow collaborators throughout their research efforts, including general advice, experimental design, interpretation of results, and publication. The technological areas of the ISS Core Facilities are and will remain up to date thanks to the annual two-million-euro contribution of the Ministry of Health, devoted to the purchase of large instruments. Beginning in 2021, the Core Facilities personnel is being expanded, as part of a multi-year recruitment campaign by the ISS.
In addition, the ISS will contribute to efforts in the Digital Transition area, thanks to the following activities: TISP is actively promoting the introduction of ICT architectures for healthcare (e.g., shared big data infrastructures), as well as the application of machine learning to the exploitation of health data, with a particular attention to regulatory issues and bottlenecks.
In Spoke 2, the ISS will adopt a "researchers 4 researchers" approach, i.e., groups of researchers sharing their experience on the different aspects of the product life-cycle to define methods and tools to support projects toward TRL5 and 6 in the field of medical and non-medical devices for health. Starting from the identification of specific needs and knowledge gaps of researchers, solutions will be identified to create a stable ecosystem where researchers and industries may find specific support to their ideas, projects, and needs, exploring solutions already implemented in other industrial sectors, such as web platforms, to facilitate the identification of partners and providers of services and products, thematic events and hackathons. Moreover, with the "researchers 4 researchers" approach, training courses for both researchers and industries to offer them some important tools to protect both intellectual property and the final product to be transferred. Different courses will be offered depending on the topics and the depth of the topics. One-day courses will be organized to explain to researchers the importance of protecting and exploiting their research, and more in-depth courses, thematic courses, divided into several modules, will be organized in collaboration with other partners in the ecosystem (i.e. Luiss or Lazio Innova). Specific training courses could be focused on regulatory aspects in order to supporters and manufacturers in facing the process of medical device certification, exploiting the long experience of ISS and its Notified Body in this sector. These courses could also go beyond the CE marking and explore the lifecycle phase of the medical device after it has been placed on the market, assessing the aspects and tools useful to assess its safety according to the requirements of EU MDR 745/2017 to allow its continuous

use. The specific Flagship project of interest are: FP5 - Development, innovation, and certification of medical and non-medical devices for health.

❖ Participant 10 - ENEA

Profile

ENEA is the National Agency for New Technologies, Energy and Sustainable Economic Development, a public body aimed at research, technological innovation and the provision of advanced services to enterprises, public administration and citizens in the sectors of energy, the environment and sustainable economic development. ENEA has highly qualified personnel, advanced laboratories, experimental facilities and excellent instruments for the realisation of projects, studies, tests, assessments, analyses and training services, with reference to product and process innovation and the valorisation of results to contribute to the development and competitiveness of the national economic system. It currently employs around 2,500 people located in 11 research centres throughout Italy. The ICT Division has developed highly qualified expertise for what concerns high performance and distributed scientific computing, data transmission networks, heterogeneous systems integrations such as big tools and scientific laboratories, cloud computing, energy efficiency of data centres, web-based applications, web services for information and communication. ENEA's ICT Division runs CRESCO, a major High Performance Computing facility, in its research centre located in Portici (Naples).

The Smart Grid and Energy Network Laboratory is fully committed in research activities regarding their integration through solutions as smart grids/microgrids and integrated energy networks. In this regard, the lab's activities mainly focus on technologies, methodologies and devices for applications in the field of smart grids, energy networks, microgrids and integrated energy systems in the presence of poly-generation and distributed cogeneration and energy storage.

Previous experience, national and international collaborations

The ENEA's Bio-pharma & Health area (SSPT-TECS and SSPT-BIOAG) works at the forefront in the development of therapies and diagnoses of different pathologies with high social impact (i.e. cancer and non-cancer diseases) and of novel plant-derived recombinant biopharmaceuticals. Artificial intelligence is also used to pursue the optimization of therapeutic protocols. One of the main goals of SSPT-TECS is health-oriented research; the biological aspects of ionising radiation carcinogenesis, about side effects of radiotherapy and the study of the effects of non-ionizing radiation on the immune and nervous system are of special interest. SSPT-BIOAG has over 20-years of experience in the field of Plant Molecular Farming consisting in the use of plants for the production of biopharmaceuticals. The ENEA Bio-pharma & Health group has developed a proprietary expression platform for the production of recombinant antibodies and antigens, and plant viruses which, together with specific expertise of the group members in antibody engineering, plant virology, proteomics, epigenetic -including miRNome- analysis, electroceutical, nutraceutical, and bioinformatics techniques will be made available within the project for identifying new diagnostic and prognostic biomarkers and developing novel tumour targeting biopharmaceuticals and diagnostic reagents.

ENEA collaborates with numerous national and international research bodies and institutions land participates in technological platforms and networks. Moreover, ENEA participate to numerous of national and international projects, connected to three subject' areas of this proposal. Worth mentioning are more than 10 ongoing Horizon 2020 funded projects, 8 relevant Patents and a large number of publications.

Involvement

ENEA will be involved in Fundamental and Industrial and applied research in Spoke 1, Valorization of research results and technologies in Spoke 2 as well as Open research infrastructures and joint labs in Spoke 6. ENEA's Team will provide a big data infrastructure to services for two research areas: Bio-pharma & Health and Energy transition. The infrastructure will collect, manage and analyse energy and bio-pharma data with AI tools and the High-Performance Computing (HPC), which is recognized as a pivotal element of the single market strategy. Its applications play a crucial role in addressing industrial, scientific and social challenges. Advances in HPC allow for sophisticated analyses through artificial intelligence (AI) and pave the way for more automated systems. At the same time, more excellent connectivity provides access to data wherever it is produced and stored. All this also allows the creation of digital replicas of physical assets ("digital twins") that can be used to simulate, optimise and automate even complex industrial systems and processes.

The relation among High Performance Computing (HPC), Artificial Intelligence (AI), Big Data and visualisation: the basic ingredients to create a digital twin of 4.0 Industry. Considering a remote manufacturing plant, a digital twin is a cyber replica that allows operation technology to be digitised, allowing a large amount of data from the plant's sensors to be collected. In addition, the data can be analysed with HPC, to simulate and forecast the plant behaviour. Furthermore, with AI, automatic decisions can be taken to optimise production. Industry management can visualise what is happening in the remote plant with a convenient dashboard. The

HPC infrastructure will also include molecular dynamics tools that support the advances in simulation for molecular biology validation.
For Spoke 1, 9 research scientists will be involved with expertise in: (3 – Digital T.) HPC and distributed scientific computing, data transmission networks, heterogeneous systems integrations, cloud computing, energy efficiency of data centres, web-based applications, web services for information and communication, AI tools for data analysis; (3- Bio-pharma&Health) plant biotechnologies, immunology, protein engineering, plant virology, molecular biology, molecular dynamics, experimental pathology and bio-engineering; (3- Energy T.) heterogeneous systems integrations through solutions such as smart grids/microgrids and integrated energy networks.
Spoke 2: To this aim 6 research scientists (2- Digital T; 2 - Energy T; 2- Bio-pharma&Health) with expertise in R&D promotion to addressing industrial, scientific and technology transfer actions towards industrial users and SMEs will be involved.
Spoke 6: To this aim 6 research scientists (2- Digital T; 2 - Energy T; 2- Bio-pharma&Health) with expertise in virtual labs and networking to support the collaboration of different Universities, Research institutions and private companies on common Research and Innovation projects.

❖ Participant 11 - Università Campus BioMedico - UCBM

Profile

Università Campus Bio-Medico di Roma (UCBM) is a young, yet rapidly developing, private academic institution, devoted to undergraduate and postgraduate education, advanced research, and provision of high-quality healthcare services with the Research Hospital. Established in 1992, today the University runs the School of Medicine and Surgery, the School of Engineering, the School of Science and Technology for Humans and the Environment and PhD in "Integrated Biomedical Sciences and Bioetics" and "Science and Engineering for Humans and the Environment". Moreover, the Centre for Integrated Research (CIR), the Campus Bio-Medico Hospital and the Centre for the Health of the Elderly are also associated to the University. The University hosts 51 multidisciplinary Research Units.
In Italy, UCBM has been systematically top-ranked for the quality of the education provided to a selected group of students. A maximum of about 120 students per year per course are admitted to undergraduate programs after an open, public competition typically joined by hundreds to thousands of candidates.
UCBM is deeply engaged in technology transfer related activities that, in the last years are rapidly growing with i) 30+ research projects ongoing in collaboration with large companies and SMEs, ii) 17 patents families owned/co-owned by UCBM in the fields of rehabilitation engineering, microengineering, regenerative medicine, biomedical instrumentation, cancer diagnostics and food analysis and iii) 7 spin-off companies accredited by the University from 2015 to date. USBM has already a strong collaboration with partners of the ecosystem, both Universities, EPR and Industries. In addition, in the last few years, UCBM has developed - as part of a strategic partnership with Marzotto Venture Accelerator - strong expertise in designing and implementing integrated incubation and acceleration programs for innovative companies, with the launch of two Call for Projects (Covid19 Challenge and Circular4Recovery). The Calls involved numerous national and global "innovation champions" (Cisco, IBM, TIM, Enel, Maire Tecnimont, Novamont, Ferrovie dello Stato, Acea, Bonifiche Ferraresi, etc), recording extensive participation of start-ups, research spin-offs, innovative SMEs from Italy and abroad. UCBM proposes an ecosystem model of Open Innovation based on a broad network of partners (universities, research centers, large enterprises, start-ups, research spin-offs, innovative SMEs, venture capitalists, investors, and public institutions) that collaborate actively in each phase of the open innovation process (discovery, empowering, exploiting). UCBM is also the headquarters and reference in the Lazio Region of the "ARTES 4.0 – Industry 4.0 Competence Center on Advanced Robotics and enabling digital Technologies & Systems" Competence Center of the Ministry of Economic Development. UCBM offers services in the areas of advanced and collaborative robotics and related enabling digital technologies with reference to Health 4.0 and safety, with an inclusive approach to other areas as well, in response to the training and innovation needs of the companies concerned to the services of the "macronode".

Previous experience, national and international collaborations

The scientific production per year is consistently and rapidly increasing (more than 900 papers, 4000+ ISI cumulative impact factor in 2020) as well as the amount of research funding raised from competitive sources in Italy, Europe and worldwide. At the present UCBM has more than 70 active projects and a high success rate of projects carried out in collaboration with companies.
Also technology transfer related activities are rapidly growing with: i) 30+ research projects ongoing in collaboration with large companies and SMEs, ii) 17 patents families owned/co-owned by UCBM in the fields of rehabilitation engineering, microengineering, regenerative medicine, biomedical instrumentation, cancer

diagnostics and food analysis and iii) 7 spin-off companies accredited by the University from 2015 to date. An outstanding network of national and international key scientific and educational partners, including 200+ national and international partner, has been continuously developed and consolidated with specific collaboration agreements over the years.
In order to support the research programs of the various Faculties, the Campus Bio-Medico University offers facilities and services to the enterprises including work areas and the latest generation tools. The facilities can be used by staff for their own research as well as research to be conducted in collaboration with other Institutions. Collaborators, in fact, are often invited to visit the University to work together on innovative projects with high scientific impact. Work areas provided include: Cytometry, Cell Imaging, Cell culture room, Molecular Biology, Radioisotope Facility, Clean Room, Engineering Facilities, Department of Medicine and Surgery Facilities.
Involvement
In Spokes 1, 2, 3 and 6, UCBM will be involved in research activities at the relevant TRL and with the available and foreseen infrastructures, c in all three areas of specialization:
- Energy Transition: UCBM theoretical and experimental activities related to the chemical-physical fundamentals, addressing the two main areas related to transformation processes and the phenomena of transport and chemical kinetics.
- Digital Transition: activities in this area are focused on the development of innovative methodologies, tools and technologies to support the analysis and design of security countermeasures.
- Bio-Pharma and Health: Healthcare 4.0 and biomarkers for precision medicine, measurement of physiological quantities, sensor development, synthesis and characterization of biomaterials, bioengineering of rehabilitation, surgical robotics, neuroengineering, including biomaterials and tissue engineering applications, development of sensors and integrated systems for telemonitoring, prosthetic systems, combining studies in biomechanics, biomechatronics/robotics and neuroscience with clinical applications.
With particular reference to the technology transfer and business incubation level in Spoke 2, SPOKE 2 - UCBM
-Energy Transition: develop and assess methods for the optimal management of Renewable Energy Communities (RECs) implement on a technological system composed of a software platform (website and mobile app) and easy-to-install smart meters. The tool is validated in real-time on a real test case. This activity refers to flagship project FP1; design and assess a management method for operations in smart districts with Hydrogen-based Energy Storage Systems (HESSs), implement on a hardware platform and validated through real-time Hardware-in-The-Loop simulations. This activity refers to flagship projects FP1 and FP2; A prototype of the technological solution for the sustainable use of renewable energies and green hydrogen in the nautical sector, is implemented, and tested in collaboration with companies and research agencies committed in the sector. This activity refers to flagship project FP2.
- Digital Transition: support the creation and scale-up of innovative enterprises by providing an integrated and customized offer of services for: the development and enhancement of entrepreneurial skills; the definition and validation of business models; the definition and/or validation of the initial phase of technological development. This activity refers to flagship projects FP1, FP2, FP4, FP5 and FP6; Supporting the development of innovative startups by providing services for acceleration and access to funding. The activity is focused on the gaps that were found in the pre-acceleration phase, mainly concerning the empowerment of the entrepreneurial team, the business model, the engineering of products, the market entry, etc. The activity is aimed at overcoming the impediments to go-to-market and the successful accomplishment of the technology transfer process. This activity refers to flagship projects FP1, FP2, FP4, FP5 and FP6.
Health and Bio-Pharma: industrial needs definition for sensor development for medical application. This activity defines the methodology to create a standard procedure for the best characterization of non-invasive sensors for medical applications. This activity refers to flagship project FP5; Establishment of a laboratory attractive for academic and industrial researchers as a one-stop solution for designing, producing, testing, and validating lab/organ-on-chip solutions, for applications ranging from point-of-care diagnostics to disease modeling and drug screening/development to support the valorization of technologies with a low maturity level of a technology (from TRL 1-3) throughout research and development phase progression. This activity refers to the flagship project FP5; Design of a protocol for using plant/plant cell culture as a farm to produce bio-active molecules of interest for their pharmaceutics, nutraceutics, cosmeceutics, or industrial properties. This activity refers to the flagship project FP5; Creation of training programs on technology transfer for both researchers and industries. UCBM third mission is exactly committed to supporting the birth of new businesses through the organization of workshops, challenges or hackathons also intended for students, meetings focused

on issues related to the creation of spin-off companies and entrepreneurial culture. In this WP UCBM is active in finding physical space for the incubation of companies founded by students, doctoral students, or researchers of the University, as well as to provide access to laboratories and equipment of the University that may be useful to the activities of the incubated companies. This action will provide support services and resources to facilitate the start-up process. This activity refers to the flagship project FP5.

❖ Participant 12 - Airbus Italia

Profile

Airbus has been a strong partner of Italy's aerospace sector for nearly 50 years. Italy has always proved to be a source of excellent collaboration for all Airbus divisions. Some 80 Airbus aircraft operate with Italian airlines, and over 240 helicopters, and nearly 90 military aircraft provide battle-winning, surveillance, life-saving capability to the Italian armed services. Italy is an important market, supplier base and source of some of the world's most innovative technology partners. Airbus in Italy has more than 160 direct employees, and over 8,000 people working on dedicated supply chain jobs with Italian suppliers across manufacturing, engineering and IT sectors. Italy's significant sourcing volumes make it a key country for all three divisions of Airbus: Commercial Aircraft, Helicopters and Defence & Space. Airbus has more than 300 suppliers across the country, making Italy Airbus' 7th sourcing country in Europe, the third one excluding Airbus home-countries, and the 10th worldwide, with a yearly spend of approx. € 500 million and Leonardo being the number one supplier with approx. € 200 million. Airbus strongly contributes to Italy's export capabilities thanks to several fruitful partnerships, which include the turboprop manufacturer ATR, MBDA missile systems, the NH90 military helicopter, the Eurofighter combat plane and the IAMCO NATO's maintenance contractor. We estimate the export value for those partnerships being more than € 30 billion as of today.

The company is a recognized major player in connectivity with peculiar competencies in IoT, 5g, Space telecommunications and related ancillary domains. It will participate with the following departments:
Engineering department: composed by 8 COEs (Satcom on the Move, Telco , Optical, Active antennas, Passive antennas, Radio Frequency, Mechanical system design, IVVQ, Software Design
Space Programs department: in charge for Space Programs in the national and international projects with institutional customers, eg. ESA/ASI/NASA and/or in cooperation with other prime contractors
Satcom Connectivity: in charge for mobile terminal, ground terminal and IOT project, department strongly involved in R&D activities in cooperation with our HQ
Operation: in charge of prototypisation integration and assembly of Space equipment.
Airbus Italia premises are hosting a clean room for space hardware integration, a thermal vacuum chamber as well as an anechoic chamber that will be eventually available.

Previous experience, national and international collaborations

The major programs currently on going are hereafter listed:
The European MALE RPAS (Medium Altitude Long Endurance, Remotely Piloted Aircraft System), is a joint European programme to answer future UAS requirements.
Considered as a key program, it has been launched by Airbus DS with Leonardo and Dassault Aviation as a joint industrial-government initiative between France, Germany, Spain and Italy.
Managed by European OCCAR (Organisation for Joint Armament Cooperation), the MALE RPAS is the first UAS designed for flight in non-segregated airspace and it will be operated worldwide to support ISTAR missions, both wide area and in-theatre.
EuroMALE will provide the European nations with an unmanned aerial system with outstanding operational capabilities, granting the sovereignty they need. Entry-into-service is planned for 2026.
Program USAB – customer Inmarsat – focused on IoT for satellites
Program Galileo Next Generation – customer UE – realization of firmware to be updated in orbit
Program SICRAL 3 – end user Italian MoD – anti-jamming system
Further minor programs are also in development.

Involvement

AIRBUS will be involved in Spoke 1, in Industrial and applied research, Pre-competitive development and Technology development and innovation addressing applications in the fields of Space telecommunications, IoT, 5G and related ancillary domains.

❖ Participant 13 – Almaviva

Profile

Since 1969 as Italsiel, Almaviva contributes writing the Italian IT history for Public sector, Industries, Finance and Transportation & Logistics.

It combines a deep knowledge of its customers business process with strong competencies in IT sector, ensuring coverage of the entire value chain: solution provider, system integrator and product provider. Its professional staff is continuously trained on the most advanced technologies and IT platform, with globally 5.115 certifications. 2020 main figures are: 552.709 Ml€ revenues and 3.803 staff.
The R&D&I Department is working on projects cofounded by EC, Italian Ministries (MUR and MISE) e Italian local Government. In the three-year period 2018 – 2020, the internal FTE staff involved in R&D&I projects are respectively 90, 81 and 31. As regards higher education, Almaviva is Sapienza' partner in the following II Level Masters: "Infrastructures Engineering and Railway Systems" and "Innovation Engineer".
Almaviva will make available: IT platform for AI algorithms training, opensource platform for IoT and Big Data, e-learning platform, and Moova Labs, a road circuit with C-ITS (V2X), Wi-Fi and LoRa Technologies to test mobility solutions.
Previous experience, national and international collaborations
The following table summarizes the most relevant research project recently funded:

		K€	
Title	**Funding organization**	**Project Total cost**	**Almaviva Total cost**
MOP - Mobility Operation Platform	MISE	16.000	16.000
The Educating City (La Città Educante)	MUR	9.638	3.909
ITS-Italy 2020	MUR	10.587	867
OCP _ Open City Platform	MUR	10.689	2.684
Healthsoaf	MUR	6.742	3.274
Advise	EC	4.121	335
Forensor	EC	4.932	464
Scene	EC	3.096	703
C-Roads Italy 2	EC	13.704	810
Foliage	EC	3.905	306
Iot Edge Node	Provincia Autonoma Trento	892	892
Feed for Good	Reg. Lombardia	1.174	488
Context - AWARE	Provincia Autonoma Trento	1.568	1.568
Smarty	Regione Toscana	3.267	1.040

Involvement
As affiliate to Spoke 2, Almaviva will contribute in the study, analysis and realization of the IT platforms of the project, covering all the technological and the functional requirements, thus providing the entire value chain, through the following tasks:
2.1 Valorization of research results for industrialization, 2.2 Valorization of technologies for industrialization, 2.5 Training in technology transfer: creation of dedicated training programmes on technology transfer, t
As affiliate to Spoke 6, Almaviva will contribute with open labs, necessary to prove the prototype solutions and services carried out by research projects realized in spoke 2, through the following tasks:
6.2 Joint labs: Setup of labs to prove the applied/industrial research outputs simulating a real context and gathering feedback from test to improve results.
6.3 Open labs and co-creation: Developing proof-of-concepts level activities, also starting from company platforms to reach TRL ⅞.
6.4 Higher education with industrial collaboration: Set-up of II Level Master to improve the skill/competencies of professionals. This task could enhance some new initiatives yet promoted by Sapienza – DICEA, such as II Level Master Degree "Innovation Engineer", which will be held for the first time during the present academic year. The master is conceived in a multidisciplinary approach (soft skills, economic/ethic/legal, engineering).

❖ Participant 14 - BV Tech

Profile
BV TECH is one of the main players in the national Information & Communication Technology and Information Security market. It operates mainly in the sectors of Public Administration, Healthcare, Telecommunications and Media, Defense and State Security, Finance and Industry.
It assists its customers in the design, implementation and maintenance of complex IT systems, ensuring the highest levels of security, reliability, ability to respect deadlines, costs and project quality. BV TECH annually dedicates over 10% of its revenues to research and innovation projects and believes it can provide value on these issues.BV TECH has various active partnership agreements and collaborations with various universities for integrated research projects, prototype development and proof of concept of research products and

technology transfer. BV TECH also finances some scholarships in some Italian universities to promote the development of industrial doctorates.
BV TECH can make available the ICT4HEALTH laboratory, consisting of a hardware infrastructure (server, network devices, data center, client workstations), a series of devices for remote assistance (vital parameters sensors) and a software infrastructure. BV TECH can also make available its Cyber Security laboratory and distinctive skills in data encryption and encryption to ensure the security of information.
Previous experience, national and international collaborations
BVTECH has developed a network with the most important universities in Italy (Sapienza, Tor Vergata, Roma 3, University in L'Aquila, Sannio University, Federico II, Milano Bicocca University, Calabria University, Bari University, Technical University of Milano, Campus Biomedico), with worldwide (MIT in Boston, University of Miami) and research centers (IRCCS San Raffaele, IRCSS Maugeri, CNR) to collaborate in research projects, for scouting of young talents and training them on knowledge and technologies strategic in the areas where the company operates. BVTECH offers to students graduation thesis and stages.
These Universities and Research Centers has been partners in the following main R&D projects:
Project name: ADIUVANT (ADvanced Ict cloUd based and Virtualized plAtform for INTegrated and personalized medicine). Funding: Fondo Crescita Sostenibile – Bando "Agenda digitale" PON I&C 2014-2020, di cui al DM 1 giugno 2016, MISE Objectives: The project involves the design, prototyping, testing and validation of an advanced and complex
technological services platform intended as an enabling tool for the management of chronic diseases, with specific reference to chronic disabling pathologies with a strong social impact. The project aims to support patients and health professionals with advanced IT tools and services for improving the harmonization and sharing of processes and activities involving health and social welfare structures dispersed throughout the territory.
Project name: Progetto «Suite prodotti cybersecurity e SOC» Funding. Apulia Region R&D funds supported by EU structural funds. Objectives. The project aims at developing novel solutions and prototypes for Network probe with DPI capabilities for IDS/IPS, SIEM systems, NGFW (Next Generation of Firewalls), Cyber Range, Collaboration platform for Cyber Situation Room, Cyber Asset Inventory
Project name: NEUROMEASURES: Progettazione di processi innovativi e servizi di supporto per la diagnosi precoce dei disturbi comportamentali e mentali nella malattia di Parkinson e nella demenza di Alzheimer
Funding: POR FESR Calabria 2007/2013 "Azioni per il Potenziamento delle infrastrutture della rete egionale dei Poli di Innovazione" The NEUROMEASURES project aims to create innovative processes and support services for the early diagnosis of Parkinson's disease and Alzheimer's dementia and the specific behavioral and mental disorders that characterize these pathologies
Involvement
BVTECH will be involved in Spokes 1, 3 and 6, developing IT solutions to support the projects, providing skills and resources in from the following units:
BU Public Administration and Healthcare: Digital Health and Telemedicine products/solutions, including innovative solutions for proactive medicine and home care assistance.
BU Defense and State Security: identifying innovative solutions in the field of cyber security and defense.
BU Research and Development and BU Infrastructures and Cloud: It includes the entire chain of design, construction and management of technological infrastructures.
In Spoke 6, in the domain of higher education and training, building on the experience accrued through the BV TECH academy and the different PhDs activated through scholarships subsidized by BV TECH, the team can support the acquisition of a concrete vision of the main strategic factors of the digital revolution in the sectors; analyze the organizational skills necessary to support the digital-ready business; support innovation capabilities to generate more insights and transform them into new activities; Acquire concrete view of the key strategic drivers of the digital disruption. In the health and bio-pharma field, the proposed team can guarantee the training of the health communicators of tomorrow, who are required to have multidisciplinary skills ranging from legislation to scientific knowledge of institutions, combining language with dissemination skills and supporting technical training. scientific with the ability to read data from a strategic perspective. In relation the open labs, the team can provide support in the creation of proofs of concept and in the validation activities of innovative ICT solutions in order to achieve energy efficiency, ensuring the highest level of safety and minimum environmental impact.

❖ Participant 15 - Catalent Anagni

Profile

Catalent Anagni has over 50 years of solid experience in offering sterile and oral products manufacturing, biologics filling, secondary packaging and recently playing a leading role as a Covid-19 vaccine manufacturing facility. During its history, the site has managed several projects in terms of building expansion, lines conversion, process development and digital transformation.

Catalent is a leading company for formulation, development and technology transfers. Our clients are startups and big pharma companies.

To further increase the manufacturing portfolio, Catalent Anagni has committed to construct, by 2023, a brand-new, cutting-edge biotechnological drug substance manufacturing facility, based on single use technologies. The project includes the construction of the manufacturing area, equipped with two 2,000L Single-Use Bioreactors, MS&T and Analytical Development lab (to support process transfer and optimization), and a quality control lab for biotech Drug Substances testing.

Previous experience, national and international collaborations

Catalent Anagni managed different technology transfer projects dedicated to sterile and biological products, in collaboration with BMS global team. In particular, the main milestones were the feasibility of the project, the cost evaluation for the project and the new production, the formulation of the product and the equipment needed for its production, the methods development and transfer, the quality and regulatory activities, the validation activities and the final batch production.

For the scientific and quality development, in 2012 the Chemical Micro and Biotechnology Lab has undergone a revamping, with an expansion of the Quality Control laboratories, the redesign of the processes and the implementation of new technologies, which included the tech transfer of CE-IEF, SEC, Biacore®, SDS-PAGE, In-vitro Bioassay methods for Drug Product release.

Considering soft skills, sharing of knowledge and innovation of processes, the Anagni site managed an important project to prepare the site to the Catalent acquisition in 2020; this project was called “Vocazione” with brainstorming team activities called “Officine delle idee” and a final Hackaton. The site also established important collaboration relationships with local Universities like “Tor Vergata” University; in 2019Augusto Giardini has been a member of the “Operational Excellence - Think Tank” project. This project has the purpose of studying, in-depth analysis and disclosure of knowledge connected with Operations Excellence in the industrial sector. The members of the Think Tank in Operations Excellence (TTOPEX) meet to discuss, exchange views, share best practices, participate in scientific surveys, research or projects, develop scientific or popular publications, promote seminars, conferences, congresses, symposia, promote and coordinate collaborations with institutions and research centers, promote the awarding of scholarships, research grants, scientific awards.

Involvement

For the spokes 2 “Technology transfer, new entrepreneurship, business incubation and acceleration” and 6 “Open Research Infrastructures, joint labs, higher education with industrial collaboration”, Catalent will involve the following departments, with their specific responsibilities and areas of action:

· Operations, Drug Product, Biotherapeutics: The Department is responsible for Operations strategy and activities for Catalent Biologics Sites.

· EHS & Engineering SME: The Department is responsible for EHS & Engineering execution and control of Engineering Capital projects in order to improve technology, structures, quality and safety of pharmaceutical production.

· Quality Control & Analytic SME: The Department is responsible for management of QC Department of the Site’s laboratory (starting materials, in-process, release, and stability testing and environmental monitoring of controlled areas) and contract laboratories.

· Continuous Improvement & Project Management SME: The Department is responsible for identify and realize business process improvement and innovation opportunities.

· Process Development & Validation SME: The Department is responsible for the industrial strategies of the Anagni site in the Manufacturing Technology area, developing and implementing proposals together with the interested functions (Production, Engineering, Quality, Supply Chain and EHS) .

· Capital Project Management & Capex SME: The Department is responsible for management and coordination of engineering projects with a prevalence of mechanical and civil activities, respecting the times, costs, regulations in force and company standards in terms of quality and safety, ensuring the responsibility of Project Manager for the completion of the activity;

For the spoke 4 "*University education, industrial PhD courses, internationalization*" and "*Professional undergraduate education in technology*" Catalent will involve the Human Resources department.

❖ Participant 16 – Coima

Profile

COIMA is a leading group for the investment, development and management of property assets on behalf of international and Italian institutional investors. Active in the Italian real estate sector since 1974, among its most important projects, the group has developed and still manages the Porta Nuova neighborhood, one of the most prestigious urban regeneration plans in Europe.

COIMA REM Founded in 1974 is a company dedicated to Development & Property Management and acts as a trusted partner for investors, dealing with development and management projects of real estate assets, providing qualified technical experience fundamental in the process of creating value for investments and in controlling operational risks. It manages more than 100 properties, of which more of 50% of are LEED certified. Wiredscore, Well and Cradle to Cradle are new certification applied to all new developments.

Previous experience, national and international collaborations

COIMA is structured to manage and guide product innovation and the adoption of the best technologies. Working constantly in close partnership with its main stakeholders, COIMA has created a market monitoring organization extremely well placed to identify, develop and manage real estate products, which it develops as offices, homes, public spaces, student housing, campus etc. developing the COIMA "Product Blueprints".

For COIMA the digitalisation is a tool for enabling people-centric services. In 2020, COIMA founded COIMA Human Technology in response to the growing need to add digital experiences to traditional property products, historically perceived as merely "physical". COIMA Human Technology was created with the mission of developing and integrating digital solutions to enable services tailored to people's needs, that are scalable to a building or district level. The company's mission is to serve the market by developing people-centric projects, where the conception, design and rationalisation process starts by first identifying the "Customer Journey". Technology is "integrated" and is put in place solely to satisfy the needs and expectations of the end user.

Involvement

COIMA aims to support the Rome Technopole project with the aim of enhancing training, research, innovation, industrial productivity with reference to: Energy Transition and Sustainability, Digital Transformation, new materials research and new construction techniques, applicable to the Urban Regeneration.

COIMA will contribute to the project with our research department focused on the energy transition, digital transition and urban sustainable regeneration, which are our focus since our foundation.

Our mission is to set and achieve the highest standards in investment, development and management, drawing upon our Italian legacy to create extraordinary cities, following worldwide best practices in finance and real estate.

❖ Participant 17 – ENI

Profile

Eni is a global energy company present in 68 Countries with over 30,000 people operating along the entire value chain. It concretely supports a fair energy transition for a net-zero carbon future, with the objective of preserving our planet and promoting an efficient and sustainable access to energy for all and respecting society and world's ecosystems.

To this end, the 17 Sustainable Development Goals (SDGs) determined by the UN represent a common target and a guiding reference for managing activities in all those Countries in which Eni operates. Along this path, Eni has committed to becoming a leading company in the production and sale of decarbonised energy products and fosters several scientific research projects on renewable energy, hydrogen, CCUS, energy efficiency, energy storage and circular economy.

Eni is able to provide capability to manage complex multidisciplinary projects through coordination competences and technical knowledge in the key areas including project management, engineering disciplines, HSE.

Producing energy with the lowest carbon footprint is the goal that drives Eni's investment in scientific and technological research. In 2020, about half of total R&D expenditure was dedicated to decarbonisation and circular economy. R&D projects have used the skills of at least 1,500 people of Eni at the 7 proprietary Research Centres. In its R&D Centers Eni faces the decarbonization challenge from many sides: from the development of decarbonized fuels for sustainable mobility, to R&D programs focused on renewable energies and energy storage as a way to increase the green energy penetration, to CCS (Carbon Capture and Sequestration) as a way to decarbonize hard to abate sectors and electricity production from fossil fuels.

Furthermore, Joule – Eni School of Entrepreneurship supports the growth of sustainable businesses through dedicated paths: one devoted to training a new generation of entrepreneurs (Human Knowledge) and one to startup incubation and acceleration programs (Energizer).
In partnership with Joule, Eni Corporate University contributes to the entrepreneurial journey by providing training programs on energy transition through the support of digital technologies, personal coaching and mentoring.
Previous experience, national and international collaborations
Research projects developed by Eni cover every aspect of the value chain:

1. Processes Decarbonization: to reduce, capture, transform or store CO2, increasing energy efficiency, reducing emissions and promoting decarbonized energy vectors.
2. Circular & Bio products: to reduce, recycle and reuse products and by-products, transforming wastes to valuable products for bio-refinery, sustainable mobility and green/circular chemistry.
3. Renewables & New energies: to sustain the development of renewable energies and storage solutions and developing breakthrough energy technologies such magnetic fusion.
4. Operational Excellence: to increase flexibility and the ability to absorb scenario volatility, extending the asset life, and continue to create value across all our activities.

In the last 10 years the financial commitment of Eni in scientific research and technological development amounted to a number higher than €2 billion and the involved people were about 1,000 FTE. Eni participates to several R&D project financed by European and National Funding Programs. Currently Eni is Partner in 11 Consortia for projects funded by the European Commission with the following research topics: valorisation processes for biomasses, photovoltaic systems, biofuels production, for a total financed budget of more than 2 M€. Eni is also Partner in 5 National Consortia funded by MUR for a total budget of more than 2 M€ on the following subjects: valorisation processes of biomasses, innovation technologies for the safeguard of marine ecosystems, conversion of offshore infrastructures for eco-sustainable utilization, optimization of concentrated thermal systems. About Intellectual Property in support of technological innovation, the total number of rights in the portfolio at the end of 2020, was equal to 7,471. In 2020 a total of 25 new patent applications were filed, generated by internal R&D activities and by the external network of cooperation: new patent applications are directly targeted at developing technologies in the field renewable energy sources sector (biofuels, solar and energy storage).
Involvement
The involvement in Rome Technopole will be concentrated in Spoke 3, focusing on the development of requirements, training activities and skills for apprenticeship and PhD courses. Joule will contribute by developing its training programs focused on the theme of sustainable entrepreneurship available to Rome Technopole. Joule programs can offer Technopole stakeholders / shareholders targeted paths on the foundations of entrepreneurship understood as a new skill, aimed at:
- developing technical and professional skills useful for the future entrepreneurs.
- providing adequate and consistent know-how to understand the bureaucratic and tax obligations.
- strengthening the skills of program participants for their employability and fostering opportunities for their effective integration into the labor market.

Eni Corporate University (ECU), will contribute together with Joule by making available to the Technopole:
- training programs capable of vertically specializing the best talents and developing resources through an innovative training offer, focused on the new skills needed for green jobs.
- virtual reality tools, which have the ultimate goal of supporting the energy transition, as well as a digital training / information platform (MyChange) that supports the acceleration of the sustainability path through a model that includes, in the corporate cultural change, that of the individual.
- specific programs with activities that involve employees of partner companies and / or selected companies that correspond to the Technopole mission on intrapreneurship issues, favoring a "contamination" of experiences between the same participants from different companies.

❖ Participant 18 – Leonardo

Profile
Leonardo is a global high-tech company in the Aerospace, Defence and Security sector, delivering advanced solutions based on dual use technologies, to meet both military requirements and civil applications. As an industrial and technological leader, the Company aims to be an engine for development, contributing to security and progress worldwide.
Leonardo dedicated € 1.5 billion to Research & Development (11% of 2019 revenues) it ranks 4th in the global Aerospace & Defence sector for Research & Development investments (Source: The 2019 EU Industrial R&D

Investment Scoreboard), over 9,000 employees are engaged in Research & Development activities, it employs about 10,600 engineers (mostly aeronautical, aerospace, electronics, mechanical, computer science and telecommunications). More than 90 universities and research centres collaborate with Leonardo worldwide, and 19% of the patent portfolio is linked to the Innovation Award. 91% of these have since been applied in Leonardo's systems, products and services, with a 5% compound annual growth rate (CAGR) of the patent portfolio in the last decade.

Previous experience, national and international collaborations

Previous experience and research collaborations: the Company participates in regional, national and international research and innovation funding projects and programmes, including major European programmes such as Horizon 2020, Horizon Europe the Italian Technology Clusters, in particular with the chairmanship of the National Cluster for Aerospace Technology, the Competence Centres (e.g Cyber 4.0) and the Regional Technology Districts.Leonardo participates in a number of projects. Listed some examples:

- Cyber Situational Awareness (ECYSAP European CYber Security Awareness, with a total budget of 10,82M€) funded by EDA through the EDIDP program.
- AESA radar technology, like EC funded PADR project CROWN (European active electronically scanned array with Combined Radar, cOmmunications, and electronic Warfare fuNctions for military applications , with a total budget of 10M€)
- quantum communication EC funded PADR project QuantaQuest (Quantum Secure Communication and Navigation for European Defence with a total budget of 1,5M€) or Italian MoD funded Q4SEC project (Quantum secure communication for military applications with a total budget of 3,8M€).
- radar processing SAURON EDIDP project on Space Situational Awareness (SSA) Sensors, with a total budget of 7,5M€; SURPRISE project (3M€) on compressing techniques,

Leonardo takes also part to the SPARTA project (Strategic programs for advanced research and technology in Europe, with a total budget of M€ 16) funded by EU to set up unique collaborations, to build transformative capabilities and form world-leading expertise centres to re-think the way cybersecurity research is performed in Europe. Moreover, Leonardo and Telespazio are part of European Quantum Communication Infrastructure (EuroQCI) Initiative and at national level of 'Quantum Communication and Synchronization Testbed'. Finally, under ESA responsibility Leonardo and Telespazio participate in SAGA project (Security And cryptoGrAphic mission), that consists of satellite quantum communication systems creation.

Involvement

Involvement in Spoke 1 will be implemented at all levels, with a research and development focus on ICT applied to communications. The project will involve Engineering and R&D areas of the Leonardo Cyber Security, Electronics Divisions, Telespazio and Leonardo Lab on quantum Technologies.

The Electronics Division will be involved in issues relating to advanced AESA radar processing, while the Cyber Security division will be partner in activities concerning cyber security applied to communications.

Telespazio and Quantum Communication research unit of Leonardo Lab on quantum technologies will be both involved in activities on Quantum Cryptography and Communication.

Leonardo Labs act as incubators for impressive research and development programmes with the aim to increase technological power, accelerate digitalization processes and develop innovative technologies.

Leonardo Labs are aimed to develop innovative contents and projects on the following key enabling technologies: HPC Design & Simulation, Big Data, Artificial Intelligence and Autonomous Intelligent Systems (e.g. for Remote Piloted Aircraft Systems), Quantum technologies and Cryptography, Electric Mobility, Innovative materials and Logistics.

In particular, Quantum lab studies quantum technologies to assess their application in sectors where the company has expertise, including aerospace, defence and security. The Quantum Communications research unit is working to develop quantum-based solutions applied to communication systems to increase their security, acting on components and subsystems, such as devices for the exchange of encryption keys and Quantum Random Number Generators (QRNG), as well as on the quantum network architectures for long-distance communications, from Quantum Communication Infrastructure through to the Quantum Internet of the future.

Telespazio works to bring Space closer to Earth, benefitting citizens, institutions and companies in a variety of sectors ranging from design and development of space systems to management of launch services and in orbit satellite control; from Earth observation to integrated satellite communication, navigation and localisation services, and through to scientific programmes.

❖ Participant 19 – Lventure Group

Profile

LVenture Group ("LVG") is a publicly traded venture capital holding company (listed on Borsa Italiana) and one of Europe's leading startup accelerators, it invests in digital startups with high growth potential and with globally scalable businesses. LVG also has strong relationships with Chambers of Commerce, Institutions and Embassies that enable the continuous creation of new business opportunities for the startups in its portfolio.
Over the years, LVG has created a network of strategic connections to strengthen relations with all key players in the innovation process. One of the main partnerships is the one with LUISS Guido Carli University, who has invested in LVG leading to the creation of LUISS EnLabs accelerator with which LVG is constantly designing and implementing entrepreneurship programs.
Below are the key metrics that tell the story of the journey and the results achieved by the Group so far:

· 20 acceleration programs (and related Call4Sartups)
· 14 incubation programs (and related Call4Teams)
· 94 startups in our portfolio
· 1500+ job positions created by our startups
· €115M raised by LVG portfolio startups (€22M by LVG, €93M by third party co-investors)
· 10 exits
· 200+ investors in our ecosystem

Previous experience, national and international collaborations

Previous experience and research collaborations:
In relation to activities of Spoke 2 - Technology transfer, new entrepreneurship, business incubation and acceleration, the track record includes:

· Executed 14 business incubation programs. Below a selection:
o UrbanTech WorkLab (2020). A program for startups designed and executed by LVG in partnership with Toyota, Linkem, Sara Assicurazioni, Cisco Systems, Amazon Web Services and the Lazio Region on the Smart Cities vertical. The program selected 10 startups out of more than 140 applications which also produced 3 POCs for 3 of the corporate partners
o TalentLab (2018, 2019), Sapienza University – Rome. A program designed and executed to support students and researchers to develop entrepreneurial projects with lean startup methodology.

·Creation of dedicated spaces: THE HUB - LVG's Rome innovation hub covers an area of 9,000 square meters and hosts a state-of-the-art coworking space open to innovators, SMEs, Corporates, Facebook Competence Centre (one of three in Europe) and 42 Roma LUISS (coding school). More than 500 people pass through the HUB daily, creating a unique vortex of contamination opportunities. Hundreds of events dedicated to the world of innovation, meetings, workshops, training courses and conferences are held at the HUB every year. In 2019 alone, more than 300 events were organized, and more than 20,000 guests were welcomed.
· Open Calls: We have managed more than 20 calls for our LUISS EnLabs acceleration program and more than 20 calls for startups and talents in partnership with corporates, such as P&G, Poste Italiane, Luiss, Google, Cisco, Telepass.
· Proof-of-concept programs:
Poste Italiane SME - INSURTECH - Call for Solutions between July 2021 and March 2022. International call by Poste Italiane and Poste Assicura, in partnership with LVG, addressed to startups already active on the market, having received at least one seed investment and with proven operational traction.

Involvement

Involvement will be implemented through:
Spoke 2 - Technology transfer, new entrepreneurship, business incubation and acceleration
· Incubation programs to create and train teams for the development and testing of innovative business concepts and business models
· Creation of dedicated spaces: advisory on the design of spaces to be used as innovative hubs
· Awards and open calls: initiatives to find talents, ideas, startups and technologies to develop or reward in partnership with Corporates and Universities. We design, plan and manage all the activities such as: communication plans, platform set-up for applications, startup scouting, selection, final award/celebration events, etc.
· Business Acceleration will build on the ongoing partnership with LUISS EnLabs and Lazio Innova. In particular, LVG invests €90k and Lazio Innova automatically co-invests €80k in any startups selected and based in Lazio. LVG can set up an Accelerator Program with a full set of similar services: 5-month program, seed

investments, mentorship, workshops and offices, to support early-stage startups in go-to-market and product market fit stages, expansion and fundraising.
· Venture Capital: LVG is a Venture Capital investor and operator that networks and matches VC funds, Business Angels, Public Investors, family offices and corporates with startups with funding requirements.
Spoke 6 - Open Research Infrastructures, joint labs, higher education with industrial collaboration
· LVG can help Universities to conduct research on topics such as entrepreneurship, venture capital and corporate venture capital with the contribution of the 100 + startups and 500+ startup founders from our portfolio network that can be interviewed with our support. For example, LVG is designing a research course with LUISS University (prof. Lechner) on the topic of coachability and its relationship with entrepreneurial success.
· Proof-of-concept between startups and corporates: LVG can run PoC, intended as "startup-corporate" experiments of testing to confirm feasibility of a solution, or feasibility of the most critical and central element of a solution. Testing in a controlled environment provides product teams the opportunity to stress-test the limitations of the product and determine what is able to be accommodated.

❖ Participant 20 - Maire Tecnimont

Profile
Tecnimont is an international leader in the field of plant engineering, rooted in the pioneering experience of Italian industrial technology shaping the new frontiers of Engineering Innovation. We embody the contractor spirit of the Group in Engineering, Procurement & Construction of large scale projects worldwide.
Tecnimont's expertise in realizing mega Projects all over the world has positioned the company among the top-notch players, with outstanding references in the management of large integrated turn-key complex projects by acting as the EPC contractor for the Client.
With a well-rooted track record and a strong technological footprint, we provide services all across the value chain. Our extensive knowledge ensures the highest technological innovation, from research, process design, and engineering, to the execution of Projects - with procurement and construction.
Since 1927, as engineering center of Italy's chemical and energy conglomerates, and then as independent brand since 1973, our long experience in managing complexity is complemented with a flexible business model ready to quickly adapt to market evolvement.
Tecnimont is a top-class safety performer. Our impressive track record, continuously confirming Zero Incident target, is a sound evidence of our outstanding commitment to Safety all over the world. We are everyday focused on disseminating Tecnimont Safety Culture to all our suppliers and subcontractors.
Engineering & Contracting is a people business. Our People have developed a great ability to engineer the new paradigm of our industry, enhancing world-class mega projects in petrochemicals, fertilizers, oil & gas refining and Power generation. Through their expertise, entrepreneurship and reliability, Tecnimont provides successful innovative solutions for tomorrow's Engineering, Procurement and Construction.
The Tecnimont R&D department fulfills the company's need to valorize its internal development potential by focusing on innovation, either by studying and developing new technologies or by innovating engineering tools and methodologies. Besides the technological aspects, our R&D projects are managed with the most advanced project management techniques within a new innovation strategy featuring a more efficient allocation of resources (human, financial, technological).
Previous experience, national and international collaborations
Tecnimont follows the Maire Tecnimont Group's approach to innovation, highly regarding its organization, processes and systems. With a holistic approach to digital transformation, we aim to increase effectiveness, safety and productivity for all operations. Tecnimont has seen impressive advances in the most current Modeling systems, resulting in the application of the full range of disciplines of BIM (Building Information Modeling) design, including 4D modeling. This truly construction-driven approach allows for the integration of the model with the project schedule, and, when used with AWP (Advanced Work Packaging) implementation, makes it possible to clearly define the priorities of the project. This digitalization process also addresses our second area of focus, being the reduction of time and cost for the Company and its clients. Our expertise is essential to the entire value chain for effectively integrating and applying the innovation made available by single players. The application of digital wireless communication, for example, has a positive impact at construction sites by reducing the quantity of construction-related activities such as cable laying and footprint building thus improving operations efficiency. We focus on using "big data" to support EPC Project Management through analytics and data-driven decision making. This includes not only the implementation of new smart applications and dashboards but also that of Robotic Process Automation for back-end activities. Always displaying a high-level of expertise in technological and process innovation, we are developing a

"digital twin" of the plant, testing new solutions in cooperation with other major players in the industry. We are also testing 3D printing applications in several phases of the printing process. It is possible to benefit from additive manufacturing, as when creating catalysts and their supports, not only for the advanced geometric solutions provided, but for the fast-track execution and enhanced confidentiality of production it affords as well.

Involvement

The activities will focus on Spoke 1, in the framework of Industrial and applied research activities, targeting the development of IT solutions for modeling and simulation of waste to chemical / waste to fuel solutions to produce e-fuels, e-chemicals and e-hydrogen.

The research project will be implemented in the following steps:

1. AI-based predictive model to forecast the characteristics of the inbound waste as feedstock
2. Advanced waste sorting and characterization based on Mechatronic to map waste characteristics and to optimize the control strategies of the gasification reactor.
3. Thermodynamic simulation of gasification reactor to optimize the design and its working conditions depending on waster variances.
4. Blockchain-based plastic credits certification to track the quantity of plastics removed from environment by converting waste into chemicals.

❖ Participant 21 – MBDA

Profile

The operational units that will be involved in the development of the activities are:

· **Seeker and DataLink Systems**
· RF Equipments & Technologies
· **Electronical Engineering**

The **Seeker and** DataLink **Systems** and RF Equipments & Technologies departments mission is to develop and implement the equipment involved in the communications between Missile and Weapon system from System level through to equipment definition.

The department has developed this expertise also with the support of external collaborations (Universities, research centres and Industrial Partners) that have contributed to:

o Define different DataLink solutions and assess the associated performances
o Study the FEC (Forward Error Correction) techniques and crypto algorithms for datalink waveforms
o Assess equipment performance through modelling activities and test in a datalink synthetic environment for the benefit of the different Projects. In particular, MBDA IT carried out these activities with the support of Tor Vergata University and La Sapienza University. The scope of this research activity was the study of a wide band channel emulation techniques and the development of a proper emulator.
o With the support of Tor Vergata University there is other research activity place to:
o develop the capability to design Radio Signal Processing algorithms and implement them in Software Define Radio with innovative autocoding methods under Mathworks Simulink Vivado Integrated Development Environment assuring digital continuity from requirement to product;
o develop auto-coded FW Algoirthms for S-band direct sampling Seeker architecture
o Development of radio communication models, techniques and technology demonstrators together with the Universities located in Campania region
o Discuss and influence suppliers' roadmaps on equipment and technology to satisfy Future Products needs
o Develop and maintain generic models to assess performance of future equipment to be developed.

The Electronical Engineering department mission is to provide leading-edge electronic solutions for MBDA products, from concept design to series production, and full in-service support.

The department has developed this expertise also with the support of external collaborations (Universities, research centres and Industrial Partners) that have contributed to:

o Study and develop an innovative neural network engine inferred on FPGA (Field Programmable Gate Array) carried out with the support of Tor Vergata University and Pisa University
o Study a HW accelerator architecture for missile use carried out with the support of Pisa University.

Previous experience, national and international collaborations

In relation to the themes and objectives of the research and innovation program MBDA IT is carrying out the Research & Development (R&D) activities described below.

1. In the framework of an international collaboration inside MBDA Group and with the University of Bristol, MBDA IT is studying and developing a demonstrator of a data-link capable to transmit data among several vehicles in flight (SWARM). This R&D activity involves data-link system studies, concept studies, protocols

and waveform studies, signal processing technics for the development of a concept Software Defined Radio demonstrator.
The proposed research collaboration aims to taking a step further in the Data Link (DL) roadmap and mature the main technological bricks of the next generation of Data Links. The approach that will be followed is to build a digital representation of the DL system and its components (also called "Digital Twin") where the fidelity is increased at each iteration of the project following a spiral approach. This process, together with the Modeling & Simulation capabilities available within the ecosystem, will allow to exit the first phase of the project with a much higher maturity of the solution (even if still demonstrated in a simulated environment and thus with a TRL of 3). The next phase will confirm in laboratory environment the results obtained thus further increasing the TRL.
2. The MBDA Electronic Engineering team is involved since 2019 in the project "Soft Common Computer Core" SC3, funded by MBDA Internal Research and Development program (IRAD), in collaboration with University of Rome "La Sapienza", Department of Information Engineering, Electronics and Telecommunications (DIET), Digital VLSI Cicruit and Systems Research Group. The project aims to develop a Microprocessor based on RISCV ISA, with functions of Functional Safety.
The proposed collaboration is the follow-up of this project, with the objective to develop an "Adaptive Hardware Acceleration Platform (AHAP)" to enable the Hardware acceleration of data processing functions to inference in several aerospace application. The new platform will integrate a Scalar Engines for embedded compute, Adaptable Engines for hardware flexibility, and DSP Engines for digital signal processing.
Another branch of the project will address the safety and Cyber security aspect of the platform aiming at defining the architecture of a dedicated micro-processor.
Involvement
Activities in Spoke 1, Applied research, will focus on:
"Applied research focused on the definition of high band Data Link (Ka and higher) between moving vehicles and between a moving vehicle and a satellite constellation" addressing the following topics:
- New low observable and high throughput waveforms
- Electronically scanned array antennas for high band DataLink
- Digital processing (eg RF signal direct sampling)
- Algorithms and techniques for the detection and tracking of the nodes of a communication network between moving vehicles (eg: tracking and data exchange dual capability)
- Technologies to reduce the size of the integrated circuits (including photonic)
"Applied research on the design and prototyping of new generation microprocessors"***:*** the group will cooperate with other entity of the ecosystem both on the industrial side and on the University side, addressing
- The HW platform
- The firmware aspects
The team will cooperate with the existing partner of the project (La Sapienza University, DIET department) plus others partners available in the ecosystem.

❖ Participant 22 – Takis Biotech

Profile
Takis is a biotechnology company based in Rome, founded in 2009 by a group of scientists from **Merck Research Laboratories** (MRL). The group has more than 20 years of experience in drug discovery and is recognized for the conception and implementation of a number of innovative technologies with the goal to improve *in vivo* gene transfer, regulation of gene expression and immunogenicity. Takis is also a Contract Research Organization (CRO), providing specialized services to Pharma/Biotech. Currently, the company employs 30 scientists. Takis operates at Tecnopolo facilities, Castel Romano, Rome, Lazio and at Biogem, Ariano Irpino (AV), Campania. Overall, Takis laboratories have a surface of about 800m^2. All reagents and instrumentation (molecular biology, biochemistry, animal housing, *in vivo* imaging, bioreactors, purification systems, cell culture facilities) required for Oncology, Immunology, Gene Therapies and Virology projects are available. Takis also has access to general tools and reagents, genetic constructs and animal models to study the effects of vaccines using gene vector platforms and *in vivo* interference with siRNA/miRNA. Takis can manage BSL-1 and BSL-2 cells and pathogens and a BSL-3 facility for *in vitro/in vivo* testing is under construction (ready 3Q22).
Previous experience, national and international collaborations
CUP F33J13000440003; PROMOTORI TECNOLOGICI PER L'INNOVAZIONE – quarta edizione; Città Metropolitana di Roma Capitale Dipartimento V - Ser vizio 1; 25.666,66

CUP F87I12002180007 ATTIVITA' PROT. FORMULARIO FILAS-CR-2011-1184; PROGETTI DI R&S IN COLLABORAZIONE DA PARTE DELLE PMI DEL LAZIO POR FESR LAZIO 2007/2013 ASSE I; FILAS LAZIO INNOVA; 361.075,64
PROGETTO DI RICERCA N. 298; FONDO CRESCITA SOSTENIBILE A FAVORE DI PROGETTI DI RICERCA E SVILUPPO – HORIZON 2020 PROGRAMMA OPERATIVO NAZIONE "IMPRESE E COMPETITIVITA'" 2014-2020 FESR ; MINISTERO DELLO SVILUPPO ECONOMICO; 500.012,50
PROG.RIF. N. POS 33; GRANDI PROGETTI R&S – PON IMPRESE E COMPETITIVITA' FESR 2014/2020 ; MINISTERO DELLO SVILUPPO ECONOMICO; 1.640.000,00
A0112-2016-13144; POR-FESR 2014/2020 Avviso Pubblico "LIFE 2020" – Progetti Semplici; Lazio Innova; 83.347,70
A0112-2016-13330 ; POR-FESR 2014/2020 Avviso Pubblico "LIFE 2020" – Progetti Integrati; Lazio Innova; 338.490
A0114-2017-14788; POR FESR 2014/2020 - Avviso Pubblico "KETs – tecnologie abilitanti"; Lazio Innova; 216.472
CUP: B83D18000450007; PROGRAMMA OPERATIVO FESR CAMPANIA 2014-2020
Asse Prioritario 1 "Ricerca e Innovazione"; Regione Campania; 77.139,75
H2020-SMEInst-2018-2020-1; TK-NEO; Commissione Europea; 50.000
CUP: B81B20000310005; Sportello Fabbrica Intelligente DM 5/3/2018 ; MINISTERO DELLO SVILUPPO ECONOMICO; 582.695
NL01 National Agency Erasmus+; ADVANCE; Commissione Europea; 33.982
H2020-MSCA-ITN-2019; MAGIC BULLET: Reloaded; Commissione Europea; 261.499,68
Catapult European Competition; NeoMatrix; EIT Health ; 25.000
CUP: B61C17000060007; Genomica e Terapia dei Tumori Rari; Regione Campania; 520.000
CUP: B61G18000470007; Campania Oncoterapie; Regione Campania; 480.000
IMI 2; ARDAT; Commissione Europea; 80.000
Progetti Strategici: HUMAD, TRAZIMAB, GEMMA, CARSA, ITHACA; Lazio Innova; 755.526,17
Emergenza Coronavirus ed Oltre; GENERAS; Lazio Innova; 139.225,09

Involvement

Takis will drive one of the Flagship project: ADVANCED AND AUTOMATED INNOVATION LABS FOR DIAGNOSTIC AND THERAPEUTIC BIOPHARMA SOLUTIONS, contributing to the development of an advanced open innovation Joint Laboratory focused on the accelerated development of biopharma solutions for enabing innovative characterization and large scale production of high-affinity monoclonal antibodies for diagnostic and therapeutic applications, and other emerging solutions for relevant pathologies.
This laboratory will be directly shared as Joint Open Lab with UCBM and with all the other interested Rome Technopole partners and stakeholders for technology transfer, innovation and training activities.
It will also be involved in several research activities within Spoke 1, to be further defined in cooperation with the reference research groups of the participating universities.

❖ Participant 23 - Thales

Profile

Thales Alenia Space Italia S.p.A. (here below TAS-Italia or TASI) is a company incorporated under the laws of Italy, having its registered office, the principal place of business and the administration at Via Saccomuro, 24, 00131 Rome, Italy. TAS-Italia is a subsidiary of Thales Alenia Space S.a.S. (100%), jointly managed and coordinated by Thales S.A. (67%) and Leonardo S.p.A. (33%), is a key European player in space telecommunications, navigation, earth observation, exploration and orbital infrastructures. With over 35 years of experience in developing space systems, TAS-Italia is involved in all aspects of the space domain. Number of employees: 2.332 (December 2021).
Drawing on decades of experience and a unique combination of skills, expertise and cultures,
TAS-Italia delivers cost-effective solutions for telecommunications, navigation, Earth observation, environmental management, exploration, science and orbital infrastructures. Governments and private industry alike count on TAS-Italia to design satellite-based systems that provide anytime, anywhere connections and positioning, monitor our planet, enhance management of its resources, and explore the Solar System and beyond. The design, development and deployment of satellite systems and space infrastructure require the development of state-of-the-art technologies, knowledge and skills for the development of on board and on ground advanced processing models and high performance computing architectures for the management, exploitation, enhancement and use of data and information (signals, images, spacecraft control data, telemetry measurements, radar data, etc.) for creating space systems and related added-value services.

Such technologies are fully in line with the company's objectives and the key technology development roadmaps. TAS-Italia is involved since years in industrial research and development activities in many technological fields and disciplines under the close coordination and leadership of the Chief Technical Officer Department which provides the strategic guidelines for the research and technological development roadmaps. In this project Thales Alenia Space Italia will be involved transversally in the thematic area of Digital Transition. In the general context of the Ecosystem of Innovation TAS-I's aim is to enhance research results, facilitate technology transfer and accelerate the digital transformation of industrial production processes in synergy with the scientific community. As far as the Digital Transition matters, TAS-I ambition is to enhance a closer integration between Industry and Research sectors throughout the implementation of a JOINT LAB that, exploiting an hybrid architecture and a complete set of technological IoT instrument, will allow the prototyping of new product solutions and of «Proof of Concepts» needed to the technological transfer which qualifying an IoT environment.

Previous experience, national and international collaborations

Relevant previous projects or activities, publications, and/or products, services (including widely used datasets or software), or other achievements connected to the subject of this proposal include:

European Space Agency (ESA) ITT AO/1-10002/19/NL, "SMART MANUFACTURING FOR FUTURE CONSTELLATION", 350.000 €;

European Space Agency (ESA) ITT AO/10612, "MACHINE LEARNING-BASED ON BOARD AUTONOMY, FAILURE PROGNOSTIC AND DETECTION", 800.000€.

"SMART MANUFACTURING IN THE SPACE INDUSTRY. A CYBER-PHYSICAL SYSTEM ARCHITECTURE AND ITS IMPLEMENTATION TO A MAIT PROCESS FOR MEGA CONSTELLATION OF SATELLITES", International Astronautical congress (IAC) 2021, release date 2021;

"SMART MANUFACTURING IN THE FRAME OF SPACE INDUSTRY. AN INDUSTRY4.0 APPROACH TO LARGE SCALE PRODUCTION OF SATELLITES CONSTELLATION", ACTA Astronautica, release date 2021;

"NECESSARY CONDITIONS FOR INFINITE HORIZON OPTIMAL CONTROL PROBLEMS WITH STATE CONSTRAINTS", Mathematical Control and Related Fields, release date 2018;

"HAMILTON-JACOBI-BELLMAN EQUATIONS FOR INFINITE HORIZON CONTROL PROBLEMS UNDER STATE CONSTRAINTS WITH TIME-MEASURABLE DATA", Nonlinear Differential Equations and Applications, release date Feb 2019;

"A TWO-PLAYER GAME REPRESENTATION FOR A CLASS OF INFINITE HORIZON CONTROL PROBLEMS UNDER STATE CONSTRAINTS", In: 2020 American Control Conference (ACC). IEEE, release date 2020;

"REPRESENTATION OF WEAK SOLUTIONS OF CONVEX HAMILTON-JACOBI-BELLMAN EQUATIONS ON INFINITE HORIZON", To appear.

Involvement

TASI will contribute to the Applied research, technology development and innovation, Spoke1, developing all the research and technologies necessary to setup the Open Joint Labs described below. In Spoke 6, Joint labs and Open labs, TASI will contribute to Open Research Infrastructures, joint labs, higher education with industrial collaboration spoke within a dedicated open collaborative area carried out in cooperation between universities, research centers and industries called "JOINT LAB" that will make available the following innovative & open shared laboratories and aiming also developing proof-of-concept level activities:

· JOINT LAB for collaborative research on ARTIFICIAL INTELLIGENCE (Machine & Deep Learning) and BIG DATA ANALYTICS E2E;
· JOINT LAB for collaborative research on VIRTUAL & AUGMENTED REALITY;
· JOINT LAB for collaborative research on DIGITAL THREAD & DIGITAL TWIN in IoT Environment;
· JOINT LAB for collaborative research on advanced ROBOTIC COLLABORATION;
· JOINT LAB for collaborative research on VIRTUAL TESTING & SIMULATION;
· JOINT AREA for CO-DESIGN and CO-ENGINEERING thinking to discover new innovative and creative solutions to be tested, validated and integrated throughout the six nearest labs.

❖ Participant 24 - Unicredit

Profile

UniCredit is a pan-European Commercial Bank with a unique service offering in Italy, Germany, Central and Eastern Europe. Digitalisation is at the heart of its strategy and our ultimate ambition is to be a truly digital bank, powered by data in all we do. We will embark on four key projects: User Experience, New Digital Offering, Payment value Chain and Cyber Security. At the same time our Digital & Data priorities are:

internalised up-skilled workforce and rationalised external organisation and partners; new way of working with modular and reusable solutions which can be scaled across our Group; investment model amplified through efficiencies and scale; client approach focused on value creation with an organisation structured around products and functions working together to deliver quality at speed. UniCredit will invest €2.8 billion in digital and data over the next three years to transform its own technology.
UniCredit has set its digital vision to become the most relevant digital financial player in supporting clients. This will be achieved by building a new Technology-digital-data capability that will enable the bank to radically improve client experience, increase cost efficiency and enable new business models beyond the existing business scope.
We are proposing a multi-functional working group with vertical capabilities (data, machine learning, AI, etc but also Human / Machine Interaction, Service Design and skills development) and managerial capabilities. Persons involved are active participants in the UniCredit transformation, working for a data driven bank as well as for a new way of working development involving new professional roles.
Capabilities selected can actively contribute with:
· open research for innovation development joint labs in cooperation with other stakeholders bringing not only hard skills but also a reality check deriving from their daily real life in a complex environment
· proof of concept development
post graduate programs on selected area required in the digital financials industries creation
Previous experience, national and international collaborations
Applied Research & Innovation are core activities to support the digital transformation. UniCredit has many applications that insist on more countries' data, involving Artificial Intelligence applications on scale using Big Data technologies. Moreover, we are working on analysis based on graphs, with increasing complexity (involving Big Data technologies) and Quantum Computing studies and POCs using IBM technology.
UniCredit is also launching its own Digital Academy for upskilling and reskilling professionals to shape the new roles of the future.
Involvement
Unicredit will implement its activities within Spoke 6, proposing a multi-functional working group with vertical capabilities (data, machine learning, AI, etc but also Human / Machine Interaction, Service Design and skills development) and managerial capabilities. Persons involved are active participants in the UniCredit transformation, working for a data driven bank as well as for a new way of working development involving new professional roles.
Capabilities selected can actively contribute with:
· open research for innovation development joint labs in cooperation with other stakeholders bringing not only hard skills but also a reality check deriving from their daily real life in a complex environment
· proof of concept development
· post graduate programs on selected area required in the digital financials industries creation.

❖ Participant 25 - Unidata

Profile
As part of the "Rome Tecnopole" project, Unidata proposes itself as a provider of advanced digital solutions, network computing and cloud infrastructures, IoT networks, PaaS for IoT, Big Data, Artificial Intelligence, Data Gathering. The specific skills and experiences make it transversal to all three thematic areas. Unidata will share its ability, demonstrated by its 37 years of history, to continuously transform innovation into business with the other partners and with the entrepreneurial fabric of the territory.
Many people who hold key technological roles in society and who will be involved in the project come from academia and research, from technology transfer, from innovative business.
Profile
Unidata has been involved in many European and national R&D projects in recent years. The main focuses of these projects were Artificial Intelligence and EDGE computing, IoT networks applied to the circular economy, e-Health, monitoring and saving of primary resources. In these project Unidata has always collaborated with universities and research centers including above all: University of Rome La Sapienza, CNIT, the University of Tor Vergata, Roma Tre, the CNR. For the sake of brevity, we only mention those active in the 2020-2022 period:
Elegant – Secure and Seamless Edge-to Cloud Analytics H2020: The ongoing project aims to develop a new software solution to be applied to the main challenges facing the Internet of Things (IoT) and big data: interoperability, reliability, security and protection. To achieve its goal, the project will bring together an european consortium of experts on low-level system software, IoT, big data, AI-assisted planning and DevOps.

Fragili – Progetti Strategici POR-FESR 2014-2020: the current project, in the field of remote assistance systems, aims to develop a solution to support the NHS in the long term and guarantee quality standards starting from telemedicine and enabling technologies. It is a support system for fragile people combining home automation, Big Data and Analytics for the study of operating models, Cloud aaS system for the operations center.
Ipse Parsit - IoT Publish Subscribe Environment - POR-FESR 2014-2020. R&D project in the IoT and Big Data field for the creation of an innovative Publish Subscribe system in the Circular Economy sector, applied to waste collection and the third sector.
Involvement
Unidata will contribute at various level to the Spoke 1 1 - Applied research, technology development and innovation activities, on the following topics:
BUSINESS INNOVATION - NEW ENTREPRENEURSHIP - IPR: We live in an age where it is no longer possible to separate technological innovation from business model innovation. Innovation management is fundamental in all aspects (from basic research to product innovation and communication). Unidata will support the project with its prime level specialists who have more than twenty years of experience not only in research but also in product innovation and innovative entrepreneurship. Thanks to the specific experience we will also support SMEs and Startups in the processes related to IPR. The support will cover all tasks, from Fundamental research to Management & Communication
HIGH SCALABLE IaaS & PaaS INFRASTRUCTURE – BIG DATA & ANALYTICS: today, every disruptive innovation is based on the combination of efficient and innovative infrastructures and platforms that make it possible to scale services in real time on a global scale. Unidata will support the project with its experts with almost twenty years of experience in IaaS, PaaS architectures, with particular focus on systems that combine IoT, Big Data & Analytics. The support will mainly concern the tasks of Industrial and applied research, precompetitive development, and technology development
IoT PLATFORM AND APPLICATION: After so many years of broken promises, finally all the technologies related to the IoT are starting to express their full potential. It is all too easy to cite sectors I4.0 and e-Health as examples. To these sectors is added (also within the PNRR) the rational use of primary resources (water and energy in the first place). Unidata will support the project with its specialists in the development of IoT applications and platforms. The support will mainly concern the tasks of Industrial and applied research, precompetitive development, and technology development.
IoT AND NGN NETWORK: It is not possible to think about the innovation of a country (especially in the sectors of primary resources, digital innovation, and health), without also dealing with innovative infrastructures for telecommunications and the IoT. For years, Unidata has included the concepts of NGN and Software Defined Network within its innovative offer. In the IoT field, it has already introduced slicing and virtual network functions (typical of 5G IoT) in the LPWA (Low Power Wide Area Network). Thanks to SDN technologies, it can already offer advanced virtual network and security services also in the TLC field. Unidata will support the project with its innovative network experts. The support will mainly concern the tasks of Industrial and applied research, precompetitive development, and technology development.NETWORK IOT AND CLOUD SECURITY: Security is a fundamental issue to keep in mind in every innovative project, especially in areas that involve sensitive data such as digital business intelligence and health. Unidata will support the project with its security experts for the network, IoT and Cloud part. The support will mainly concern the tasks of Industrial and applied research, precompetitive development, and technology development.

C) CHARACTERISTICS, FEASIBILITY AND CONTROL

Critical mass involved in the project

Rome Technopole is organized in 6 thematic-functional Spokes, as described in section b.1.2 and detailed in section c.3. These Spokes are conceived in a perspective of supply chain as the ecosystem domains within which the different types of activities that represent the founding mission of Rome Technopole take place. **According to the declination of the public call of the Investment 1.4 of PNRR-M4C2**, these activities are: fundamental and applied industrial research, precompetitive development, technology scale-up for industrialization, technology transfer, start-up incubation and acceleration, patenting and licensing; open research infrastructure, joint and open labs to develop and sustain integrated research and innovation activity in collaboration with industries; university and professional education, higher education, PhDs in collaboration with industries, longlife learning; outreach, public engagement, open science, students' engagement, job placement, activities related to the achievement of SDGs goals in the economy and society, initiative aimed to reduce inequalities and to promote women in science.

All these activities are declined within three smart specialization areas of the regional strategic plan 2021-2027 (i.e. energy transition, digital transition, health & bio-pharma) through vertical innovation flagship projects that are carried out with Rome Technopole in a logic of integration among research capability, infrastructure availability, industrial needs, technology development, including the aspects related to the supply chain of the ecosystem, i.e. engagement of young people in STEM, education and training along all three levels (bachelor, master, PhD), job placement, longlife and professional learning.

Rome Technopole project has been originally conceived by the three public universities of Rome (Sapienza Univ. of Rome, Univ. of Tor Vergata, Univ. of Roma Tre), in collaboration with **Unindustria** and **Lazio Region**, with the specific goal of providing Rome city with an integrated system of research, training and businesses that would push the territory out of the crisis generated by the COVID pandemic. This model has been widely disseminated and presented to the entrepreneurial system of Rome and Lazio in several occasions and also through the press, and it has attracted large consensus from companies, industries and SMEs, which have proposed themselves as partner of the project.

Therefore, the partnership of the project is larger with respect to the original promoting partners, and it consists of 7 universities, 4 public research centers, 13 large industries and multinational corporate, 1 SME, all having headquarter in Lazio, selected according to the rationale described in the following.

Among Universities having headquarters in Lazio, funding partners of the ecosystem have been selected according to the following criteria:

- excellence, qualification and critical mass in the specific smart specialization areas (SSA) on which the project is focused, i.e. energy transition, digital transition, health & bio-pharma, as resulting from researcher mapping shared among them;
- -amount and quality of the scientific publication produced in the last five years, specifically on the selected SSAs, as resulting from data-base of common use in the national and international community;
- quality and quantity of the university courses offered (both first and second level) specifically on the selected SSAs;
- quality and quantity of the PhD courses offered specifically on the selected SSAs;
- international collaborations on research projects focused on the selected SSA, as resulting from international agreement, financed European projects, financed Erasmus Mundus programmes, etc..
- active start up and spin off on the selected SSAs.

Among the Public Research Center having headquarter in Lazio, funding partners of the ecosystem have been selected CNR, INFN, ENEA and ISS because of their dimension and large qualification in the specific SSAs and also because they are already member of the Open Research Infrastructure for Innovation of Lazio Region (IARI) and already involved in numerous research project in collaboration with the selected Universities on similar topics.

Among enterprises and industries, the ones selected as funding partners are the largest companies and multinational corporate having headquarter in Lazio; they have specific business in the specific SSAs of interest of the project or are service provider or potential financer of Rome Technopole. They are:

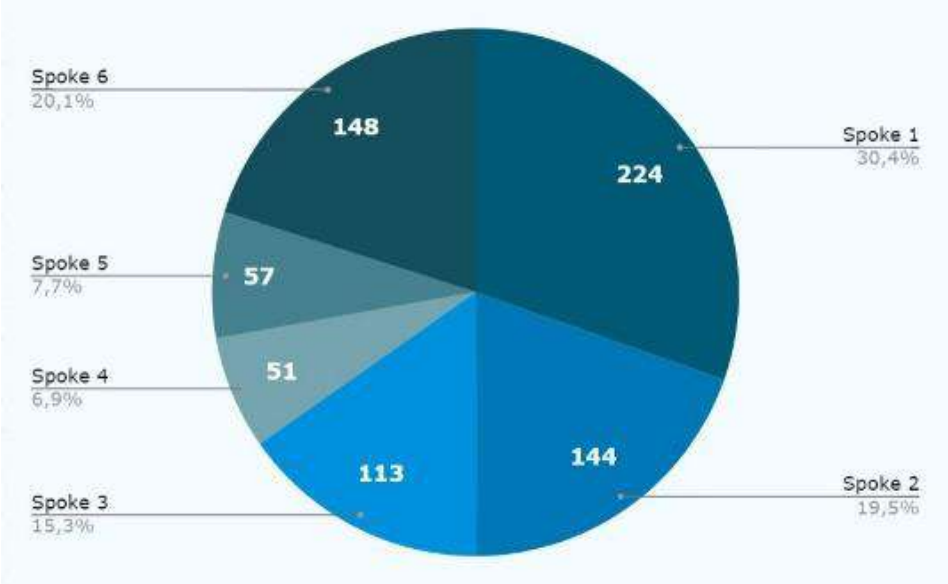
- **in the area of energy transition,** there are: ENI, Maire Tecnimont, COIMA, whose business cover different aspects of the same SSA, such as decarbonization and energy, circular economy and waste recycling, urban requalification and zero-emission building.

- **in the area of digital transition:**
    - Leonardo, Thales Alenia Space, Airbus Italia, MBDA, whose business cover the field of space communications, aerospace, microelectronics;
    - Unidata who is a telecommunications operator with a significant presence in Rome and Lazio;
    - Almaviva whose business cover the fields of cybersecurity, defense and security, banking and insurance, transport and logistics, agriculture, health, telco, energy & services, central and local public administration;
    - BV Tech, who mission is management consulting and information & communication technology, with special focus even on digitalization in health;
    - Unicredit group, who is one of the main European financial groups and the leading bank in Italy and is particularly interested in activities related to digital transition;
- **in the area of health & bio-pharma:** Catalent who is a large company in the field of bio-pharma and Tachis biotech, who is a SME active in the field of pharma;
- **as a cross-cutting competence,** LVenture who is a holding company that invests in digital startups with high growth potential and with its accelerator LUISS EnLabs, born from a collaboration agreement with the Luiss University.

The following table summarizes the **distribution of Universities, Public research institutes (EPR) and Industrial partners among the six spokes**.

Partners involved	Spoke 1 Applied research, technology development and innovation (Università degli Studi La Sapienza)	Spoke 2 Technology transfer, new entrepreneurship, business incubation and acceleration (Università degli Studi Tor Vergata)	Spoke 3 University education, industrial PhD courses, internationalization (Università degli Studi Roma Tre)	Spoke 4 Professional undergradute education in technology (Università di Cassino e del Lazio Meridionale)	Spoke 5 Out-reach, public engagement, lifelong learning (Università degli Studi della Tuscia)	Spoke 6 Open Research Infrastructures, joint labs, higher education with industrial collaboration (Università degli Studi La Sapienza)
Universities	7	7	5	4	4	4
Public research centers	2	3	2	1	2	4
Industrial Partners	9	3	3	1	0	5
Total	18	13	10	6	6	13

Human resources dedicated to the project have been selected on the basis of their specific expertise and competences in the field of the project, and specifically in one or more S3, and/or as key-person with a specific institutional role inside their institution which directly fit the scope of the project. Senior researchers and professor have been selected non the basis of their curriculum and scientific qualification, assessed through bibliometric parameters in use in the scientific community, dimension of their research group, past responsibility and coordination of research project, international collaborations.
The following graphs summarize the allocation of human resources for each spoke



The critical mass requirement set forth in the Call has been fully respected, as summarized in table below:

Spoke	Affiliates	Number of persons (CVs)	Persons involved for at least 3 man months/year	Total persons involved
Spoke 1 Applied research, technology development and innovation (Università degli Studi La Sapienza)	Università degli Studi La Sapienza	50	5	226
	Università degli Studi Tor Vergata	12	4	
	Università degli Studi Roma Tre	27	4	
	Università di Cassino e del Lazio Meridionale	8	4	
	Università degli Studi della Tuscia	8	4	
	CNR	14	4	
	LUISS	9	4	
	Istituto Superiore di Sanità	13	4	
	ENEA	7	4	
	Università Campus Bio-Medico di Roma	12	4	
	AIRBUS	7	4	
	BV-Tech S.P.A.	7	4	
	COIMA	7	7	
	Leonardo S.P.A.	7	4	
	MAIRE TECNIMONT	7	4	
	MBDA	8	4	
	Takis	7	4	
	Thales	7	4	
	Unidata	9	4	
Spoke 2 Technology transfer, new entrepreneurship, business incubation and acceleration (Università degli Studi Tor Vergata)	Università degli Studi Tor Vergata	10	5	146
	Università degli Studi La Sapienza	30	4	
	Università degli Studi Roma Tre	16	4	
	Università di Cassino e del Lazio Meridionale	8	4	
	Università degli Studi della Tuscia	9	4	
	CNR	9	4	
	LUISS	7	4	
	Istituto Superiore di Sanità	7	4	
	ENEA	7	4	
	Università Campus Bio-Medico di Roma	9	4	
	AlmavivA	18	4	
	CATALENT	8	4	
	LVENTURE	8	4	
Spoke 3 University education, industrial PhD courses, internationalization (Università degli Studi Roma Tre)	Università degli Studi Roma Tre	34	5	114
	Università degli Studi La Sapienza	22	4	
	Università degli Studi Tor Vergata	7	4	
	Università degli Studi della Tuscia	7	4	
	CNR	7	4	
	Istituto Superiore di Sanità	7	4	
	Università Campus Bio-Medico di Roma	8	4	
	BV-Tech S.P.A.	7	4	
	CATALENT	8	4	
	Eni	7	4	
Spoke 4 Professional undergradute education in technology (Università di Cassino e del Lazio Meridionale)	Università di Cassino e del Lazio Meridionale	7	5	48
	Università degli Studi La Sapienza	12	4	
	Università degli Studi Roma Tre	7	4	
	Università degli Studi della Tuscia	7	4	
	Istituto Superiore di Sanità	7	4	
	CATALENT	8	4	
Spoke 5 Out-reach, public engagement, lifelong learning (Università degli Studi della Tuscia)	Università degli Studi della Tuscia	7	5	53
	Università degli Studi La Sapienza	12	4	
	Università degli Studi Tor Vergata	7	4	
	Università degli Studi Roma Tre	7	4	
	CNR	7	4	
	Istituto Nazionale di Fisica Nucleare	13	4	
Spoke 6 Open Research Infrastructures, joint labs, higher education with industrial collaboration (Università degli Studi La Sapienza)	Università degli Studi La Sapienza	23	5	149
	Università degli Studi Tor Vergata	9	4	
	Università degli Studi Roma Tre	12	4	
	Università degli Studi della Tuscia	7	4	
	CNR	7	4	
	Istituto Nazionale di Fisica Nucleare	11	4	
	Istituto Superiore di Sanità	8	4	
	ENEA	7	4	
	Università Campus Bio-Medico di Roma	7	4	
	AlmavivA	17	4	
	BV-Tech S.P.A.	7	4	
	LVENTURE	7	4	
	Takis	7	4	
	Thales	7	4	
	Unicredit	13	4	

The human resources allocated to each spoke cover all three relevant specialization areas, with the following distribution:

Management structure of the HUB

The model of innovation ecosystem that is proposed to be adopted is that of a center of national excellence for higher education, professional and continuing education, industrial research, knowledge transfer and technology transfer, and sees the synergistic and integrated participation of universities, important industrial partners, business associations, national and regional institutions.

The new institution is characterized by a streamlined structure that does not duplicate or replicate existing university structures in the region, but puts in place a system of existing resources and already available and is functional to the provision of innovative transdisciplinary degree or master's degree courses in response to new educational needs of the world of production with particular attention to the transverse areas of sustainability and ecological and digital transitions, university training courses, professional training and continuing education, on the other hand, the activation of new industrial doctorate programs, the creation of laboratories for technology transfer to companies, for business incubation, for training and specialization in the most advanced technologies of students.

The new institution will have to adopt operational management procedures that provide for the use of professors on staff at partner universities, involving technical staff from the business world, according to a model that aims to solve and not accentuate the problem of precariousness in the world of research and university education, attracting to the Lazio region excellent young researchers, a veritable hotbed of talent and professionalism.

The start-up plan of Rome Technopole foresees the systemization and integration of the capacities and resources of the universities (open research infrastructures), of the companies and industries (joint labs and open labs) participating in the project, together with the creation and activation of the operational headquarters of Rome Technopole, as a real campus of the innovation ecosystem, within the city of Rome, in areas made available by the Municipality of Rome that adheres to the project. The new headquarters is expected to be equipped with new laboratories for teaching and industrial research, spaces for the incubation of business ideas, classrooms for meetings and seminars, spaces for temporary technological exhibitions, legal and administrative headquarters, according to the plan detailed below.

❖ Rome Technopole headquarters and campus

The construction of the headquarters and campus of Lazio Technopole is foreseen within the Pietralata area owned by the Municipality of Rome, which is part of the regional strategic development plans.

It is foreseen to realize new buildings for a total of about 15.000 square meters, organized in:

1. Common areas and services, including representation areas: about 30% of the total space available.

2. Multimedia classrooms and rooms for teaching and training activities: about 10% of the total available spaces.
3. Research laboratories and areas for technology transfer: about 35% of the total space available, of which about 1000 square meters for the incubator.
4. Student housing and residences (according to the college model): about 20% of the total space available, with the creation of 300 beds.
5. Administrative offices and headquarters of Rome Technopole: about 5% of the total space available.

In the external areas, it is foreseen to create 500 parking spaces, including areas reserved for the recharging of cars and electric vehicles and areas reserved for car-sharing. The mobility plan to be implemented in order to facilitate and increase the accessibility of the site should include the establishment of a shuttle service with electric traction that connects the campus of Rome Technopole, with the metro line and high-speed rail at Tiburtina station.

Within the frame of this project, considering the budget available and the time duration, it is planned to complete: the final design of the new headquarter and campus (over the total area of intervention), including the design of the sustainable mobility system; the construction of the first lot of the intervention for a total of about 2.300 sqm, including headquarter, administrative offices and incubator. The completion of the Rome Technopole campus is foreseen with additional resources that will be made available by the Municipality of Rome and Lazio Region, by 2027.

For the purposes of planning and implementation of the interventions for the realization of the Rome Technopole headquarters, a "**Committee for the construction of Rome Technopole Campus**" will be constituted within the Hub, composed of Rome Technopole partners and representatives of the Municipality of Rome and the Lazio Region, with the function of assisting the planning activities, through the definition of requirements and specifications for environments and systems for the purposes of carrying out the activities of the Technopole. The site will be realized as an example of application of innovative technologies developed within the Spoke 1 and 6, within of the flagship project "Energy transition and digital transition in urban renewal and construction" in line with the objective "Greener Europe" of energy efficiency and integration of smart grid technologies. In fact, it is foreseen the realization of the interventions for the realization of the Rome Technopole headquarters implementing strategies and technologies of energy efficiency, anti-seismic, building sustainability and integration with a sustainable mobility plan for the use of the headquarters, according to which to encourage e-mobility and car-sharing.

❖ Activities

The specific activities functional to the establishment and activation of Rome Technopole are listed below, indicating the Spoke within which they are located:

- ***Communication and promotion of the Rome Technopole brand and services***
  - Internal and external communication (Hub)
  - Website (in Italian with multilingual translation) (Hub)
  - Web portal for research, research infrastructures and technology transfer (Hub)
  - Monthly newsletter (Hub)
  - Promotion events (Hub)
- ***Services to support research and technology transfer***
  - Permanent support desk for national and international competitive planning (information on opportunities and open calls, match-making between research groups and companies, support in the search for research partnerships) (Spoke1)
  - Support desk for innovative entrepreneurship (organization of meetings with investors, coaching services on patenting and business creation) (Spoke 2)
- ***Services in support of national and international mobility***
  - Programs and actions aimed at promoting international mobility through the provision of housing and university residences, recreational spaces and sports, common spaces for students and students of doctoral programs (Spoke 3)
  - Talent scouting on national and international territory (Spoke 1)
- ***Classrooms and spaces for training***
  - Multimedia classrooms (Spoke 2)
  - Teaching laboratories (Spoke 2)
- ***Transdisciplinary laboratories for industrial research and innovation***

- New laboratories within Rome Technopole for the development of integrated university-enterprise proof-of-concept projects of innovative ideas and technologies and pilot projects of industrialized prototypes (Spoke 1, 3, 6)
- New laboratories for the implementation of technological platforms for the strengthening of the research infrastructure of Rome Technopole (Spoke 6)

- ***Incubator, innovation showcase, equipped open space***
  - Business incubator with spaces for coworking and incubated start-ups (Spoke 2)
  - Contamination lab to promote meetings and training of entrepreneurial culture (Spoke 6)
  - Exhibition spaces for prototypes and proof-of-concept (innovation showcase) and demonstration events (showcase) (Spoke 5)
- ***Support services to ensure gender balance***
  - Nursery school at Rome Technopole, reserved places for Rome Technopole employees (Spoke 5).

❖ Organizational model and implementation of the Rome Technopole plan

The implementation of the project for the realization of "Rome Technopole" foresees the establishment of a legal entity that can operate as a streamlined tool for the implementation of all planned actions and reforms.

The managerial and organizational model to which it intends to arrive is that of an entity of high institutional profile, non-profit, dedicated to actions and investments for the promotion and support of training and research activities, according to the format of "Foundation of participation", participated by universities, research institutions, Unindustria and major industrial players in the areas of strategic interest, founding partners of Rome Technopole.

The implementation plan of the project is activated with the establishment of the "Rome Technopole" Foundation, within 30 days from the conclusion of the negotiation phase with the MUR. Companies and industries that intend to join "Rome Technopole" will have to sign a commitment to invest in research and development in the new Foundation entity, contributing to the co-financing of training, research and technology transfer activities of their own strategic interest.

Rome Technopole's organizational chart includes:

- ***Governing bodies:***
  - President
  - Research Manager
  - Board of Directors
  - Assembly of Founding Members
- ***Committees for carrying out technical-scientific activities, training and exploitation of infrastructural resources for research:***
  - Technical Scientific Coordination Committee, including all Spoke leaders
  - Didactics Committee, including representatives of partners involved in educational and training activities
  - Committee for the Open Research Infrastructure for Innovation, including representative of partners participating to the Open Research Infrastructure of Rome Technopole
  - International Steering Committee
- ***Support Units for the performance of administrative and management activities and for the realization of the seat:***
  - Support Unit for Management, Administration and Accounting
  - Support Unit for promotion, communication and dissemination activities
  - Support Unit for technology transfer and intellectual property
  - Committee for the construction of Rome Technopole Campus
- ***Departments for development of technical and scientific activities and project implementation***
  The technical and scientific activities of Rome Technopole take place within the Spoke Departments. Each Department is coordinated by a Director (representative of the Spoke Leader) and a Management Committee consisting of one representative per Spoke affiliate.
  - Department Spoke 1 - Applied research, technology development and innovation
  - Department Spoke 2 - Technology transfer, new entrepreneurship, business incubation and acceleration

- Department Spoke 3 - University education, industrial PhD courses, internationalization
- Department Spoke 4 - Professional undergraduate education in technology
- Department Spoke 5 - Out-reach, public engagement, lifelong learning
- Department Spoke 6 - Open Research Infrastructures, joint labs, higher education with industrial collaboration

❖ Ex-post evaluation

Rome Technopole will be subjected to **ex post evaluation** of its activities by a panel of external experts constituted through an international public call. The experts may come from the scientific world as well as from the set of subjects that interact with the university within the multiple activities of teaching, research and third mission, specifically in relation to relations with the business world and the production of goods and services. The Panel may conduct hearings with the heads of individual structures in order to clarify essential elements of their respective activities.

In particular, the assessment will focus on the development of teaching (number of degree courses, number of innovative doctorates, number of foreign students), the enhancement of research (patents, spinoffs, third-party contracts and agreements) and the production of social and cultural public goods (public engagement, continuing education, clinical trials).

Rome Technopole will be subject to an initial evaluation 24 months after the project start-up date and then every three years thereafter.

❖ Dematerialization and digitization policy to minimize cost and times of procedures

The creation and management of a complex structure such as Roma Technopole, which addresses significant objectives to be achieved on different integrated levels, entails the adoption of procedures and decision-making processes to be declined in a rigorous perspective of administrative simplification. This must be considered as an element of reference in the construction of the structure already in the planning phase of the overall organization (administrative and technological operational) in a capillary manner involving all management and implementation procedures. The creation of a specific body for the application of simplification procedures is foreseen, which will verify the implementation of a rigorous policy of dematerialization and digitalization, drawing inspiration from procedures and tools already in use in the European Community. These will be defined and declined in relation to the specific actions as well as provided with adequate resources. Particular attention will be given to the simplification of all actions that provide for the activation and support of complex procedures such as calls for industrial research and technology transfer activities.

Work plan

Rome Technopole work plan is meant **to cover the entire training, research and innovation value-chain, from fundamental research up to open innovation**, taking into consideration also professional undergraduate training and outreach and public engagement.

The workplan is organized into **6 functional spokes**, each of them **divided in several tasks as described in the tables below**, that intersect the 3 thematic specialization areas identified by the project (energy transition, digital transition, health & biopharma), as described in section b.1.2. All the activities of Rome Technopole will be implemented through the achievement of the specific objectives of each spoke, as outlined in the following, through a methodology based on two concurring different approaches:

Integration of existing skills and competencies through partnerships between universities, industries and businesses participating in the project, regional and municipal government. The primary objective is to start the operational and technical-scientific structure of Rome Technopole at T0, implementing the first actions of strengthening, networking and integrating activities of training, higher education, research, technology transfer internationalization already underway. Fundamental to this process is the strategic collaborative role of Unindustria, as the main industrial association operating in the region, of the Lazio Region as recorder and guarantor of this process, and of Rome Technopole's partner companies.

New initiatives of the integrated community of Rome Technopole. The objective is to implement all the new actions and initiatives that arise from Rome Technopole's planning, around the 7 flagship ecosystem projects of strategic interest of the industrial partners and reported in section B “Methodology and project implementation” and through the functional operation of the Spokes in which Rome Technopole is articulated.

The theme of multidisciplinarity and contamination of knowledge is the common denominator of all the initiatives.
The workplan of Rome Technopole includes **activities casted in all 3 strategic specialization areas of the regional trajectories (EnT, DgT, H&BP)**. Moreover, the start-up plan **includes the 7 vertical innovation flagship projects** described in section b.2.1, which are focused on strategic topics of interest of the industrial partners and include activities inside more than one spoke, as sketched below.

Task	SPOKE 1	SPOKE 2	SPOKE 3	SPOKE 4	SPOKE 5	SPOKE 6
1	FP1, FP5, FP7	FP1, FP5, FP7	FP3, FP5		All	All
2	FP1, FP4, FP5, FP7	FP2, FP4, FP6	-		All	FP1, FP3, FP6, FP7
3	FP3, FP4, FP6, FP7	FP1	All		All	FP, FP4
4	FP2, FP4	FP1	All		FP4	FP2, FP4, FP5
5	All	-	All		All	FP2, FP4
6		FP1, FP3, FP4	All		All	

Legend:Vertical innovation flagship projects	**S3 Area**
FP1 - Decarbonization and digitalization in research on new green energy sources	EnT; DgT
FP2 - Energy transition and digital transition in urban regeneration and construction	EnT; DgT
FP3 - Digital transition in the decarbonization process and in waste recycling processes	EnT; DgT
FP4 - Development, innovation and certification of medical and non-medical devices for health	H&BP
FP5 - Digital transition through AESA (Active Electronically Scanned Array) radar technology, quantum cryptography and quantum communications	DgT
FP6 – Artificial intelligence, virtual reality and digital twin for advanced engineering and aerospace	DgT
FP7 – Advanced and automated innovation labs for diagnostic and therapeutic biopharma solutions	H&BP

The following tables describe activities, tasks, expected results, deliverables and contributing partner for each Spoke. The specific involvement and activity of each partner in the Spokes is described in Section B "Profiles of Spoke partners and affiliates".

❖ **Spoke 1 - Applied research, technology development and innovation**
Leader:Università La Sapienza **Affiliates**:Università degli Studi Tor Vergata, Università degli Studi Roma Tre, Università degli Studi della Tuscia, Università di Cassino e del Lazio Meridionale, Università Campus Bio-Medico di Roma, LUISS, CNR, Istituto Superiore di Sanità, ENEA, UNIDATA, Leonardo S.P.A., THALES, AIRBUS, BV-Tech S.P.A., MBDA, MAIRE TECNIMONT, COIMA
Description
Spoke 1 objective is the development and promotion of industrial research activities, technology and innovation that take into account: - The research offer of the system of universities and research institutions and of the national and international innovation network in which they operate; - the infrastructure capacity to support research in the area (open research infrastructure and high-tech labs); the research and innovation strategies of the European community and the Lazio region; the needs and development strategies of companies and industries operating in the area. Planned activities are: - incentivation and dissemination of industrial research activities aimed at consolidating and broadening the interest of university research groups in industrial research to be developed within the TRL 1-5 (from fundamental research to pre-competitive development); - dissemination of the practice of direct comparison company-research group on issues of industrial research for the definition of common objectives and shared paths that allow the development of research in the laboratory that provide for the presence of constraints in order to product and process innovation. The interventions will be articulated in: - development of flagship projects (from FP1 to FP6), depending on the different initial TRL; - open calls for industrial research addressed to the innovation of products and processes, open to the participation of universities, research organizations, SMEs external to Rome Technopole, including dedicated calls for Southern Italian regions (about the 60% of the budget of the calls); - constitution of university-industry research groups aimed at defining objectives and activities, promoting participation of stakeholders; - definition of verification methods - developed of a new approach to intellectual property of research results, as a tool to enhance the competitiveness of the country's industrial and production system, in order to favor the integration between the university world, public research and industrial world, with a view to equal relationship of skills and knowledge. In addition, **Task 6 in Spoke 1 collects all activities related to project management and communication**, including overall coordination of the Hub and Spokes, project management and reporting, communication of overall project aims, activities and results. These activities should be in charge of the Hub, which however in the submission phase of the proposal is not an existing legal entity. Therefore, these activities and the related budget are attributed to the leading partner of the proposal,i.e. Sapienza University of Rome.
Tasks
1.1- Fundamental research: activities aimed at supporting disruptive innovation in all three of the identified "vertical" thematic areas, to be performed in collaboration with industrial partners, based on their technology and innovation needs. Involvement and collaboration with external partners and enterprises not member of Rome Technopole, will be supported through open call for collaborative research and development projects. A part of the budget for open calls for fundamental research (around the 60%) will be dedicated to external partners and enterprises located in the southern Italian regions, in order to promote growth and innovation also outside Lazio region, in line with the objectives of PNRR. **1.2 - Industrial and applied research**: research targeting project in the range of TRL 2-3, defining joint objectives and research paths. Includes industrial research open calls and creation of joint research teams. A

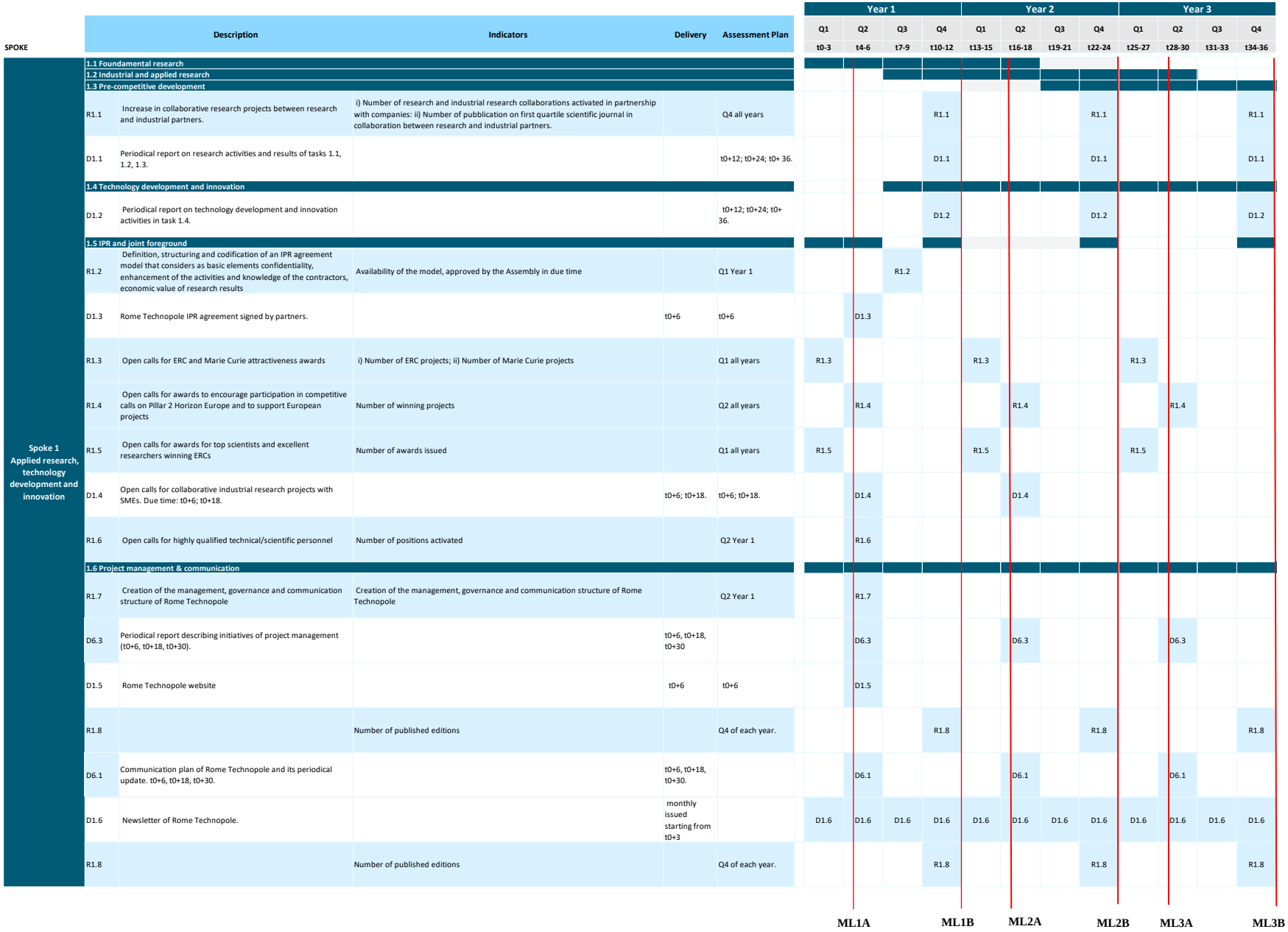
part of the budget for open calls for industrial research (around 60%) will be dedicated to external partners and enterprises located in the southern Italian regions, in order to promote growth and innovation also outside Lazio region, in line with the objectives of PNRR.
1.3 - Pre-competitive development: research targeting project in the range of TRL 4
1.4 - Technology development and innovation: creation of labs dedicated to the development of technologies for both products and processes.
1.5 - IPR and joint foreground: creation of expert working groups, defining IPR and foreground frameworks enabling joint activities for researchers from different entities
1.6 - Project management & communication: overall coordination of the Hub and Spokes, project management and reporting. Communication of overall project aims, activities and results, including web site of Rome Technopole, web communication and communication via social media. Hiring of Research Programme Manager.

Expected results

R1.1 - Increase in collaborative research projects between research and industrial partners. Indicators for assessment: i) Number of research and industrial research collaborations activated in partnership with companies: to be monitored at the end of each year Q4 all years; ii) Number of publications on first-quartile scientific journal in collaboration between research and industrial partners.
R1.2 - Definition, structuring and codification of an IPR agreement model that considers as basic elements confidentiality, enhancement of the activities and knowledge of the contractors, economic value of research results Q1 Year 1. Indicators for assessment: Availability of the model, approved by the Assembly in due time
R1.3 - Open calls for ERC and Marie Curie attractiveness awards Q1 all years. Indicators for assessment: i) Number of ERC projects; ii) Number of Marie Curie projects
R1.4 - Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects Q2 all years. Indicators for assessment: Number of winning projects
R1.5 - Open calls for awards for top-scientists and excellent researchers winning ERCs. Indicators for assessment: Number of awards issued
R1.6 - Open calls for highly qualified technical/scientific personnel Q2 Year 1. Indicators for assessment: Number of positions activated
R1.7 - Creation of the management, governance and communication structure of Rome Technopole Q2 Year 1
R1.8 - Monthly newsletter starting from Q1 Year 1. Indicator for assessment: Number of published editions to be monitored at Q4 of each year.

Deliverables

D1.1 – Periodical report on research activities and results of tasks 1.1, 1.2, 1.3. Due time: t0+12; t0+24; t0+ 36.
D1.2 - Periodical report on technology development and innovation activities in task 1.4. Due time: t0+12; t0+24; t0+ 36.
D1.3 – Rome Technopole IPR agreement signed by partners. Due time: t0+6
D1.4 – Open calls for collaborative industrial research projects with SMEs, including dedicated calls for Southern Italian regions. Due time: t0+6; t0+18.
D1.5 - Rome Technopole website production. Due time: t0+6
D1.6 - Newsletter of Rome Technopole. Due time: monthly issued starting from t0+3


Year 1
Year 2
Year 3
Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4
t0-3 t4-6 t7-9 t10-12 t13-15 t16-18 t19-21 t22-24 t25-27 t28-30 t31-33 t34-36
SPOKE
Description
Indicators
Delivery
Assessment Plan
Spoke 1 Applied research, technology development and innovation
1.1 Foundamental research
1.2 Industrial and applied research
1.3 Pre-competitive development
R1.1 Increase in collaborative research projects between research and industrial partners. i) Number of research and industrial research collaborations activated in partnership with companies: ii) Number of pubblication on first quartile scientific journal in collaboration between research and industrial partners. Q4 all years
D1.1 Periodical report on research activities and results of tasks 1.1, 1.2, 1.3. t0+12; t0+24; t0+ 36.
1.4 Technology development and innovation
D1.2 Periodical report on technology development and innovation activities in task 1.4. t0+12; t0+24; t0+ 36.
1.5 IPR and joint foreground
R1.2 Definition, structuring and codification of an IPR agreement model that considers as basic elements confidentiality, enhancement of the activities and knowledge of the contractors, economic value of research results Availability of the model, approved by the Assembly in due time Q1 Year 1
D1.3 Rome Technopole IPR agreement signed by partners. t0+6 t0+6
R1.3 Open calls for ERC and Marie Curie attractiveness awards i) Number of ERC projects; ii) Number of Marie Curie projects Q1 all years
R1.4 Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects Number of winning projects Q2 all years
R1.5 Open calls for awards for top scientists and excellent researchers winning ERCs Number of awards issued Q1 all years
D1.4 Open calls for collaborative industrial research projects with SMEs. Due time: t0+6; t0+18. t0+6; t0+18. t0+6; t0+18.
R1.6 Open calls for highly qualified technical/scientific personnel Number of positions activated Q2 Year 1
1.6 Project management & communication
R1.7 Creation of the management, governance and communication structure of Rome Technopole Creation of the management, governance and communication structure of Rome Technopole Q2 Year 1
D6.3 Periodical report describing initiatives of project management (t0+6, t0+18, t0+30). t0+6, t0+18, t0+30
D1.5 Rome Technopole website t0+6 t0+6
R1.8 Number of published editions Q4 of each year.
D6.1 Communication plan of Rome Technopole and its periodical update. t0+6, t0+18, t0+30. t0+6, t0+18, t0+30.
D1.6 Newsletter of Rome Technopole. monthly issued starting from t0+3
R1.8 Number of published editions Q4 of each year.
ML1A
ML1B
ML2A
ML2B
ML3A
ML3B

❖ **Spoke 2 - Technology transfer, new entrepreneurship, business incubation and acceleration**

Leader: Università degli Studi Tor Vergata

Affiliates:Università degli Studi La Sapienza, Università degli Studi Roma Tre, Università degli Studi della Tuscia, Università di Cassino e del Lazio Meridionale, Università Campus Bio-Medico di Roma, Istituto Superiore di Sanità, LUISS, CNR, ENEA, AlmavivA, CATALENT, LVENTURE

Description

Spoke 2 objective is the promotion of industrial valorization of research's results with respect to both internal and external entities and stakeholders, taking into account:

- to activate, support, encourage and test the actions necessary for the exploitation of the results of research developed in universities and research centers located in the regional territory for the maturation of the "Technology Readiness Level" (TRL) of research products from TRL 4 to TRL 6 towards industrialization and marketing, with specific focus on the involvement of the stakeholder boards through the creation of communities on the three smart specialization areas (EnT, DgT, H&BP) and of focus groups on specific subtopics;
- to activate, support, encourage and test the actions necessary for the exploitation of the results of research developed in universities and research centers located in the regional territory for the maturation of the "Technology Readiness Level" (TRL) of research products from TRL 4 to TRL 6 towards industrialization and marketing;
- studying and testing new technology transfer models to make it manageable by integrating it with industrial research and experimental development activities. Objectives are to reduce economic, technical, and scientific risks and reduce the time to market of research.

Planned activities are:

- promotion of industrial development of research results and technologies (products and transformation processes) to be developed within the TRL 4-6 (from laboratory to industrial prototype development and validation), aimed at consolidating and broadening the interest of industries and SMEs in collaborating with research groups;
- promotion of students and researchers' entrepreneurship in systematic and participatory forms by supporting the creation of innovative start-ups/spin-offs and their acceleration;
- training courses for both researchers and industries employee mainly based on "on the job" activities strictly related to specific TT projects under way.
- patenting;
- creating of communities and focus groups involving external stakeholders in order to promote and support technology transfer.

The interventions will be articulated in:

- development of flagship projects (FP2, FP4, FP5 and FP6);
- open calls for prototyping and proof of concept projects addressed to the validation of products and processes, open to the participation of universities, research organizations, SMEs external to Rome Technopole, including dedicated calls for Southern Italian regions (about 60% of the calls budget);
- organization training courses to be designed on specific technological need from industries;
- promotion of startups births by providing spaces and access to dedicated funds;
- promotion of application of new patents;
- definition of a TT model capable of fully enhancing the skills present in the Technopole ecosystem.

Tasks

2.1 Valorization of research results for industrialization: activities targeting projects aiming to reach TRL 5-6, creating dedicated reaserch groups, definition of common methods and objectives through the exploitation of research results in terms of products to be brought to pre-industrialization.

2.2 Valorization of technologies for industrialization: activities targeting projects aiming to reach TRL 5-6, creating dedicated research groups, definition of common methods and objectives through the enhancement of industrial research activities in terms of process technologies to lead to industrialization.

2.3 Business incubation, promotion of new start-ups and spin off: creation of dedicated spaces, awards and open calls. A part of the budget for open calls (around the 60%) will be dedicated to external partners and enterprises located in the southern Italian regions, in order to promote growth and innovation also outside Lazio region, in line with the objectives of PNRR.

2.4 Business acceleration and venture capital: activities aiming at supporting the growth of start ups and spin offs from previous WP. Cooperation with Lazio Innova on open calls.
2.5 Training in technology transfer: creation of dedicated training programmes on technology transfer, targeting both researchers and industries
2.6 Patenting & licensing: creation of dedicated training programmes on patenting and licensing, targeting both researchers and industries

Expected Results

R2.1: Increase of industrial research projects concerning development of new products from research results. Indicators for assessment: i) Number of collaborations agreements activated in partnership with companies: to be monitored at the end of each year Q4 all years;
R2.2: Increase of technology transfer projects in collaboration with research groups. Indicators for assessment: i) Number of collaborations agreements activated in partnership with companies: to be monitored at the end of each year Q4 all years;
R2.3: Open calls for students' participation to training courses. Indicators for assessment: i) number of courses activated; ii) number of students involved; both to be monitored at the end of each year Q4 all years;
R2.4: Open calls to support the birth of startups. Indicators for assessment: i) number of startup constituted; ii) number of members of the startups; both to be monitored at the end of each year Q4 all years.
R2.5: Organization of meetings and periodic events for fundraising by investors. i) number of events organized; ii) total fund raised; both to be monitored at the end of each year Q4 all years.
R2.6: Open calls to support patenting by startups and SMEs, with dedicated budget for subjects in the southern Italian regions. Indicators for assessment: i) Number of new patents' applications.
R2.7: Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects Q2 all years. Indicators for assessment: i) Number of winning projects
R2.8: Open calls for highly qualified technical/scientific personnel Q2 Year 1. Indicators for assessment: i) Number of positions activated.

Deliverables

D2.1 – Periodical report on exploitation activities and results of tasks 2.1, 2.2, including technical reports. Due time: t0+12; t0+24; t0+ 36.
D2.2 – Periodical report on initiatives activated and results of tasks from 2.3 to 2.6. Due time: t0+12; t0+24; t0+ 36.
D2.3 – Best practices for the exploitation and industrial valorization of research results as outcome of Spoke 2 overall activities. Due time: t0+ 36.

SPOKE		Description	Indicators	Delivery	Assessment Plan	Year 1				Year 2				Year 3			
						Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
						t0-3	t4-6	t7-9	t10-12	t13-15	t16-18	t19-21	t22-24	t25-27	t28-30	t31-33	t34-36
Spoke 2 Technology transfer, new entrepreneurship, business incubation and acceleration	2.1 Valorization of research results for industrialization																
	2.2 Valorization of technologies for industrialization																
	R2.1	Increase of industrial research projects concerning development of new products from research results.	i) Number of collaborations agreements activated in partnership with companies		Q4 all years				R2.1				R2.1				R2.1
	R2.2	Increase of technology transfer projects in collaboration with research groups.	i) Number of collaborations agreements activated in partnership with companies		Q4 all years;				R2.2				R2.2				R2.2
	R2.3	Open calls for students' participation to training courses.	i) number of courses activated; ii) number of students involved;		Q4 all years				R2.3				R2.3				R2.3
	D2.1	Periodical report on exploitation activities and results of tasks 2.1, 2.2, including technical reports.		t0+12; t0+24; t0+ 36.					D2.1				D2.1				D2.1
	2.3 Business incubation, promotion of new start-ups and spin offs																
	2.4 Business acceleration and venture capital																
	2.5 Training in technology transfer																
	2.6 Patenting & licensing																
	R2.4	Open calls to support the birth of startups.	i) number of startup constituted; ii) number of members of the startups;		Q4 all years.				R2.4				R2.4				R2.4
	R2.5	Organization of meetings and periodic events for fundraising by investors	i) number of events organized; ii) total fund raised		Q4 all years.				R2.5				R2.5				R2.5
	R2.6	Open calls to support patenting by startups and SMEs.	i) Number of new patents' applications.		Q2 all years		R2.6				R2.6				R2.6		
	R2.7	Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects	Number of winning projects		Q2 all years		R2.7				R2.7				R2.7		
	R2.8	Open calls for highly qualified technical/scientific personnel	i) Number of positions activated.		Q2 Year 1.		R2.8										
	D2.2	Periodical report on initiatives activated and results of tasks from 2.3 to 2.6.		t0+12; t0+24; t0+ 36.					D2.2				D2.2				D2.2
	D2.3	Best practices for the exploitation and industrial valorization of research results as outcome of Spoke 2 overall activities.		t0+ 36.													D2.3

ML1A ML1B ML2A ML2B ML3A ML3B

❖ **Spoke 3 - University education, industrial PhD courses, internationalization**

Spoke leader: Università degli Studi Roma Tre

Affiliates: Università degli Studi La Sapienza, Università degli Studi Tor Vergata, Università degli Studi della Tuscia, Università Campus Bio-Medico di Roma, CNR, Istituto Superiore di Sanità, ENI, BV-Tech S.P.A., CATALENT

Description

Spoke 3 fundamental objective is to increase the degree of collaboration and correlation between companies and universities in the design of educational and training paths. Rationalizing and specializing the educational offerings of leading universities in areas of great perspective, with an inter-disciplinary logic and open to co-designing curricular paths with companies, is a decisive action to help graduates acquire the skills and knowledge required in the labor market, as well as to promote their personal development and their employability.

This respond to the need to refine the combination of soft and hard skills, improve the employability of graduates, reduce the phenomena of over-qualification and under-qualification of young workers and wage gaps. The Rome Technopole's mission is also to develop a model, best practices with practical indications to reduce skill mismatch and increase skill levels and opportunities for economic growth.

Main activities will be oriented to:

- Enhancement and implementation of interdisciplinarity, multi-disciplinarity and trans-disciplinarity among and in the Courses of Study of both the first and second level of training;
- Validation of the competencies acquired at the end of the study path, intervening with targeted actions in the training paths, also envisaging, if necessary, changes to the Regulations and/or to the organization of the Course/s in order to reduce the gap to industry employment.
- Provision for innovative courses that also contemplate the acquisition of additional extra-curricular credits, with dedicated activities that better support the acquisition of specific additional skills.
- Innovative PhD courses aimed to facilitate and improve the quality of employment in the industrial contest correlated to the three strategic areas (EnT, DgT, H&BP).
- Wide use of digital technology in high education will be strategic and fully supported in order to promote and enhance internationalization, through the development of innovative courses making use of MOOCs, interactive labs, team working experiences, collaborative and co-creation labs.

Tasks

3.1 Trans/Multi/Inter-disciplinarity in the university courses (First Level, Second Level): Development and opening of new programs and “minor courses” to integrate transdisciplinary/multidisciplinary curricula in existing university courses focused on technologies related to the 3 smart specialization areas EnT, DgT, H&BP. **Courses in Energy Transition** will be integrated with extra-curricular courses for the acquisition of the Diploma Supplement, with reference to the following sectors: technologies for energy efficiency, renewable sources, intelligent and sustainable management of " electricity and energy processes, innovative technologies for the production and storage of hydrogen and innovative fuels (Renewable Sustainable Fuels - RSFs), technologies for the storage of electricity.

Courses in Digital Transition will be integrated with extra-curricular courses for the acquisition of the Diploma Supplement, with reference the theme of digital transition applied to health, aerospace, creative and cultural industries, including HPC (high power computing), big-data, cyber security, artificial intelligence for applications of strategic interest such as "remote medicine". Courses in Health & Bio-Pharma will be integrated with extra-curricular courses for the acquisition of a supplementary diploma, which involve the themes of the development of new molecules, drugs and serums, also based on of natural and biological substances, nutraceuticals, metabolomics, for treatment and wellbeing, technologies and devices for the controlled release of drugs, technologies for pharmaceuticals in the field of personalized medicine, theranostics.

3.2 International university courses: definition of relevant study areas and curricula, creation of joint/dual degrees in Energy transition, Digital transition, and Bio Pharma and Health. MOOCs, summer schools and winter schools.

3.3 Apprenticeship university courses and internship: Definition of the training or ad hoc research projects, in line with the needs of the host company. Monitoring of activities (including *in itinere* monitoring), in order to improve the effectiveness of the overall action

3.4 PhD courses in partnership with industries, apprenticeship and international PhD courses: Creation of interuniversity PhD schools, definition of relevant thematic research areas of specific strategic interest for

companies and industries that decide to collaborate in these third-level training programs. Open calls for PhD scholarships. Activation of courses.

3.5 Attraction of excellence students and foreign students: Investments targeted at attracting top undergraduate and graduate students, excellent students, international students, national and international excellent post-docs and top scientists. Creation of dedicated study paths and arrangements, calls for "full board" scholarships, open calls for recruitment. Calls for: economic support plans, awards and grants for top students and for students most in need for innovative transdisciplinary university and post-graduate training courses (training courses, advanced training, masters, doctorates).

3.6 IPR and agreements with industrial stakeholders: development of new contractual frameworks and templates to approach and regulate intellectual property of research results involving undergraduate students, PhD students, research entities, universities and industries. Definition, structuring and codification of a model agreement that considers confidentiality, the enhancement of the activities and knowledge of the contractors, and economic value of the research results as basic elements.

Expected results

R3.1 - Revision and integration of trans/multi/inter-disciplinary curricula in university courses (first level and second level) by means of acquisition of extra-curriculum credits Q1 Year 1. Indicator for assessment: Number of "minor course" and novel curricula activated.

R3.2 – Activation of new courses in collaboration between university partners on new skills related to the development of the flagship projects Q1 Year 2. Indicator for assessment: i) Number of interuniversity courses activated Q4 all years; ii) Number of trained people Q4 all years.

R3.3 - Definition, structuring and codification of an IPR agreement to approach and regulate intellectual property of research results involving undergraduate students, PhD students, research entities, universities and industries Q1 Year 1. Indicators for assessment: Availability of the model, approved by the Assembly in due time.

R3.4 - Open calls for attraction of excellent undergraduate and PhD students Q1 all years. Indicators for assessment: Number of grants financed.

R3.5 – New interuniversity PhD course on dual transition in KET and in the area of health&bio-pharma, in collaboration with industrial partners and stakeholders. Indicators for assessment: i) Number of PhD courses attivates; ii) Number of PhD students; iii) Total amount of the financial contribution from industries and enterprises.

Deliverables

D3.1 – Annual report describing education offer of Rome Technopole (first level and second level). Due time: t0+12; t0+24; t0+ 36.

D3.2 – Annual report describing the PhD offert of Rome Technopole. Due time: t0+12; t0+24; t0+ 36.

D3.3 – Rome Technopole IPR agreement on knowledge generated by students, researchers and other partners of Tome Technopole, signed by partners. Due time: t0+3

D3.4 – Open calls for excellent students (undergraduate and PhD). Due time: t0+6; t0+18; t0+30.

SPOKE		Description	Indicators	Delivery	Assessment Plan	Q1 t0-3	Q2 t4-6	Q3 t7-9	Q4 t10-12	Q1 t13-15	Q2 t16-18	Q3 t19-21	Q4 t22-24	Q1 t25-27	Q2 t28-30	Q3 t31-33	Q4 t34-36
Spoke 3 University education, industrial PhD courses, internationalization	**3.1 Transdisciplinary university courses**																
	3.2 International university courses																
	3.3 Apprenticeship university courses and internship																
	R3.1	Revision and integration of trans/multi/interdisciplinary curricula in university courses (first level and second level) by means of acquisition of extracurriculum credits	Number of "minor course" and novel curricula activated.		Q1 Year 1	R3.1											
	R3.2	Activation of new courses in collaboration between university partners on new skills related to the development of the flagship projects		Q1 Year 2						R3.2							
	R3.2		i) Number of interuniversity courses activated Q4 all years; ii) Number of trained people Q4 all years.		Q4 all years;				R3.2				R3.2				R3.2
	D3.1	Annual report describing education offer of Rome Technopole (first level and second level).		t0+12; t0+24; t0+ 36.					D3.1				D3.1				D3.1
	3.4 PhD courses in partnership with industries, apprenticeship and international PhD courses																
	D3.2	Annual report describing the PhD offert of Rome Technopole.		t0+12; t0+24; t0+ 36.					D3.2				D3.2				D3.2
	3.5 Attraction of excellence students and foreign students																
	R3.4	Open calls for attraction of excellent undergraduate and PhD students	Number of grants financed.		Q1 all years	R3.4				R3.4				R3.4			
	R3.5	New interuniversity PhD course on dual transition in KET and in the area of health&bio pharma, in collaboration with industrial partners and stakeholders.	i) Number of PhD courses activated; ii) Number of PhD students; iii) Total amount of the financial contribution from industries and enterprises.		Q2 and Q4 all years		R3.5		R3.5		R3.5		R3.5		R3.5		R3.5
	D3.4	Open calls for excellent students (undergraduate and PhD).		t0+3; t0+12; t0+27;		D3.4				D3.4				D3.4			
	3.6 IPR and agreement with industrial stakeholders																
	R3.3	Definition, structuring and codification of an IPR agreement to approach and regulate intellectual property of research results involving undergraduate students, PhD students, research entities, universities and industries	Availability of the model, approved by the Assembly in due time.		Q1 Year 1	R3.3											
	D3.3	Rome Technopole IPR agreement on knowledge generated by students, researchers and other partners of Tome Technopole, signed by partners.		t0+3		D3.3											

ML1A **ML1B** **ML2A** **ML2B** **ML3A** **ML3B**

❖ **Spoke 4 - Professional undergradute education in technology**

Leader: Università di Cassino e del Lazio Meridionale,
Affiliates: Università degli Studi La Sapienza, Università degli Studi Roma Tre, Università degli Studi della Tuscia, Istituto Superiore di Sanità, CATALENT

Description

Spoke 4 general objective is to enrich, improve and coordinate the offer of both ITS professional courses and Bachelor professional courses in the Lazio Region. The specific objectives that are derived are:

- to overcome the great mismatch between the work demand of technical personnel and the offer of professional graduates and undergraduates,
- to provide up-to-date technical education that is constantly adapted to the requirements of the industry,
- to guarantee that both hard and soft skills are acquired in the professional education,
- to reduce dropout from the educational system,
- to facilitate the job placement of technical personnel.

To these aims, the Rome Technopole will organize and carry out systematic analysis of the enterprise requirements in terms of skills of their workforce to define the need of new ITS professional courses and constantly update the existing ones, with specific attention to the three thematic areas of the project.
With a similar approach, concerning the bachelor professional courses, EQF compliant curricula for the few existing ones will be defined and new courses will be activated.
A key to the success of the project is the creation of a regional network for professional education, including ITS, schools, Universities and EPRs, Enterprises, and regional institutions, which overcomes the present spot structure of professional courses. The network implements a real Teaching and Training Infrastructure (TTI) designed to guide students in the choice of their career and prepare them for it; at the same time, the network will continuously adjust professional education to labor requirements, so that offer and demand can easily match. The TTI contributes to orient the students towards a career choice with high-level technical and cultural training. The networking activity will allow to better coordinate the formation requirements and the courses to be realized. The realization of suitable laboratories as well as the networking of existing ones will allow a better use of the resources coming from enterprises, universities and EPRs in the only interest of the knowledge development of young people.

Task

4.1 Student guidance and attraction toward professional courses: implementing activities, such as open days, student fairs, web-based tools, that specifically target students, to better focus young people toward professional formation; specific attention will be paid to increase the number of women that choose professional and STEM courses.
4.2 ITS professional courses: definition of relevant study areas and EQF compliant curricula, starting from the systematic analysis of the enterprise requirements in terms of skills of their workforce; activation of new professional courses. Exploitation of digital technology in order innovate professional education, promoting collaborative and interactive labs, team working experiences, co-creation labs.
4.3 Bachelor professional courses: definition of relevant study areas and EQF compliant curricula, starting from the systematic analysis of the enterprise requirements in terms of skills of their workforce; activation of new Bachelor professional courses with the direct involvement of industry in the educational program.
4.4 Network for professional education (ITS, schools, Universities and Enterprises): stable dedicated networking activities for relevant actors involved in the professional education and the regional institutions, aiming at defining needs and learning objectives, supporting strategic decisions on all other activities of the spoke.
4.5 Transition between professional and university courses for dropout reduction: support and tutoring actions targeting students of both ITS and Bachelor professional courses, to reduce the dropout; the definition of bridges between different professional courses also at different educational levels.
4.6 Placement of students coming from professional courses: activities, such as open days with industries (spoke affiliates, stakeholder board members), in cooperation with local chambers of Commerce and Industrial organizations; a specific matching system to facilitate internship and traineeship.

Expected Results

R4.1 – Adequacy assessment and revision of existing ITS professional courses, also through the exploitation of innovative digital technologies Q4 Year 1. Indicator for assessment: Number of revised courses.

R4.2 – Adequacy assessment and revision of existing Bachelor professional courses, also through the exploitation of innovative digital technologies Q4 Year 1. Indicator for assessment: Number of revised courses.
R4.3 – Activation of new ITS professional courses within the network for professional education, referring to the thematic areas and the flagship projects Q2 Year 2. Indicator for assessment: i) Number of new courses activated Q4 all years; ii) Number of trained people Q4 all years.
R4.4 – Activation of new Bachelor professional courses within the network for professional education, referring to the thematic areas and the flagship projects Q4 Year 2. Indicator for assessment: i) Number of new courses activated Q4 all years; ii) Number of trained people Q4 all years.
R4.5 – Reduction of dropout from the educational system Q4 Year 2. Indicator for assessment: Number and percentage of students out of the educational system that are enrolled in the professional courses Q4 all years.
R4.6 – Increase of the placement of professional personnel Q4 Year 2. Indicator for assessment: Number and percentage of students that complete the professional courses and are employed Q4 all years.
R4.7 – Institution and operation of the regional network for professional education Q2 Year 1. Indicator for assessment: Definition of the regional strategic plan for professional education Q4 Year 1.

Deliverables

D4.1 – Annual report describing the Rome Technopole's offer of professional education (ITS and Bachelor). Due time: t0+12; t0+24; t0+ 36.
D4.2 – Annual report defining the work demand of professional personnel in terms of skills. Due time: t0+12; t0+24; t0+ 36.
D4.3 – Strategic plan of the regional network for professional education. Due time: t0+12; t0+24; t0+ 36.

SPOKE		Description	Indicators	Delivery	Assessment Plan	Year 1 Q1 t0-3	Year 1 Q2 t4-6	Year 1 Q3 t7-9	Year 1 Q4 t10-12	Year 2 Q1 t13-15	Year 2 Q2 t16-18	Year 2 Q3 t19-21	Year 2 Q4 t22-24	Year 3 Q1 t25-27	Year 3 Q2 t28-30	Year 3 Q3 t31-33	Year 3 Q4 t34-36
Spoke 4 Professional undergradute education in technology	**4.1 Student guidance and attraction toward professional courses**																
	4.2 ITS professional courses																
	R4.1	Adequacy assessment and revision of existing ITS professional courses	Number of revised ITS courses.		Q4 Year 1				R4.1								
	R4.3	Activation of new ITS professional courses within the network for professional education, referring to the thematic areas and the flagship projects	i) Number of new ITS courses activated ii) Number of trained people		Q2 year 1, Q4 all years		R4.3		R4.3				R4.3				R4.3
	4.3 Bachelor professional courses																
	R4.2	Adequacy assessment and revision of existing Bachelor professional courses	Indicator for assessment: Number of revised Bachelor professional courses.		Q4 Year 1				R4.2								
	R4.4	Activation of new Bachelor professional courses within the network for professional education, referring to the thematic areas and the flagship projects	Indicator for assessment: i) Number of new bachelor courses activated ii) Number of trained people		Q2 year 1, Q4 all years		R4.4		R4.4				R4.4				R4.4
	D4.1	Annual report describing the Rome Technopole's offer of professional education (ITS and Bachelor)		t0+12; t0+24; t0+ 36.					D4.1				D4.1				D4.1
	4.4 Network for professional education (ITS, schools, Universities and Enterprises)																
	R4.7	Institution and operation of the regional network for professional education	Definition of the regional strategic plan for professional education	Q4 Year 1	Q4 Year 1.				R4.7								
	D4.3	Strategic plan of the regional network for professional education.		t0+12; t0+24; t0+ 36					D4.3				D4.3				D4.3
	4.5 Transition between professional and university courses for dropout reduction																
	R4.5	Reduction of dropout from the educational system	Number and percentage of students out of the educational system that are enrolled in the professional courses		Q2 year 1, Q4 all years		R4.5		R4.5				R4.5				R4.5
	4.6 Placement of students coming form professional courses																
	R4.6	Increase of the placement of professional personnel	Number and percentage of students that complete the professional courses and are employed		Q2 year 1, Q4 all years		R4.6		R4.6				R4.6				R4.6
	D4.2	Annual report defining the work demand of professional personnel in terms of skills.		t0+12; t0+24; t0+ 36.					D4.2				D4.2				D4.2

ML1A **ML1B** **ML2A** **ML2B** **ML3A** **ML3B**

❖ Spoke 5 - Out-reach, public engagement, lifelong learning

Leader: Università degli Studi della Tuscia
Affiliates: Università degli Studi La Sapienza, Università degli Studi Tor Vergata, Università degli Studi Roma Tre, CNR, Istituto Nazionale di Fisica Nucleare

Description

Spoke 5 objective is

- the promotion and fostering, valorization, dissemination, and transfer of knowledge, know-how, and technologies for social changes in line with the Sustainable Development Goals (SDGs) of UN Agenda 2030 "4 – quality education" and "11 – sustainable cities and communities" and Lazio Region Smart Specialization Strategy (S3);
- the promotion and fostering of the social mission of the university as a means of breaking down inequalities, equipping it with operational tools and resources necessary to attract young people who start from social conditions preclusive of university studies, breaking down barriers and inequalities that the pandemic has accentuated.

Planned activities are focused to:

- engage and involve various communities, organizations, companies, governmental entities, and institutions external to academia, taking into account the scientific and economic vocations of the territory of reference; define a common working strategy to produce social impacts of Rome Techopole activities in order to better increase the citizens' and communities' quality of life;
- engage students starting from the third year of secondary schools in Lazio, with the main objective of guiding them to the conscious choice of university study paths within the Rome Technopole project.
- promote placement of graduated students from Rome Technopole, reducing the gap between university and industrial world.

The interventions will be articulated in:

- dissemination of results of flagship projects (from FP1 to FP6);
- specific actions in the area of knowledge exchange with stakeholders and on production of public goods and civic/public engagement which includes lifelong learning opportunities, presenting research findings in an engaging and accessibly way (e.g. public events), public goods and activities for inclusion, management and protection of cultural heritage, public health, scientific communication and open science, secondary school students' engagement, job placement, promoting women in science, and in general activities related to the achievement of SDGs goals in the economy and society;
- secondary school student engagement and graduated student placement;
- promotion of Rome Technopole brand;
- initiative aimed to reduce inequalities and promote gender balance, in particularly in STEM.

Tasks

5.1 Dissemination and exploitation of technical and scientific results: activities targeting industries and research community, events, publications aimed to disseminate research results and to promote the brand of Rome Technopole.

5.2 Knowledge exchange with stakeholders: activities of the stakeholder board, open events

5.3 Visibility and impact on society: promoting the brand and the social mission of Rome Technopole as a means of breaking down inequalities. Investment to support gender balance in STEM and to promote female empowerment and entrepreneurship.

5.4 Lifelong learning: Actions aimed at revising and updating the legal framework for continuing training relevant to the labor market for people of working age; definition of relevant study areas and learning paths. Multidisciplinary approach.

5.5 Secondary School students' engagement: activity specifically targeting students, with open days, student fairs etc. Incoming and *in itinere* tutoring plans aimed at filling training gaps also resulting from the provision of remote school teaching due to the restrictions for the fight against the COVID 19 pandemic for the students of the courses who find themselves having a incomplete or inadequate training.

5.6 Placement: activities include job orientation activities, soft skills and employability skills development, co-design of training activities, development of internship and job opportunities, operational linking of labour supply and demand; the set of instruments are: career/recruitment events, open days, consultation tables, training activities, digital platforms, etc.; the activities are carried out in collaboration with companies, associations, institutions, etc.

Expected Results

R5.1 - Definition and structuring of dissemination actions as public events (e.g. scientific exhibitions) and publications for sharing research results with potential users - peers in the research field, industry, other commercial players, policymakers and citizens to be defined at beginning of each year Q1 all years, to be monitored at the end of each year Q4 all years.
R5.2 - Definition and structuring of activities on implementing and continuously developing offers and formats for knowledge exchange with stakeholders and the transfer of scientific findings and methods as well as technical expertise into the scientific community and society (defined at beginning of each year Q1 all years, to be monitored at the end of each year Q4 all years). Impact of scholarly output will be explored in non-traditional avenues, such as blogs, Twitter, Meta and other social media in Q1, Q2, Q3 and Q4 for all years.
R5.3 - Definition and structuring of specific activities in the field of adult education and lifelong learning, based on which it therefore will be designed high-level training activities by supporting the creation of joint specialization courses, training courses, intensive courses and thematic workshops (to be defined at beginning of each year Q1 all years, to be monitored at the end of each year Q4 all years.)
R5.4 - Definition and structuring of activities aimed at students starting from the third year of secondary schools in Lazio, with the main objective of guiding them to the conscious choice of university study paths within the Rome Technopole project by means initiatives as seminars, open days, student fairs, virtual tours, PCTO; activities aimed at teachers: training of teachers in the choice of study courses in the field of energy transition, digital transformation, technologies for health, training/updating of high school teachers on Rome Technopole (to be defined at beginning of each year Q1 all years, to be monitored at the end of each year Q4 all years).
R5.5 - Definition and structuring of activities include job orientation activities, soft skills and employability skills development, co-design of training activities, development of internship and job opportunities, operational linking of labour supply and demand by means of career/recruitment events, open days, consultation tables, training activities, digital platforms, etc. in collaboration with companies, associations, institutions, etc. (to be defined at beginning of each year Q1 all years, to be monitored at the end of each year Q4 all years).

Deliverables

D5.1 – Periodical report on activities on Dissemination and exploitation of technical and scientific results Task 5.1. Due time: t0+12; t0+24; t0+ 36.
D5.2 - Periodical report on outputs coming from Knowledge exchange with stakeholders in task 5.2. Due time: t0+12; t0+24; t0+ 36.
D5.3 – Periodical reports, videos and digital content as output of tasks 5.3 and 5.4. Due time: t0+12; t0+24; t0+ 36.
D5.4 – Periodical report on Placement and students' engagement activities. Due time: t0+12; t0+24, t0+ 36.
D5.5 – Number of student engaged.

SPOKE		Description	Indicators	Delivery	Assessment Plan	Year 1 Q1 t0-3	Q2 t4-6	Q3 t7-9	Q4 t10-12	Year 2 Q1 t13-15	Q2 t16-18	Q3 t19-21	Q4 t22-24	Year 3 Q1 t25-27	Q2 t28-30	Q3 t31-33	Q4 t34-36
Spoke 5 Out-reach, public engagement, lifelong learning	**5.1 Dissemination and Exploitation of technical and scientific results**																
	R5.1	Definition and structuring of dissemination actions as public events (e.g. scientific exhibitions) and publications for sharing research results with potential users peers in the research field, industry, other commercial players,	Plan of dissemination actions as public events (e.g. scientific exhibitions) and publications	Q1 all years	Q4 all years.	R5.1			R5.1				R5.1				R5.1
	D5.1	Periodical report on activities on Dissemination and exploitation of technical and scientific results Task 5.1.		t0+12; t0+24; t0+ 36.					D5.1				D5.1				D5.1
	5.2 Knowledge exchange with stakeholders																
	R5.2 a	Plan for knowledge exchange with stakeholders and the transfer of scientific findings and methods as well as technical expertise		Q1 all years		R5.2 a				R5.2 a				R5.2 a			
	R5.2 b		Impact of scholarly output will be explored in non traditional avenues, such as blogs, Twitter, Meta and other social media		Q1, Q2, Q3 and Q4 for all years.												
	D5.2	Periodical report on outputs coming from Knowledge exchange with stakeholders in task 5.2.		t0+12; t0+24; t0+ 36.					D5.2				D5.2				D5.2
	5.3 Visibility and impact on society																
	5.4 Lifelong learning																
	R5.3	Definition and structuring of specific activities in the field of adult education and lifelong learning, based on which it therefore will be designed high level training activities by supporting the creation of joint specialization courses,	Adult education and lifelong learning action plan and yearly objectives	Q1 all years	Q4 all years				R5.3				R5.3				R5.3
	R5.4	Definition and structuring of activities aimed at students starting from the third year of secondary schools in Lazio, with the main objective of guiding them to the conscious choice of university study paths within the Rome Technopole	Secondary school teacher and student orientation action plan and yearly objectives	Q1 all years	Q4 all years				R5.4				R5.4				R5.4
	D5.3	Periodical reports, videos and digital content as output of tasks 5.3 and 5.4.		t0+12; t0+24; t0+ 36.					D5.3				D5.3				D5.3
	5.5 Secondary School students' engagement																
	5.6 Placement																
	R5.5	Definition and structuring of activities include job orientation activities, soft skills and employability skills development, codesign of training activities, development of internship and job opportunities, operational linking of	Activity plan for job orientation activities	Q1 all years	Q4 all years	R5.5			R5.5				R5.5				R5.5
	D5.5	Number of student engaged and number of placements															
	D5.4	Periodical report on Placement and students' engagement activities		t0+12; t0+24; t0+ 36.					D5.4				D5.4				D5.4

ML1A **ML1B** **ML2A** **ML2B** **ML3A** **ML3B**

❖ **Spoke 6 - Open Research Infrastructures, joint labs, higher education with industrial collaboration**

Leader: Università degli Studi La Sapienza,
Affiliates: Università degli Studi Roma Tre, Università degli Studi Tor Vergata, Università degli Studi della Tuscia, Università Campus Bio-Medico di Roma, CNR, Istituto Nazionale di Fisica Nucleare, Istituto Superiore di Sanità, ENEA, AlmavivA, BV-Tech S.P.A., LVENTURE, THALES, UNICREDIT,

Description

Spoke 6 objective is to promote and support all stable joint activities between research partners and industrial partners from the perspective of the ecosystem.
This include:

- Consolidation and strengthening of the open research infrastructure for innovation of the Lazio Region (IARI) as stable technologic platform for the development of all activities of Rome Technopole, definition of regulation and access rules;
- Implementation of the portal for access to the research infrastructure of Rome Technopole
- Creation of joint labs with industries, promoting also some collaborations with labs, research groups and research infrastructures located in the southern Italian regions;
- Creation of open labs and contamination labs to promote and support cross-fertilization, creativity, technology-push and demand-pull innovation.
- Development of high-level training and research apprenticeships to significantly increase the number of employment contracts aimed at training and employing at the same time young people in applied research inside companies.

Planned activities are:

- Activation of a Join Lab focused on "Internet-of-things, artificial intelligence, machine learning for machine-aided design, digital assembly and inspection, digital twin" in collaboration with partner Thales Alenia Space Italy
- Activation of a Joint Lab within the project "Rome Advanced District – ROAD" aimed at realizing a technological pole on green energy at ENI site in Rome (Gazometro area)

In addition, **Task 6 in Spoke 6 collects all activities related to the construction of the headquarters of Lazio Technopole**, which is foreseen within the Pietralata area owned by the Municipality of Rome as part of the regional strategic development plans, for a total of about 15.000 square meters. This activity, which should be in charge of the Hub, and the related budget are attributed to the leading partner of the proposal, i.e. Sapienza University of Rome.

Tasks

6.1 Open research infrastructure for innovation (IARI): common technological platform including top-level scientific instrumentation and state-of-art large laboratories, open to provide research and technological services to internal and external partners of Rome Technopole. The activity will be focused on:

- regulation for shared use and service-on-demand of the open research infrastructure;
- redevelopment and upgrading research laboratories of IARI.

The availability and strengthening of the open research infrastructure IARI, with top-level instrumentation, is strategic in order to promote attractiveness of early-career researchers, post-PhDs and top scientists coming from all the country and abroad.
6.2 Joint labs: for developing proof-of-concept level activities through stable collaboration between research partners and industrial partners, on specific topics.
6.3 Open labs and co-creation: labs open to students, researchers, stakeholders aimed at promoting open-innovation and co-creation.
6.4 Higher education with industrial collaboration: post-graduate programmes on selected areas, aiming at meeting the demands of regional and national industries. Activation of courses in collaboration with industrial partners.
6.5 Vocational training for technologies and innovation: definition of relevant training areas and EQF compliant curricula. Activation of courses.
6.6 Headquarter of Rome: design and realization of the first lot of about 2.300 sqm of the new headquarter of Rome Technopole (for a total of about 15.000 sqm), organized as follows:

- Common areas and services, including representation areas: about 30% of the total space available.
- Multimedia classrooms, for teaching and training activities: about 10% of the total available spaces.
- Laboratories for research, technology transfer and innovation activities: about 35% of the total space available, of which about 1000 square meters for the incubator.

- Student housing and residences (according to the college model): about 20% of the total space available, with the creation of 300 beds.
- Administrative offices and headquarters of Rome Technopole: about 5% of the total space available.

Expected Results

R6.1 - Increase of funding to universities and research partners by the industrial funding partners and stakeholders starting at Q4 Year 1. Indicators for assessment: Amount of financing share from industrial partners and stakeholders Q4 all years.

R6.2 - Training courses, higher education, masters in collaboration with industrial partners starting at Q2 Year 1. Indicators for assessment: i) Number of courses activated in collaboration with industrial partners Q4 all years. ii) Number of trained people Q4 all years.

R6.3 - Activation of Joint Labs on themes inherent to the 3 AdS starting from Q4 Year 1. Indicators for assessment: Number of university-industry laboratories activated: to be monitored at the end of each year Q4 Year 2, Q4 Year 3.

R6.4 - Open calls for highly qualified technical/scientific personnel Q2 Year1. Indicators for assessment: - Number of positions activated

R6.5 Construction of the Rome Technopole headquarters including: final design Q3 Year 1; realization of the first lot (headquarters, administrative offices, incubator) Q4 Year 3; definition of a sustainable mobility plan with parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing Q3 Year 1; implementation of the first lot of the sustainable mobility plan with parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing (at least 50%) Q4 Year 3.

Deliverables

D6.1 – Communication plan of Rome Technopole and its periodical update. t0+6, t0+18, t0+30.

D6.2 – Periodical report describing activities of the joint labs, open lab and contamination labs of Rome Technopole (t0+6, t0+18, t0+30)

D6.3 – Periodical report describing initiatives of project management (t0+6, t0+18, t0+30).

D6.4 – Regulation of use and access to IARI (t0+3)

D6.5 - Final design of the Rome Technopole site, including urban redevelopment project and sustainable mobility plan (t0+9)

D6.6 - First lot of the new headquarter of Rome Technopole, including incubator and parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing (t0+36).

SPOKE		Description	Indicators	Delivery	Assessment Plan	Year 1 Q1 t0-3	Year 1 Q2 t4-6	Year 1 Q3 t7-9	Year 1 Q4 t10-12	Year 2 Q1 t13-15	Year 2 Q2 t16-18	Year 2 Q3 t19-21	Year 2 Q4 t22-24	Year 3 Q1 t25-27	Year 3 Q2 t28-30	Year 3 Q3 t31-33	Year 3 Q4 t34-36
Spoke 6 Open Research Infrastructures, joint labs, higher education with industrial collaboration	6.1 Open research infrastructure for innovation																
	6.2 Joint labs																
	6.2 Master & post-degree courses																
	6.3 Open labs and co-creation																
	R6.1	Increase of funding to universities and research partners by the industrial funding partners and stakeholders	Amount of financing share from industrial partners and stakeholders		Q4 all years.				R6.1				R6.1				R6.1
	R6.2	Training courses, higher education, masters in collaboration with industrial partners	i) Number of courses activated in collaboration with industrial partners. ii) Number of trained people		Q4 all years.				R6.2				R6.2				R6.2
	R6.3	Activation of Joint Labs on themes inherent to the 3 AdS	Number of university industry laboratories activated		Q4 Year 2, Q4 Year 3								R6.3				R6.3
	D6.2	Periodical report describing activities of the joint labs, open lab and contamination labs of Rome Technopole		t0+6, t0+18, t0+30			D6.2				D6.2				D6.2		
	6.4 Higher education with industrial collaboration																
	6.5 Vocational training for technologies and innovation																
	R6.4	Open calls for highly qualified technical/scientific personnel	Number of positions activated		Q2 Year1, every 9 months		R6.4			R6.4			R6.4			R6.4	
	R6.5	Construction of the Rome Technopole headquarters including: final design; realization of the first lot (headquarters, administrative offices, incubator); definition of a sustainable mobility plan with parking areas with		final design **Q3 Year 1**; realization of the first lot				R6.5									R6.5
	D6.4	Regulation of use and access to IARI		t0+3		D6.4											
	6.6 Vocational training for technologies and innovation																
	D6.5	Final design of the Rome Technopole site, including urban redevelopment project and sustainable mobility plan		t0+9				D6.5									
	D6.6	First lot of the new headquarter of Rome Technopole, including incubator and parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing		t0+36													D6.6

ML1A **ML1B** **ML2A** **ML2B** **ML3A** **ML3B**

Time plan

The project has six Milestones, which are finalized to the assessment of the actuation of the start-up plan of Rome Technopole and are scheduled at the months 4 and 12 of each year of the project.
The six milestones are:

- ML1A (t0+4) - Start-up of Rome Technopole Ecosystem;
- ML1B (t0+12) - Completition of Rome Technopole Ecosystem start-up;
- ML2A (t0+16) - Consolidation of Rome Technopole innovation ecosystem: assessment phase;
- ML2B (t0+24) - Completition of the consolidation of Rome Technopole innovation ecosystem;
- ML3A (t0+28) - Final assessment of Rome Technopole: the innovation ecosystem of Rome and Lazio region;
- ML3B (t0+36) - Final assessment of Rome Technopole: final validation, internationalization and sustainability plan.

In the following we describe the details of deliverables, expected results, responsibility and means of verification of each milestone.

❖ Milestone deliverables and expected results

▪ Milestone ML1A (t0+4) - Start-up of Rome Technopole Ecosystem

Set-up of Rome Technopole governance and administrative offices, FPs detailed workplan definition and kick-off, first-year educational plan definition

The scope of the milestone is to **assess the integration of existing skills and competencies to develop the start-up plan of Rome Technopole**, through a holistic and multidisciplinary approach to research, technology development and innovation, technology transfer and sharing of open research infrastructure, education, out-reach and public engagement.
More specifically, the scope of the milestone is:

i) To set-up governance and administrative offices of Rome Technopole, including activation of Rome Technopole headquarters;
ii) To define the profile and the content of the international call for the selection of the Scientific Director of Rome Technopole;
iii) To map and integrate existing skills, competencies and capabilities of Rome Technopole's funding partners, in order to set-up thematic research communities and to define needs and specific research profiles to be hired;
iv) To define the first-year educational plan of Rome Technopole;
v) To define the dissemination and public engagement plan;
vi) To define regulation of IARI (Open Research Infrastructure for Innovation of Lazio Region), for both internal and external users.

This milestone contributes to the expected results for each Spoke, according to the time plane reported for each spoke.

Spoke	Deliverables & Expected Results
1	D1.1 – Periodical report on research activities and results of tasks 1.1, 1.2, 1.3 - PART 1. I D1.2 - Periodical report on technology development and innovation activities in task 1.4. - PART 1 D1.4 – Open calls for collaborative industrial research projects with SMEs. - PART 1: Definition of the content of the call and admission rules D1.5 - Rome Technopole website production: web site design and activation - PART 1 D1.6 - Newsletter of Rome Technopole: first issue PART 1 Contribution to expected results: R1.3 - Open calls for ERC and Marie Curie attractiveness awards Q1 all years. Definition of call content and time plan for year 1.

	R1.4 - Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects Q2 all years. Definition of call content and time plan for year 1. R1.5 - Open calls for awards for top-scientists and excellent researchers winning ERCs. Definition of call content and time plan for year 1. R1.6 - Open calls for highly qualified technical/scientific personnel Q2 Year 1. Definition of call content and time plan for year 1. R1.7 - Creation of the management, governance and communication structure of Rome Technopole. Definition and creation of the administrative and management office of Rome Technopole and set-up of Rome Technopole headquarter. Set up of the international call for the Scientific Director. Nomination of the governing board members. R1.8 - Monthly newsletter starting from Q1 Year 1. Indicator for assessment.
2	D2.1 – Periodical report on exploitation activities and results of tasks 2.1, 2.2, including technical reports. PART 1:creating of communities and focus groups, both internal and external ones involving members of the stakeholder board in order to promote and support technology transfer. D2.2 – Periodical report on initiatives activated and results of tasks from 2.3 to 2.6. - PART 1 Contribution to expected results: R2.3: Open calls for students' participation to training courses. Indicators for assessment. Definition of call content and time plan for year 1; R2.4: Open calls to support the birth of startups. Mapping of existing start ups within the three different strategic areas. Definition of call content and time plan for year 1. R2.5: Organization of meetings and periodic events for fundraising by investors. Time plan for year 1 R2.6: Open calls to support patenting by startups and SMEs. Mapping of patents within the three different strategic areas. Definition of call content and time plan for year 1. R2.7: Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects. Definition of call content and time plan for year 1. R2.8: Open calls for highly qualified technical/scientific personnel – Definition of call content and time plan for year 1.
3	D3.3 – Rome Technopole IPR agreement on knowledge generated by students, researchers and other partners of Rome Technopole, signed by partners. (COMPLETED) Contribution to expected results: R3.1 - Revision and integration of trans/multi/inter-disciplinary curricula in university courses (first level and second level) by means of acquisition of extra-curriculum credits). Mapping of existing courses and of industrial needs. Definition of the new course development strategies. R3.3 - Definition, structuring and codification of an IPR agreement to approach and regulate intellectual property of research results involving undergraduate students, PhD students, research entities, universities and industries. R3.4 - Open calls for attraction of excellent undergraduate and PhD students.
4	D4.1 - Periodical report describing the Rome Technopole's offer of professional education (ITS and Bachelor) D4.2 - Periodical report describing the work demand of professional personnel in terms of skills - Analysis of previous existing reports D4.3 - Strategic plan of the regional network for professional education - General Lines Contribution to expected results: R4.1 - Adequacy assessment and revision of existing ITS professional courses - Definition of the criteria R4.2 - Adequacy assessment and revision of existing Bachelor professional courses - Definition of the criteria
5	D5.1 - Periodical report on activities on Dissemination and exploitation of technical and scientific results of task 5.1 – Part 1 (Definition and planning of models and standards to be used for

	dissemination activities - Definition of performance monitoring indicators for the continuous control of actions, results and related effects with respect to the activities of task 5.1) D5.2- Periodical report on outputs coming from Knowledge exchange with stakeholders in task 5.2 - Part 1 (Mapping of stakeholders and specific needs and wishes - Definition of performance monitoring indicators and relative targets for the continuous control of actions, expected results and related effects with respect to the activities of task 5.2) D5.3 - Periodical reports, videos and digital content as output of tasks 5.3 and 5.4 – Part 1 (Definition and planning of communication models such as logos, social media IT platforms to increase the visibility and impact on society of the actions undertaken with a view to continuous training, inclusive approach, overcoming gender inequalities - Definition of performance monitoring indicators and relative targets for the continuous control of actions, expected results and related effects with respect to the activities of task 5.3 and 5.4) D5.4 – Periodical report on Placement and students' engagement activities. -Part 1 (Definition of standards for placement activities and mapping of existing activities and recipients of the initiatives - Definition of performance monitoring indicators and relative targets for the continuous control of actions, expected results and related effects with respect to the activities of students' engagement) D5.5 – Number of students and public organizations engaged and relative results – Part 1(Definition of communication channels, standards and target audiences for engagement activities of students and public organizations - Definition of performance monitoring indicators and relative targets for the continuous control of actions, expected results and related effects with respect to the activities of students and public organizations engaged)
6	D6.2 – Periodical report describing activities of the joint labs, open lab and contamination labs of Rome Technopole. PART 1 - First year planning D6.3 – Periodical report describing initiatives of project management. PART 1 - set-up of the managing structure D6.4 – Regulation of use and access to IARI (t0+3) - COMPLETED

- **Milestone ML1B (t0+12) - Completition of Rome Technopole Ecosystem start-up**

The scope of the milestone is:

i) To publish all open calls for R&D projects, business incubation, start-up acceleration, student grants, early-career researcher attraction, PhDs hiring, research hiring;
ii) To hire the Scientific Director of Rome Technopole;
iii) To perform all the activities needed to achieve the expected results as described in Annex 1, according to the defined time plan (Q4 of year 1).

This milestone contributes to the expected results for each Spoke, according to the time plane reported for each spoke.

Spoke	Deliverables & Expected Results
1	D1.1 – Periodical report on research activities and results of tasks 1.1, 1.2, 1.3 - First year assessment of Flagship Project. PART 2. D1.2 - Periodical report on technology development and innovation activities in task 1.4. - PART 2. D1.3 – Rome Technopole IPR agreement signed by partners. Due time: t0+6 - COMPLETED D1.4 – Open calls for collaborative industrial research projects with SMEs. - PART 2: Publication of the first batch of calls D1.5 - Rome Technopole website production. Due time: t0+6 - COMPLETED D1.6 - Newsletter of Rome Technopole. Due time: monthly issued starting from t0+3 Contribution to expected results:

	R1.2 - Definition, structuring and codification of an IPR agreement model that considers as basic elements confidentiality, enhancement of the activities and knowledge of the contractors, economic value of research results. R1.3 - Open calls for ERC and Marie Curie attractiveness awards. Publication of the first batch of calls. R1.4 - Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects. Publication of the first batch of calls. R1.5 - Open calls for awards for top-scientists and excellent researchers winning ERCs. Publication of the first batch of calls. R1.6 - Open calls for highly qualified technical/scientific personnel. Publication of the first batch of calls. R1.7 - Creation of the management, governance and communication structure of Rome Technopole.
2	D2.1 – Periodical report on exploitation activities and results of tasks 2.1, 2.2, including technical reports. - PART 2: analysis on industrial research and technology transfer projects activated (R2.1 and R2.2) D2.2 – Periodical report on initiatives activated and results of tasks from 2.3 to 2.6. - PART 2 Contribution to expected results: R2.3: Open calls for students' participation to training courses. - Publication of the first and second batch of calls R2.4: Open calls to support the birth of startups. - Publication of the first and second batch of calls R2.5: Organization of meetings and periodic events for fundraising by investors. – First and second meeting events R2.6: Open calls to support patenting by startups and SMEs. - Publication of the first and second batch of calls R2.7: Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects. - Publication of the first and second batch of calls (t0+6 – t0+12). R2.8: Open calls for highly qualified technical/scientific personnel – Publication of the second and final batch of calls.
3	D3.1 – Annual report describing education offer of Rome Technopole (first level and second level). D3.2 – Annual report describing the PhD offer of Rome Technopole. D3.4 – Open calls for excellent students (undergraduate and PhD). Contribution to expected results: R3.4 - Open calls for attraction of excellent undergraduate and PhD students. R3.5 – New interuniversity PhD course on dual transition in KET and in the area of health&bio-pharma, in collaboration with industrial partners and stakeholders. Definition of needs and new course proposals.
4	D4.1 - Annual report describing the Rome Technopole's offer of professional education (ITS and Bachelor) D4.2 - Annual report describing the work demand of professional personnel in terms of skills D4.3 - Strategic plan of the regional network for professional education - Complete Contribution to expected results: R4.3 - Activation of new ITS professional courses within the network for professional education, referring to the thematic areas and the flagship projects R4.4 - Activation of new Bachelor professional courses within the network for professional education, referring to the thematic areas and the flagship projects
5	D5.1 - Periodical report on activities on Dissemination and exploitation of technical and scientific results of task 5.1 – Part 2 (Drafting and launching of the event plan for the dissemination of results compliant with the definitive standards in milestone 1- Implementation of 10% of activities – Open calls) D5.2- Periodical report on outputs coming from Knowledge exchange with stakeholders in task 5.2 - Part 2 (Drafting and launching of the executive plan for comparison and relationship with

	the stakeholders, collection of experiences and definition of best practices - Implementation of 10% of activities) D5.3 - Periodical reports, videos and digital content as output of tasks 5.3 and 5.4 – Part 2 (Implementation of communication plans and definition of specific actions to increase objectives such as inclusion, continuous training and the involvement of the female gender in scientific and entrepreneurial activities - Implementation of 10% of activities) D5.4 – Periodical report on Placement and students' engagement activities. -Part 2 (Implementation of the student and organization engagement plan through the definition of activities and events consistent with the models expected at milestone 1- Implementation of 10% of activities) D5.5 – Number of students and public organizations engaged and relative results – Part 2 (Implementation of activities aimed at involving students and public actors in compliance with the standards defined in milestone 1- Implementation of 10% of activities)
6	D6.1 – Communication plan of Rome Technopole and its periodical update - FIRST RELEASE planned at t0+6 D6.2 – Periodical report describing activities of the joint labs, open lab and contamination labs of Rome Technopole - PART 1 D6.3 – Periodical report describing initiatives of project management - PART 1 D6.5 - Final design of the Rome Technopole site, including urban redevelopment project and sustainable mobility plan (t0+9) - COMPLETED D6.6 - First lot of the new headquarter of Rome Technopole, including incubator and parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing - PART1: requirement for preliminary design and publication of the preliminary design competition. Contribution to expected results: R6.2 - Training courses, higher education, masters in collaboration with industrial partners. First batch of courses. R6.4 - Open calls for highly qualified technical/scientific personnel. Publication of the first batch of calls. R6.5 Construction of the Rome Technopole headquarters including: final design. Definition of a sustainable mobility plan with parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing.

- **Milestone ML2A (t0+16) - Consolidation of Rome Technopole innovation ecosystem: assessment phase**

The scope of the milestone is to start the activities of the consolidation plan of Rome Technopole.
This includes:

i) Conclusion of the fundamental research activity of the flagship projects and starting of the industrial research phase, experimental development and feasibility studies;
ii) To define the second-year educational plan of Rome Technopole, including the proposal of new degrees, new masters and courses on twin digital transition and advanced technologies for health and bio-pharma;
iii) To consolidate the professional education program of Rome Technopole;
iv) To start activities of the new joint-labs, open labs and co-creation labs in collaboration with enterprises;
v) To define a plan for strengthening IARI.

This milestone contributes to the expected results for each Spoke, according to the time plane reported for each spoke.

Spoke	Deliverables & Expected Results
1	D1.1 – Periodical report on research activities and results of tasks 1.1, 1.2, 1.3 - First year assessment of Flagship Project. PART 3.

	D1.2 - Periodical report on technology development and innovation activities in task 1.4. - PART 3. D1.4 – Open calls for collaborative industrial research projects with SMEs. - PART 3: Definition of the contents of the second batch of calls. D1.6 - Newsletter of Rome Technopole. Due time: monthly issued starting from t0+3 Contribution to expected results: R1.3 - Open calls for ERC and Marie Curie attractiveness awards Q1 all years. Definition of call content and time plan for year 2. R1.4 - Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects Q2 all years. Definition of call content and time plan for year 2. R1.5 - Open calls for awards for top-scientists and excellent researchers winning ERCs. Definition of call content and time plan for year 2. R1.6 - Open calls for highly qualified technical/scientific personnel Q2 Year 1. Definition of call content and time plan for year 2. R1.7 - Creation of the management, governance and communication structure of Rome Technopole. Assessment of the administrative, management, communication office of Rome Technopole.
2	D2.1 – Periodical report on exploitation activities and results of tasks 2.1, 2.2, including technical reports. - PART 3 D2.2 – Periodical report on initiatives activated and results of tasks from 2.3 to 2.6. - PART 3 Contribution to expected results: R2.3: Open calls for students' participation to training courses. Indicators for assessment. Definition of call content and time plan for year 2; R2.4: Open calls to support the birth of startups. Mapping of exhisting start ups within the three different strategic areas. Definition of call content and time plan for year 2. R2.5: Organization of meetings and periodic events for fundraising by investors. Time plan for year 2 R2.6: Open calls to support patenting by startups and SMEs. Mapping of patents within the three different strategic areas. Definition of call content and time plan for year 2. R2.7: Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects. Definition of call content and time plan for year 2. R2.8: Open calls for highly qualified technical/scientific personnel – Definition of call content and time plan for year 2.
3	D3.4 – Open calls for excellent students (undergraduate and PhD). Contribution to expected results: R3.2 – Activation of new courses in collaboration between university partners on new skills related to the development of the flagship projects. R3.4 - Open calls for attraction of excellent undergraduate and PhD students. R3.5 – New interuniversity PhD course on dual transition in KET and in the area of health&bio-pharma, in collaboration with industrial partners and stakeholders.
4	D4.1 - Periodic report describing the Rome Technopole's offer of professional education (ITS and Bachelor) D4.3 - Strategic plan of the regional network for professional education - Revision Contribution to expected results: R4.1 - Adequacy assessment and revision of existing ITS professional courses R4.2 - Adequacy assessment and revision of existing Bachelor professional courses R4.7 - Institution and operation of the regional network for professional education
5	D5.1 - Periodical report on activities on Dissemination and exploitation of technical and scientific results of task 5.1 – Part 3 (Implementation of at least 30% of activities) D5.2- Periodical report on outputs coming from Knowledge exchange with stakeholders in task 5.2 - Part 3 (Implementation of at least 30% of activities)

	D5.3 - Periodical reports, videos and digital content as output of tasks 5.3 and 5.4 – Part 3 (Implementation of at least 30% of activities) D5.4 – Periodical report on Placement and students' engagement activities. -Part 3 (Implementation of at least 30% of activities) D5.5 – Number of students and public organizations engaged and relative results – Part 3 (Implementation of at least 30% of activities)
6	D6.1 – Communication plan of Rome Technopole and its periodical update - Periodical update D6.2 – Periodical report describing activities of the joint labs, open lab and contamination labs of Rome Technopole - PART 2 D6.3 – Periodical report describing initiatives of project management - PART 2 D6.5 - Final design of the Rome Technopole site, including urban redevelopment project and sustainable mobility plan (t0+9) - COMPLETED D6.6 - First lot of the new headquarter of Rome Technopole, including incubator and parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing - PART 2: preliminary design.

- **Milestone ML2B (t0+24) - Completition of the consolidation of Rome Technopole innovation ecosystem**

The scope of the milestone is to complete the consolidation of Rome Technopole ecosystem as a fully integrated community of research partners, industrial partners and local institution that is recognized at regional and at national level the Rome city's reference system for high tech development, research, innovation and high education. Specific objectives of the milestone are:

i) Start precompetitive development and high-TRL research activities within the flagship project;
ii) Scale-up of technologies for technology transfer of the flagship project results;
iii) Quality assurance system for research and educational activities fully validated and consolidated;
iv) Student engagement, top student attraction and job placement services fully implemented;
v) Strengthening and up-grading of labs and instrumentation of the open research infrastructure of Rome Technopole (IARI)

This milestone contributes to the expected results for each Spoke, according to the time plane reported for each spoke.

Spoke	Deliverables & Expected Results
1	D1.1 – Periodical report on research activities and results of tasks 1.1, 1.2, 1.3 - First year assessment of Flagship Project. PART 4. D1.2 - Periodical report on technology development and innovation activities in task 1.4. - PART 4. D1.4 – Open calls for collaborative industrial research projects with SMEs. - PART 4: Publication of the second batch of calls D1.6 - Newsletter of Rome Technopole. Due time: monthly issued starting from t0+3 Contribution to the expected results: R1.3 - Open calls for ERC and Marie Curie attractiveness awards. Publication of the second batch of calls. R1.4 - Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects. Publication of the second batch of calls. R1.5 - Open calls for awards for top-scientists and excellent researchers winning ERCs. Publication of the second batch of calls. R1.6 - Open calls for highly qualified technical/scientific personnel. Publication of the second batch of calls.
2	D2.1 – Periodical report on exploitation activities and results of tasks 2.1, 2.2, including technical reports. - PART 4: including analysis on industrial research and technology transfer projects activated (R2.1 and R2.2)

	D2.2 – Periodical report on initiatives activated and results of tasks from 2.3 to 2.6. - PART 4 R2.3: Open calls for students' participation to training courses. - Publication of the third and fourth batch of calls (t0+18 – t0+24). R2.4: Open calls to support the birth of startups. - Publication of the third and fourth batch of calls (t0+18 – t0+24). R2.5: Organization of meetings and periodic events for fundraising by investors. – third and fourth meeting events (t0+18 – t0+24) R2.6: Open calls to support patenting by startups and SMEs. - Publication of the third and fourth batch of calls (t0+18 – t0+24). R2.7: Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects. - Publication of the third and fourth batch of calls (t0+18 – t0+24).
3	D3.1 – Annual report describing education offer of Rome Technopole (first level and second level). D3.2 – Annual report describing the PhD offer of Rome Technopole.
4	D4.1 - Annual report describing the Rome Technopole's offer of professional education (ITS and Bachelor) D4.2 - Annual report describing the work demand of professional personnel in terms of skills R4.3 - Activation of new ITS professional courses within the network for professional education, referring to the thematic areas and the flagship projects R4.4 - Activation of new Bachelor professional courses within the network for professional education, referring to the thematic areas and the flagship projects
5	D5.1 - Periodical report on activities on Dissemination and exploitation of technical and scientific results of task 5.1 – Part 4 (Continuous control and improvement in the performances detected in relation to the activities referred to in task 5.1 - Implementation of at least 60% of activities – open calls) D5.2- Periodical report on outputs coming from Knowledge exchange with stakeholders in task 5.2 - Part 4 (Continuous control and improvement in the performances detected in relation to the activities referred to in task 5.2 - Implementation of at least 60% of activities) D5.3 - Periodical reports, videos and digital content as output of tasks 5.3 and 5.4 – Part 4 (Continuous control and improvement in the performances detected in relation to the activities referred to in task 5.3 and 5.4 - Implementation of at least 60% of activities) D5.4 – Periodical report on Placement and students' engagement activities. -Part 4 (Continuous control and improvement in the performances detected in relation to the activities referred to students' engagement activities - Implementation of at least 60% of activities) D5.5 – Number of students and public organizations engaged and relative results – Part 4 (Continuous control and improvement in the performances detected in relation to the activities referred to students and public organizations engaged - Implementation of at least 60% of activities)
6	D6.1 – Communication plan of Rome Technopole and its periodical update - Periodical update D6.2 – Periodical report describing activities of the joint labs, open lab and contamination labs of Rome Technopole - PART 3 D6.3 – Periodical report describing initiatives of project management - PART 3 D6.6 - First lot of the new headquarter of Rome Technopole, including incubator and parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing - PART 3: final design. Contribution to expected results: R6.2 - Training courses, higher education, masters in collaboration with industrial partners. First batch of courses. R6.4 - Open calls for highly qualified technical/scientific personnel. Publication of the second batch of calls.

	R6.5 Construction of the Rome Technopole headquarters including: final design. Definition of a sustainable mobility plan with parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing.

- **Milestone ML3A (t0+28) - Final assessment of Rome Technopole: the innovation ecosystem of Rome and Lazio region**

The scope of the milestone is:

i) consolidation and assessment of the the quality assurance system of research activities and didactics;
ii) completion of all flagship project activities at low TRL;
iii) consolidation of technical communities of enterprises, SME and stakeholders and consolidation of periodic events for fundraising by investors;
iv) consolidation of regulations in IPR involving undergraduate students, PhD students, research entities, universities and industries;
v) consolidation of strategy for job placement of Rome Technopole;
vi) definition of final plan of Rome Technopole heartquarter construction;
vii) Definition of a sustainable mobility plan with parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing;
viii) completion of strengthening and up-grading of labs and instrumentation of the open research infrastructure of Rome Technopole (IARI).

This milestone contributes to the expected results for each Spoke, according to the time plane reported for each spoke.

Spoke	Deliverables & Expected Results
1	D1.1 – Periodical report on research activities and results of tasks 1.1, 1.2, 1.3 - PART 5. D1.2 - Periodical report on technology development and innovation activities in task 1.4. - PART 5. D1.4 – Open calls for collaborative industrial research projects with SMEs. - PART 5: Definition of the content of the next call D1.6 - Newsletter of Rome Technopole. Due time: monthly issued starting from t0+3 Contribution to expected results: R1.3 - Open calls for ERC and Marie Curie attractiveness awards Q1 all years. Definition of call content and time plan for year 3. R1.4 - Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects Q2 all years. Definition of call content and time plan for year 3. R1.5 - Open calls for awards for top-scientists and excellent researchers winning ERCs. Definition of call content and time plan for year 3. R1.6 - Open calls for highly qualified technical/scientific personnel Q2 Year 1. Definition of call content and time plan for year 13 R1.7 - Creation of the management, governance and communication structure of Rome Technopole. Monitoring and assessment of the administrative, management and communications offices of Rome Technopole R1.8 - Monthly newsletter starting from Q1 Year 3. Indicator for assessment.
2	D2.1 – Periodical report on exploitation activities and results of tasks 2.1, 2.2, including technical reports. - PART 5 D2.2 – Periodical report on initiatives activated and results of tasks from 2.3 to 2.6. - PART 5 Contribution to expected results: R2.3: Open calls for students' participation to training courses. Indicators for assessment. Definition of call content and time plan for year 3; R2.4: Open calls to support the birth of startups. Mapping of existing start ups within the three different strategic areas. Definition of call content and time plan for year 3.

	R2.5: Organization of meetings and periodic events for fundraising by investors. Time plan for year 3. R2.6: Open calls to support patenting by startups and SMEs. Mapping of patents within the three different strategic areas. Definition of call content and time plan for year 3. R2.7: Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects. Definition of call content and time plan for year 3.
3	D3.4 – Open calls for excellent students (undergraduate and PhD). Contribution to the expected results: R3.4 - Open calls for attraction of excellent undergraduate and PhD students R3.5 – New interuniversity PhD course on dual transition in KET and in the area of health&bio-pharma, in collaboration with industrial partners and stakeholders.
4	D4.1 - Periodic report describing the Rome Technopole's offer of professional education (ITS and Bachelor) Contribution to the expected results: R4.1 - Adequacy assessment and revision of existing ITS professional courses R4.2 - Adequacy assessment and revision of existing Bachelor professional courses
5	D5.1 - Periodical report on activities on Dissemination and exploitation of technical and scientific results of task 5.1 – Part 5 (Promotion of meeting, events and work tables aimed to implement any corrective actions capable of satisfying the expected performance levels for the actions of task 5.1 - Implementation of at least 80% of activities - exploitation plan definition) D5.2- Periodical report on outputs coming from Knowledge exchange with stakeholders in task 5.2 - Part 5 (Promotion of meeting, events and work tables aimed to implement any corrective actions capable of satisfying the expected performance levels for the actions of task 5.2 - Implementation of at least 80% of activities - exploitation plan definition) D5.3 - Periodical reports, videos and digital content as output of tasks 5.3 and 5.4 – Part 5 (Promotion of meeting, events and work tables aimed to implement any corrective actions capable of satisfying the expected performance levels for the actions of task 5.3 and 5.4 - Implementation of at least 80% of activities - exploitation plan definition) D5.4 – Periodical report on Placement and students' engagement activities. -Part 5 (Promotion of meeting, events and work tables aimed to implement any corrective actions capable of satisfying the expected performance levels for the students' engagement activities - Implementation of at least 80% of activities - exploitation plan definition) D5.5 – Number of students and public organizations engaged and relative results – Part 5 (Promotion of meeting, events and work tables aimed to implement any corrective actions capable of satisfying the expected performance levels for the students and public organizations engaged - Implementation of at least 80% of activities - exploitation plan definition)
6	D6.1 – Communication plan of Rome Technopole and its periodical update - Periodical update D6.2 – Periodical report describing activities of the joint labs, open lab and contamination labs of Rome Technopole - PART 4 D6.3 – Periodical report describing initiatives of project management - PART 4 D6.6 - First lot of the new headquarter of Rome Technopole, including incubator and parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing - PART 4: starting realization fo the first lot. Contribution to the expected results: R6.5 Construction of the Rome Technopole headquarters including: final design. Definition of a sustainable mobility plan with parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing.

- **Milestone ML3B (t0+36) - Final assessment of Rome Technopole: final validation, internationalization and sustainability plan**

The scope of the milestone is:
The scope of the milestone is the final validation of the consolidation and sustainability plan of Rome Technopole ecosystem and of the internationalization activity. Rome Technopole is fully operating:

i) New researchers have been hired and new PhD students have been financed by Rome Technopole;
ii) The open research infrastructure IARI is fully operating;
iii) The sustainability plan of the foundation has been defined and validated;
iv) Adult education and lifelong learning based on the industrial and territorial need is available;
v) Rome Technopole's adult education and lifelong learning courses are consolidated;
vi) Rome Technopole's monitoring system of outreach and public engagement activities is available and assessed;
vii) The design and realization of the first lot of about 2.300 sqm of the new headquarter of Rome Technopole (for a total of about 15.000 sqm) has been completed.

This milestone contributes to the expected results for each Spoke, according to the time plane reported for each spoke.

Spoke	Deliverables & Expected Results
1	D1.1 – Periodical report on research activities and results of tasks 1.1, 1.2, 1.3 - COMPLETED D1.2 - Periodical report on technology development and innovation activities in task 1.4. - COMPLETED D1.4 – Open calls for collaborative industrial research projects with SMEs. - COMPLETED D1.6 - Newsletter of Rome Technopole. Due time: monthly issued starting from t0+3 - COMPLETE Contribution to the expected results: R1.3 - Open calls for ERC and Marie Curie attractiveness awards. Publication of the third batch of calls. R1.4 - Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects. Publication of the third batch of calls. R1.5 - Open calls for awards for top-scientists and excellent researchers winning ERCs. Publication of the third batch of calls. R1.6 - Open calls for highly qualified technical/scientific personnel. Publication of the third batch of calls.
2	D2.1 – Periodical report on exploitation activities and results of tasks 2.1, 2.2, including technical reports. – COMPLETED: including analysis on industrial research and technology transfer projects activated (R2.1 and R2.2) D2.2 – Periodical report on initiatives activated and results of tasks from 2.3 to 2.6. – COMPLETED D2.3 – Best practices for the exploitation and industrial valorization of research results as outcome of SPOKE 2 overall activities. - COMPLETED Contribution to expected results: R2.3: Open calls for students' participation to training courses. - Publication of the fifth batch of calls (t0+30). R2.4: Open calls to support the birth of startups. - Publication of the fifth batch of calls (t0+30). R2.5: Organization of meetings and periodic events for fundraising by investors. – Fifth meeting event (t0+30) R2.6: Open calls to support patenting by startups and SMEs. - Publication of the fifth batch of calls (t0+30). R2.7: Open calls for awards to encourage participation in competitive calls on Pillar 2 Horizon Europe and to support European projects. - Publication of the fifth batch of calls (t0+30).
3	D3.1 – Annual report describing education offer of Rome Technopole (first level and second level). D3.2 – Annual report describing the PhD offer of Rome Technopole.

4	D4.1 - Annual report describing the Rome Technopole's offer of professional educatione (ITS and Bachelor) D4.2 - Annual report describing the work demand of professional personnel in terms of skills Contribution to the expected results: R4.5 - Reduction of the dropout from the educational system R4.6 - Increase of the placement of professional personnel
5	D5.1 - Final report on activities on Dissemination and exploitation of technical and scientific results of task 5.1 (Closing of the activities related to task 5.1 and definition of the lessons learned - exploitation plan implementation) D5.2- Final report on outputs coming from Knowledge exchange with stakeholders in task 5.2 (Closing of the activities related to task 5.2 and definition of the lessons learned - exploitation plan implementation) D5.3 - Final reports, videos and digital content as output of tasks 5.3 and 5.4 (Closing of the activities related to task 5.3 and 5.4 and definition of the lessons learned - exploitation plan implementation) D5.4 – Final report on Placement and students' engagement activities. (Closing of the activities related to students' engagement activities and definition of the lessons learned - exploitation plan implementation) D5.5 – Number of students and public organizations engaged and relative final results (Closing of the activities related to students and public organizations engaged and definition of the lessons learned - exploitation plan implementation)
6	D6.1 – Communication plan of Rome Technopole and its periodical update - Final release - COMPLETED D6.2 – Periodical report describing activities of the joint labs, open lab and contamination labs of Rome Technopole -COMPLETED D6.3 – Periodical report describing initiatives of project management -COMPLETED D6.6 - First lot of the new headquarter of Rome Technopole, including incubator and parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing - ongoing constructions Contribution to the expected results: R6.2 - Training courses, higher education, masters in collaboration with industrial partners. R6.5 Construction of the Rome Technopole headquarters including: final design. Definition of a sustainable mobility plan with parking areas with charging stations and dedicated parking spaces for car / bike / scooter sharing. The first lot is completed.

❖ Responsibility and means of verification

The scope of the milestone is to **assess the integration of existing skills and competencies to develop the start-up plan of Rome Technopole**, through a holistic and multidisciplinary approach to research, technology development and innovation, technology transfer and sharing of open research infrastructure, education, out-reach and public engagement. The partner responsible of the milestone assessment and the specific means of verification are reported in the table below.

- **Milestones ML1A and ML1B**

Resp.	Means of verification
Spoke 1 UniRM1	➢ Rome Technopole Foundation has been constituted and it is fully operative. The Managing Director has been hired through an international call. The supporting units have been set. The Spoke Departments have been set. ➢ The 3-year strategic research and innovation plan of Rome Technopole has been approved by the General Assembly. ➢ The web site of Rome Technopole is online.

	➢ Flagship projects have started: definition of requirements and preliminary results of research activities are assessed ➢ Regulation of IPR and joint foreground has been defined and approved by the General Assembly ➢ First batch of researchers and top scientists hired. ➢ The monitoring system for the quality assurance of research has been set-up and activated.
Spoke 2 UniRM2	➢ New products from research results have been produced and validated ➢ The first batch training courses in technology transfer has been provided ➢ The first batch of open calls to support the birth of startups has been provided ➢ Bi-monthly meetings and events for fundraising by investors have been organized ➢ Support task of Rome Technopole to patenting and licensing has been activated ➢ The first batch of highly qualified technical/scientific personnel have been hired
Spoke 3 UniRM3	➢ Definition of the educational and training needs of industrial partners. ➢ The first-year Rome Technopole education plan, integrating and strengthening already active courses with trans/multi/inter-disciplinary curricula in university courses (first level and second level) and soft skill tailored on the needs of industrial partners, has been published. ➢ IPR agreement on intellectual property of research results involving undergraduate students, PhD students, research entities, universities and industries have been approved by the General Assembly of Rome Technopole. ➢ The first batch of open calls for attraction of excellent undergraduate and PhD students has been published. ➢ A first proposal of new interuniversity PhD course on dual transition in KET and in the area of health&bio-pharma, in collaboration with industrial partners and stakeholders has been presented to the General Assembly of Rome Technopole. ➢ The monitoring system for the quality assurance of didactics has been set-up and activated.
Spoke 4 UniCAS	➢ Adequacy assessment and revision of existing ITS professional courses has been completed. ➢ Adequacy assessment and revision of existing Bachelor professional courses has been completed. ➢ A plan of courses and actions finalized to the reduction of dropout from the educational system has been defined. ➢ A plan for job placement of professional personnel has been defined. ➢ The regional network for professional education has been constituted. ➢ The regional strategic plan for professional education has been defined.
Spoke 5 UniTUS	➢ The dissemination plan of Rome Technopole has been defined and approved by General Assembly, including knowledge exchange with stakeholders and the transfer of scientific findings and methods as well as technical expertise into the scientific community and society. ➢ The plan for adult education and lifelong learning has been defined and approved by General Assembly. ➢ The first batch of adult education and lifelong learning courses has been produced. ➢ The monitoring system of outreach activities is set up. ➢ The first year engagement campaign for students and related event has been performed. ➢ The job placement plan has been defined and approved by the General Assembly. ➢ The first year job placement campaign and match-making event among graduated students and industries has been performed.
Spoke 6 UniRM1	➢ The strengthening and up-grading plan of the open research infrastructure of Rome Technopole (IARI) has been defined and approved by General Assembly. ➢ The first batch of training courses, higher education, masters in collaboration with industrial partners starting at has been performed. ➢ The activation plan of Joint Labs on themes inherent to the 3 AdS has been defined. ➢ The first batch of highly qualified technical/scientific personnel has been hired. ➢ The final design of the Rome Technopole headquarters is completed and the preliminary tests to assess the construction site have been performed.

	➢ The sustainable mobility plan of Rome Technopole headquarter and campus has been defined.

- **Milestones ML2A and ML2B**

Resp.	Means of verification
Spoke 1 UniRM1	➢ The fundamental research activities of flagship projects has been concluded and the scale-up of results at higher TRLs is started ➢ Flagship projects have started the phase of pre-competitive development. ➢ IPR and joint foreground agreements are monitored and regulation has been revised according to the feed-back of the first two-year experimentation. ➢ Second batch of researchers and top scientists hired. ➢ The results of the monitoring system for the quality assurance of research of year 1 are available.
Spoke 2 UniRM2	➢ New products from research results of flagship projects have been produced and validated. ➢ Scale-up of technologies of flagship projects for industrialization has been performed. ➢ The second batch training courses in technology transfer has been provided ➢ The second batch of open calls to support the birth of startups has been provided ➢ Bi-monthly meetings and events for fundraising by investors have been organized ➢ Patenting and licensing monitoring report has been issued ➢ The second batch of highly qualified technical/scientific personnel have been hired
Spoke 3 UniRM3	➢ The second-year Rome Technopole education plan, eventually including new inter-university trans/multi/inter-disciplinary courses has been published. ➢ A report concerning the monitoring of IPR agreement on intellectual property of research results involving undergraduate students, PhD students, research entities, universities and industries have been produced. ➢ The second batch of open calls for attraction of excellent undergraduate and PhD students has been published. ➢ The results of the monitoring system for the quality assurance of didactics of year 1 are available.
Spoke 4 UniCAS	➢ A plan for job placement of professional personnel has been defined. ➢ The regional network for professional education has been constituted. ➢ The regional strategic plan for professional education has been defined. ➢ New ITS professional courses within the network for professional education, referring to new thematic areas and the flagship projects have been activated. ➢ New Bachelor professional courses within the network for professional education, referring to the thematic areas and the flagship projects has been proposed. ➢ Monitoring report of the reduction of dropout from the educational system is available. ➢ Monitoring report of the job placement of professional personnel is available.
Spoke 5 UniTUS	➢ The update of the dissemination plan of Rome Technopole has been completed. ➢ The update of the plan for adult education and lifelong learning has been completed. ➢ The second batch of adult education and lifelong learning courses has been produced. ➢ The first year report of the monitoring system of outreach activities is available. ➢ The second year engagement campaign for students and related event has been performed. ➢ The monitoring report of the job placement activity of the year is available. ➢ The second year job placement campaign and match-making event among graduated students and industries has been performed.
Spoke 6 UniRM1	➢ The strengthening and up-grading of labs and instrumentation of the open research infrastructure of Rome Technopole (IARI) is started. ➢ The second batch of training courses, higher education, masters in collaboration with industrial partners starting at has been performed. ➢ The first Joint Lab on themes inherent to the 3 AdS has been activated. ➢ The second batch of highly qualified technical/scientific personnel has been hired.

	➢ The construction of Rome Technopole headquarter and campus is started. ➢ The realization of the sustainable mobility plan of Rome Technopole headquarter and campus has started.

- **Milestones ML3A and ML3B**

Resp.	Means of verification
Spoke 1 UniRM1	➢ All research activities of the flagship projects have been concluded and scaled up at higher TRL- ➢ IPR and joint foreground agreements are monitored and the final consolidated regulation has been defined and approved by the General Assembly. ➢ Third batch of researchers and top scientists hired. ➢ The results of the monitoring system for the quality assurance of research of year 2 are available. ➢ Rome Technopole research sustainability plan is available.
Spoke 2 UniRM2	➢ Final products from research results of flagship projects have been produced and validated. ➢ Scale-up of technologies of flagship projects for industrialization has been concluded. ➢ The third batch training courses in technology transfer has been provided ➢ The third batch of open calls to support the birth of startups has been provided ➢ Bi-monthly meetings and events for fundraising by investors have been organized ➢ Patenting and licensing monitoring report has been issued ➢ The third batch of highly qualified technical/scientific personnel have been hired. ➢ Rome Technopole technology transfer sustainability plan is available.
Spoke 3 UniRM3	➢ The third-year Rome Technopole education plan, including the new inter-university trans/multi/inter-disciplinary courses has been published. ➢ The consolidated regulation of agreement on intellectual property of research results involving undergraduate students, PhD students, research entities, universities and industries have been defined and approved by General Assembly. ➢ The third batch of open calls for attraction of excellent undergraduate and PhD students has been published. ➢ The results of the monitoring system for the quality assurance of didactics of year 2 are available. ➢ Rome Technopole high education sustainability plan is available.
Spoke 4 UniCAS	➢ Monitoring report and sustainability plan of the newly activated ITS professional courses within the network for professional education, referring to new thematic areas and the flagship projects is available. ➢ Monitoring report and sustainability plan of the newly Bachelor professional courses within the network for professional education, referring to the thematic areas and the flagship projects has been proposed. ➢ Final report on the reduction of dropout from the educational system is available. ➢ Final report of the job placement of professional personnel is available.
Spoke 5 UniTUS	➢ The sustainability plan for adult education and lifelong learning based on the industrial and territorial need is available. ➢ The third batch of adult education and lifelong learning courses has been produced. ➢ The first year report of the monitoring system of outreach activities is available. ➢ The second year engagement campaign for students and related event has been performed. ➢ The monitoring report of the job placement activity of the second year is available. ➢ The third year job placement campaign and match-making event among graduated students and industries has been performed. ➢ The strategy for job placement of Rome Technopole are defined and consolidated.
Spoke 6 UniRM1	➢ The strengthening and up-grading of labs and instrumentation of the open research infrastructure of Rome Technopole (IARI) is completed. ➢ The third batch of training courses, higher education, masters in collaboration with industrial partners starting at has been performed.

	➢ The sustainability plan of the activated Joint Lab on themes inherent to the 3 AdS is defined. ➢ The third batch of highly qualified technical/scientific personnel has been hired. ➢ The construction of the first lot of Rome Technopole headquarter and campus is completed. ➢ The first lot of the sustainable mobility plan of Rome Technopole headquarter and campus is completed.

The Gantt of the project is reported below.

Time Plan and activity milestones		Year 1				Year 2				Year 3			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Spoke 1 Applied research, technology development and innovation	1.1 Foundamental research												
	1.2 Industrial and applied research												
	1.3 Pre-competitive development												
	1.4 Technology development and innovation												
	1.5 IPR and joint foreground												
	1.6 Project management & communication												
Spoke 2 Technology transfer, new entrepreneurship, business incubation and acceleration	2.1 Valorization of research results for industrialization												
	2.2 Valorization of technologies for industrialization												
	2.3 Business incubation, promotion of new start-ups and spin offs												
	2.4 Business acceleration and venture capital												
	2.5 Training in technology transfer												
	2.6 Patenting & licensing												
Spoke 3 University education, industrial PhD courses, internationalization	3.1 Transdisciplinary university courses												
	3.2 International university courses												
	3.3 Apprenticeship university courses and internship												
	3.4 PhD courses in partnership with industries, apprenticeship and international PhD courses												
	3.5 Attraction of excellence students and foreign students												
	3.6 IPR and agreement with industrial stakeholders												
Spoke 4 Professional undergradute education in technology	4.1 Student guidance and attraction toward professional courses												
	4.2 ITS professional courses												
	4.3 Bachelor professional courses												
	4.4 Network for professional education (ITS, schools, Universities and Enterprises)												
	4.5 Transition between professional and university courses for dropout reduction												
	4.6 Placement of students coming form professional courses												
Spoke 5 Out-reach, public engagement, lifelong learning	5.1 Dissemination and Exploitation of technical and scientific results												
	5.2 Knowledge exchange with stakeholders												
	5.3 Visibility and impact on society												
	5.4 Lifelong learning												
	5.5 Secondary School students' engagement												
	5.6 Placement												
Spoke 6 Open Research Infrastructures, joint labs, higher education with industrial collaboration	6.1 Open research infrastructure for innovation												
	6.2 Joint labs												
	6.2 Master & post-degree courses												
	6.3 Open labs and co-creation												
	6.4 Higher education with industrial collaboration												
	6.5 Vocational training for technologies and innovation												
			ML1A		ML1B	ML2A			ML2B	ML3A			ML3B

Budget

In order to develop the Rome Technopole, as a results of the negotiation phase, the amount of the total requested financing by MUR is of 110.000.000 €, with a total cost of the project of 121.497.674,71 €.

A part of the financing has been allocated to southern Italian regions, in order to fulfill the requirements of MUR during the negotiation phase. The amount of costs and financing allocated to southern Italian regions are reported in the table below.

Total Costs	**€**	**121.497.674,71**	
Action line 019	**€**	121.497.674,71	100,00%
Digital	**€**	50.901.697,87	41,90%
Southern Italian Regions	**€**	16.056.400,00	13,22%
Total financing from MUR	**€**	**110.000.000,00**	
Southern Italian Regions	**€**	15.006.400,00	13,64%

The budget fulfills the requirement of at least 40% of total costs on "Digital" and 100% of costs on action line 019.

The budget for southern Italian regions has been allocated as follows:

- "Open calls": the 61% of the total financing of the open calls is reserved to research entities and enterprises having labs or headquarter in the south of Italy.
- Other costs for applied and industrial research activities: the 14% of the total financing of other costs (i.e. instrumentations, materials, etc) is reserved to research entities and enterprises having labs or headquarter in the south of Italy. The partners that will have budget allocated to the south on this topic are: CNR, INFN, ENEA, Thales Alenia Space, Leonardo.

The following table summarizes the amount of financing and costs reserved to the southern Italian regions (financing requested to MUR):

Type	South (Euro)	Nord-Center (Euro)	TOTAL (Euro)
Open calls	**11.556.400**	7.337.600	18.894.000
Instrumentations, materials, ….	**3.450.000**	20.796.260	24.246.260
TOTAL	**15.006.400**	28.133.860	43.140.260

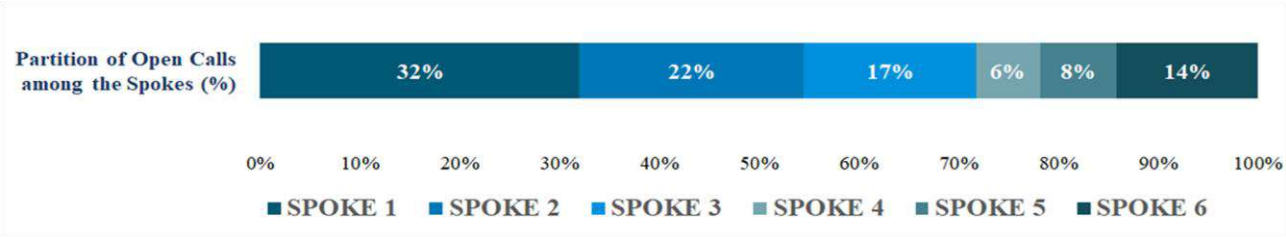
The detailed budget, in the table below, has been developed for each funding partner based on both the specific needs expressed during the construction of the present proposal and the activities in which each partner will take part, based on its participation in different Spokes. Moreover, the budget has been divided among all the funding partners.

FUNDING PARTNERS	SPOKE 1	SPOKE 2	SPOKE 3	SPOKE 4	SPOKE 5	SPOKE 6	TOT
Università La Sapienza	15.886.545 €	3.746.310 €	3.462.378 €	1.661.993 €	2.329.832 €	17.495.704 €	**44.582.761 €**
Università Roma Tor Vergata	2.394.201 €	6.089.905 €	1.779.235 €	- €	957.383 €	1.697.449 €	**12.918.173 €**
Università Roma Tre	2.109.233 €	1.470.374 €	5.308.524 €	614.631 €	759.798 €	1.385.922 €	**11.648.481 €**
Università di Cassino	1.664.348 €	1.494.709 €	- €	1.991.143 €	- €	- €	**5.150.200 €**
Università della Tuscia	932.886 €	898.629 €	855.134 €	498.571 €	2.005.230 €	792.218 €	**5.982.669 €**
CNR	1.369.199 €	995.710 €	768.744 €	- €	528.214 €	1.040.908 €	**4.702.775 €**
LUISS	617.545 €	540.214 €		- €	- €	- €	**1.157.759 €**
INFN	- €	- €	- €	- €	921.493 €	1.963.877 €	**2.885.370 €**
ISS	1.071.577 €	701.769 €	686.816 €	396.894 €	- €	782.106 €	**3.639.161 €**
ENEA	1.151.505 €	974.833 €	- €	- €	- €	1.003.461 €	**3.129.799 €**
Università Campus BioMedico	791.175 €	670.634 €	582.389 €	- €	- €	643.723 €	**2.687.921 €**
Airbus Italia	232.026 €	- €	- €	- €	- €	- €	**232.026 €**
Almaviva	- €	494.361 €	- €	- €	- €	494.361 €	**988.721 €**
BV Tech	572.249 €	- €	572.249 €	- €	- €	572.249 €	**1.716.746 €**
Catalent Anagni	- €	494.418 €	494.418 €	494.418 €	- €	- €	**1.483.253 €**
Coima	221.220 €	- €	- €	- €	- €	- €	**221.220 €**
ENI	- €	- €	150.000 €	- €	- €	- €	**150.000 €**
Leonardo	794.361 €	- €	- €	- €	- €	- €	**794.361 €**
Lventure Group	- €	513.869 €	- €	- €	- €	513.869 €	**1.027.737 €**
Maire Tecnimont	497.606 €	- €	- €	- €	- €	- €	**497.606 €**
MBDA	494.361 €	- €	- €	- €	- €	- €	**494.361 €**
Takis Biotech	494.361 €	- €	- €	- €	- €	494.361 €	**988.721 €**
Thales	965.728 €	- €	- €	- €	- €	965.728 €	**1.931.456 €**
Unicredit	- €	- €	- €	- €	- €	494.361 €	**494.361 €**
Unidata	494.361 €	- €	- €	- €	- €	- €	**494.361 €**
Spoke TOT	**32.754.487 €**	**19.085.733 €**	**14.659.886 €**	**5.657.649 €**	**7.501.950 €**	**30.340.295 €**	**110.000.000 €**

As specified in the previous table, the budget has also been developed for each Spoke, for which we report below the details of costs break-down.

The main reported expenses have been calculated as follows:

- The item "**Open calls for awards for services and supplies"** has been calculated based on the activation of "open calls" from the Spokes. Therefore, there is an amount of 18.894.000 € which is in compliance with the requirements of Article 5 of the Tender. It must be considered that this amount is divided among the different Spokes as follows:
    - 6.123.600 € in Spoke 1, managed by the Spoke Leader Università La Sapienza;
    - 4.250.000 € in Spoke 2, managed by the Spoke Leader Università Tor Vergata;
    - 3.258.000 € in Spoke 3, managed by the Spoke Leader Università Roma Tre;
    - 1.195.000 € in Spoke 4, managed by the Spoke Leader Università di Cassino;
    - 1.443.000 € in Spoke 5, managed by the Spoke Leader Università della Tuscia;
    - 2.624.400 € in Spoke 6, managed by the Spoke Leader Università La Sapienza



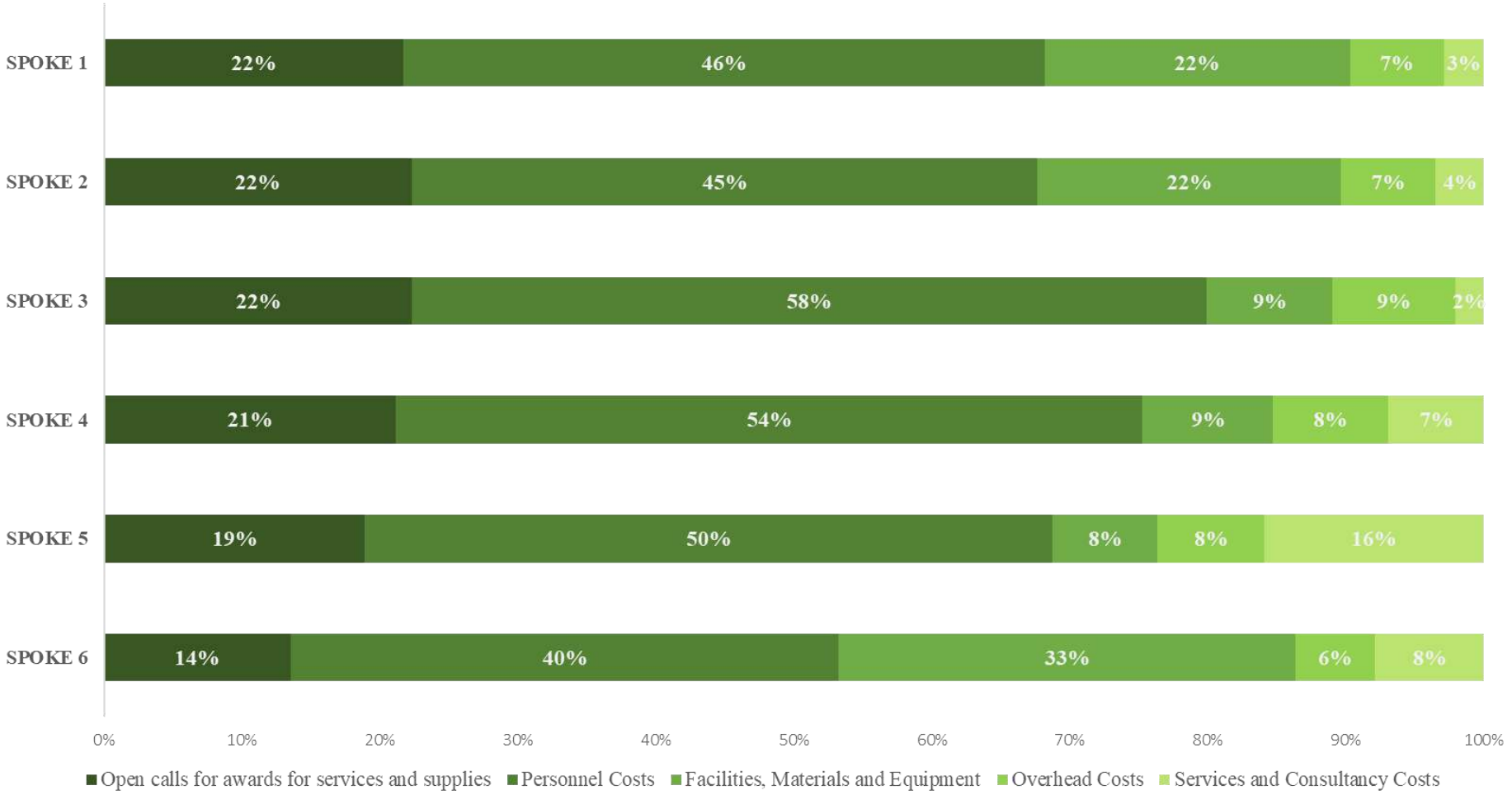
- "**Personnel Costs**" include all expenses for structured personnel, senior professors, researchers and PhD students. The global amount of this item is 44.687.792 €. This amount is calculated in accordance with Article 9 of the Tender, through the application of standard costs where is possible.
- "**Facilities, Materials and Equipment**" are referred to plans, resources and related services, scientific instruments and other assets, functional to research and lab activities. The total amount estimated for this costs item has been calculated as a percentage of Personnel Costs and is set at 19.313.955 €.
- "**Overhead Costs**" have been calculated "flat" as 15% of the Personnel Costs and the total amount is set at 6.703.169 €.

- "**Services and Consultancy Costs**" have been calculated based on the specific needs of the individual Affiliated and Spoke participants and the total amount is set at 4.932.305 €.
- "**Hub's General Expenses**" have been calculated as a percentage of Personnel Costs (10%) and the total amount is set at 4.468.779 €. It must be underlined that the full amount of this costs is entirely attributed to Spoke 1.
- To conclude, Hub's "**Building**" costs are expected to be more than 25.000.000 €. This plan shows only the admissible amount equal to 10% of the total Rome Technopole's budget, and it is entirely attributed to Spoke 6. The following detailed items are included in 11.000.000 €:
    - Project design;
    - Incubator;
    - Offices and Headquarter area;
    - Common areas;
    - Laboratories;

According with the detailed description above, below is reported the costs break-down for each Spoke:

COST ITEMS	SPOKE 1	SPOKE 2	SPOKE 3	SPOKE 4	SPOKE 5	SPOKE 6	TOT
Open calls	**6.123.600 €**	**4.250.000 €**	**3.258.000 €**	**1.195.000 €**	**1.443.000 €**	**2.624.400 €**	**18.894.000 €**
Personnel costs	**13.094.729 €**	**8.634.329 €**	**8.390.906 €**	**3.062.378 €**	**3.798.484 €**	**7.706.965 €**	**44.687.792 €**
Facilities, materials and equipment	**6.247.656 €**	**4.190.217 €**	**1.333.946 €**	**536.093 €**	**585.144 €**	**6.420.900 €**	**19.313.955 €**
Overhead costs	**1.910.404 €**	**1.309.004 €**	**1.299.479 €**	**469.799 €**	**587.318 €**	**1.127.164 €**	**6.703.169 €**
Services	**824.884 €**	**668.420 €**	**302.206 €**	**394.378 €**	**1.215.779 €**	**1.526.639 €**	**4.932.305 €**
General expenses	**4.468.779 €**						**4.468.779 €**
Buildings						**11.000.000 €**	**11.000.000 €**
TOT	**32.670.052 €**	**19.051.970 €**	**14.584.536 €**	**5.657.649 €**	**7.629.724 €**	**30.406.068 €**	**110.000.000 €**

Partition of Cost Items per Spoke (%) (this view is not taking into consideration the amount of Hub's G&A and the costs for Buildings)



Planned effort by Spoke

The table below summarizes the foreseen effort in man/months over the 3 years of project duration, distributed among spokes and affiliates and divided for each specialization area: EnT - energy Transition, DgT - Digital Transition, H&BP - Health and bio-pharma.

Spoke	Affiliates	EnT	DgT	H&bp	Total effort in man months
Spoke 1 Applied research, technology development and innovation (Università degli Studi La Sapienza)	Università degli Studi La Sapienza	66	51	336	2.310
	Università degli Studi Tor Vergata	30	27	30	
	Università degli Studi Roma Tre	37,5	36	51	
	Università di Cassino e del Lazio Meridionale	30	36	24	
	Università degli Studi della Tuscia	42	0	30	
	CNR	57	60	69	
	LUISS	0	153	0	
	Istituto Superiore di Sanità	0	45	69	
	ENEA	24	18	18	
	Università Campus Bio-Medico di Roma	33	54	96	
	Airbus Italia	0	63	0	
	BV Tech	0	33	12	
	Coima	23,4	23,3	0	
	Leonardo	0	63	0	
	Maire Tecnimont	24	21	0	
	MBDA	0	111	0	
	Takis	0	0	63	
	Thales	0	63	0	
	Unidata	99	90	99	
Spoke 2 Technology transfer, new entrepreneurship, business incubation and acceleration (Università degli Studi Tor Vergata)	Università degli Studi Tor Vergata	15	24	42	1.302
	Università degli Studi La Sapienza	57	51	108	
	Università degli Studi Roma Tre	21	30	15	
	Università di Cassino e del Lazio Meridionale	33	45	9	
	Università degli Studi della Tuscia	36	9	39	
	CNR	18	9	42	
	LUISS	0	105	0	
	Istituto Superiore di Sanità	0	0	51	
	ENEA	18	27	18	
	Università Campus Bio-Medico di Roma	54	54	78	
	AlmavivA	0	141	0	
	Catalent	0	0	72	
	LVenture Group	27	27	27	
Spoke 3 University education, industrial PhD courses, internationalization (Università degli Studi Roma Tre)	Università degli Studi Roma Tre	84	54	63	897
	Università degli Studi La Sapienza	48	30	123	
	Università degli Studi Tor Vergata	9	18	33	
	Università degli Studi della Tuscia	9	24	27	
	CNR	18	12	15	
	Istituto Superiore di Sanità	0	0	51	
	Università Campus Bio-Medico di Roma	27	30	42	
	BV Tech	0	36	9	
	Catalent	0	0	72	
	Eni	63	0	0	
Spoke 4 Professional undergradute education in technology (Università di Cassino e del Lazio Meridionale)	Università di Cassino e del Lazio Meridionale	33	18	24	426
	Università degli Studi La Sapienza	42	51	30	
	Università degli Studi Roma Tre	37,5	4,5	0	
	Università degli Studi della Tuscia	6	12	39	
	Istituto Superiore di Sanità	0	9	48	
	Catalent	0	0	72	
Spoke 5 Out-reach, public engagement, lifelong learning (Università degli Studi della Tuscia)	Università degli Studi della Tuscia	12	18	27	410
	Università degli Studi La Sapienza	66	33	24	
	Università degli Studi Tor Vergata	15	18	12	
	Università degli Studi Roma Tre	24,75	18,75	9	
	CNR	9	18	9	
	Istituto Nazionale di Fisica Nucleare	0	96	0	
Spoke 6 Open Research Infrastructures, joint labs, higher education with industrial collaboration (Università degli Studi La Sapienza)	Università degli Studi La Sapienza	27	54	105	1.211
	Università degli Studi Tor Vergata	15	33	24	
	Università degli Studi Roma Tre	13,5	9	36	
	Università degli Studi della Tuscia	33	3	24	
	CNR	36	3	24	
	Istituto Nazionale di Fisica Nucleare	0	0	114	
	Istituto Superiore di Sanità	0	6	60	
	ENEA	18	18	27	
	Università Campus Bio-Medico di Roma	0	36	66	
	AlmavivA	0	138	0	
	BV Tech	0	0	45	
	LVenture Group	27	18	18	
	Takis	0	0	63	
	Thales	0	63	0	
	Unicredit	6	48	0	

Strategic actions for broader involvement and equal opportunities

Rome Technopole puts a great effort towards **equal gender support** both in terms of research matters and their gender impact as well as in the definition of project's roles.
In this framework, inclusion and diversity, especially focusing on the gender issues, is an inherent dimension of Rome Technopole endeavor and will be integral to its work in various ways:

1. **Gender balance in the composition of the team** → The project coordinator, Prof. Sabrina Sarto, is a woman and about 35% of the human resources employed to carry out the activities is represented by female scientists and professionals.
2. **Gender balance in research analysis** → taking into consideration gender-informed research matters such as gender medicine or the relationship between IA and gender.
3. **Gender equality of participants in flagship projects, open calls, start up initiatives and hiring**, ensuring that at least 40% of temporary staff and phd students enrolled within the project will be women.
4. **Gender dimension in outreach, public engagement and co-creation activities**, with specific initiatives devoted- for instance - to female entrepreneurship

Similarly, specific measures and initiatives will be put in place to ensure the **involvement of young scholars** who have obtained their PhDs in the last 10 years. To this regard, young scientists already represent over the 11% of the overall human resources involved in the project implementation (with 30% of them being women) and the further measures to attract them from EU and beyond will deal with the launch of specific calls for excellent young scientists (based on Be4ERC Sapienza initiative's approach under spoke 1), of visiting grants for young scientists, of start-ups challenges for phd students and young researchers (spoke 2) as well as an open programme to support phd and early career researchers transversal skills (spoke 3 and 6).
In order to tackle the **wider participation as possible**, 3 different engagement strategies has been defined to join Rome Technopole:

- **membership as spokes or spokes affiliates:** 11 universities and research centers and 14 industries and enterprises joined in this way. All the spokes and affiliates will be also founding associates of the participatory Foundation that will manage Rome Technopole;
- **membership as founding associated partners of Rome Technopole**: all the local public authorities (Regione Lazio, Lazio Innova, City of Rome) and industrial unions (Chambers of Commerce, Unindustria) as well as some companies and research bodies for a total of 15 members will join Rome Technopole as founding associates. The following table lists all the organisations that will join **Rome Technopole as founders of the Hub**:

ORGANISATION NAME	PUBLIC/PRIVATE
1. Unindustria	Public authority
2. Regione Lazio	Public authority
3. Roma Capitale	Public authority
4. CCIAA Roma	Public authority
5. CCIAA Latina/Frosinone	Public authority
6. Lazio Innova	Public authority
7. GALA S.p.A.	Company
8. WESTPOLE SPA	Company
9. CAPGEMINI	Company
10. INAIL	Public authority
11. Aeroporti di Roma	Company
12. Acea	Company
13. WSENSE	Academic startup
14. Confindustria Dispositivi Medici	Union

- **membership to the stakeholders' board**: over 40 public and private entities, representing some of the most interesting and promising economic and social realities of the territory, have expressed

their support to Rome Technopole and shown their interest in being involved in its activities and plans such as the open calls. The following table represents all the organisations that have already joined Rome Technopole board of stakeholders:

Organization name	EnT	DgT	H&BP	Public/Private
HEREMOS Srl		X	X	Academic startup
Quantum Leap - divisione di Infinity Edge S.r.l.		X		SME
Deep Ocean Capital SGR SpA		X		SME
Confindustria Servizi Innovativi e Tecnologici		X	X	Public authority
TELECONSYS SPA		X		SME
EUROKLEIS SRL		X		SME
SPECIAL PRODUCT'S LINE SPA			X	Company
Mashfrog group srl		X		SME
Mediavoice Srl		X		SME
Medtronic		X	X	Company
Brain Innovations Srl			X	Academic startup
Fondazione EBRI 'Rita Levi-Montalcini'			X	Research institution
Fondazione Mondo Digitale		X		Foundation
Health Pixel srl		X	X	Academic startup
Enginfo Consulting S.r.l.		X		SME
COTEC - Fondazione per l'Innovazione		X		Foundation
Menarini Ricerche			X	Company
Menarini Biotech			X	Company
Elettronica e sistema per automazione Ele.Si.A. S.p.A.		X		Company
IFO - Istituti Fisioterapici Ospedalieri			X	IRCCS
3d0 srl		X		SME
Everybotics srl		X		Academic spin off
LEDA, Laboratorio di ElettroDinamica Avanzata		X		Research organisation
DB SERET srl		X		SME
Neatech.it srl				
Deep Blue SRL		X		SME
Sordina IORT Technologies S.p.A.			X	Company
Exprivia SpA		X		Company
Cisco		X		Company
ISED		X		Company
ITA Airways		X		Company
JANSSEN-CILAG SPA			X	Company
Accenture S.p.A.		X		Company
Eustema S.p.A		X		Company
Istituto per la Competitività		X		Foundation
Fondazione Santa Lucia IRCCS			X	IRCCS
Dompè			X	Company
Sanofi s.r.l.			X	Company
Edison	X			Company

Such a relevant number of actors has been reached through an intense action of online promotion of the Rome Technopole objectives and, from this, **several group and one-to-one meetings** have occurred. This is the base for the further development of the project's community that will be supported especially by spokes 5 and 6 through not only dissemination and exploitation of scientific results, but also by fostering knowledge

exchange, co-creation and impact creation according to a quadruple helix engagement approach (academia, enterprises, civil society, policy makers).
All these actions, that intersect all the 6 spokes of the project, will ensure that Rome Technopole research will be inclusive, interactive and sensitive to economic, societal and cultural needs and concerns.

Qualitative-quantitative indicators for monitoring activities and for ex-post evaluation

The following indicators' table describes the actions and the related targets for monitoring and ex-post assessing the project during and beyond its lifetime.

Indicator	Action & Spoke(s)	Target
% of female temporary researchers/staff recruited	Hiring procedures taking into consideration the gender dimension - spoke 1	at least 40%
N. of flagship research projects developed	Design and implementation of R&I projects involving Rome Technopole partners - spoke 1	at least 2 for each scientific area
Availability of exploitable results	Set up of initiatives to support industrialization, technology transfer, licensing, new patents and startups - spoke 2	Guidelines for Rome Technopole IPR and startups management
N. of joint ownership agreements deriving from Rome Technopole activities	Set up of clear and transparent procedures to manage joint ownership and results - spoke 2	At least 3 per year
% of female phd students recruited	Hiring procedures taking into consideration the gender dimension - spoke 3	at least 40%
N. of young researchers attracted	Design and implementation of grants, calls and awards to attract talented young researchers - spokes 1-2-3-6	at least 100
N. of students accessing Rome Technopole degree courses	Design and implementation of attractive joint curricula - spoke 3	at least 700 in 5 years
N. of professional undergraduate courses for education in technology	Design and implementation of courses for undergraduate professionals - spoke 4	at least 3 per year
Establishment of a network for professional education	Networking activities aiming at defining needs and learning objectives for professional education - spoke 4	Network established
N. of open access publications	When possible, the relevant publications deriving from Rome Technopole activities will be made available in open access to foster the widest knowledge transfer possible to the academic community and the society - spoke 5	at least 5 per year
N. of stakeholders involved by the end of the project	Definition of a detailed and inclusive dissemination and exploitation plane, capable of involving - through dedicated media and channels - all different project stakeholders - spoke 5	at least 300
N. of access to the open research infrastructure made available by Rome Technopole	The open research infrastructure will be mapped and made available to Rome Technopole members with defined access and usage procedures - spoke 6	at least 100 per year
N. of open, joint and co-creation actions	Design and implementation of R&I activities and proof-of-concepts in cooperation between universities, research centers and industries - spoke	at least 6

	6	
Respect of DNSH principles	DNSH principles will be assessed by periodically checking the compliance with the EC checklist on do not significant harm - all spokes	Positive score on the EC DNSH checklist

Attraction of early-career researchers to the region

Nothing could be more important for the future of our country than attracting early-career researchers and promoting attractive research careers in Lazio region. Offering career perspectives is indeed needed to convince the brightest and most daring minds to take up the challenge. Most people go into research for the intellectual challenge, to satisfy their sense of curiosity about the world. Young researchers are looking for the right conditions for carrying out their research, in particular with respect to the availability of research infrastructure research funding, research resources. In particular, early-career researchers are attracted where they see some future prospects to find an opportunity, that is a decent job, to develop their potential.
Within this context Rome Technopole is a great opportunity for young researchers and for early-career researcher, because it gives the opportunity to a young researcher to be part of an innovation ecosystem in which Research and Enterprise meet together in order to promote and support jointly top level research, technology transfer, high education, business incubation, business acceleration.
During the first three year of Rome Technopole project, relevant resources are allocated in order to publish open calls aimed at offering research grants and hiring young researchers that choose to move to Rome Technopole to carry out their research.
In particular, Spoke 1 has planned some actions to attract early-career researchers, as detailed below:

- open calls for ERC and Marie Curie attractiveness awards at the first quartile, all years, in order to attract winners of ERC or Marie Curie grants to choose Rome Technopole as host institution through the founding universities. Rome Technopole will support these researchers providing labs and financial support to their research, and also the possibility to get access to IARI (the regional research infrastructure open to both research and industrial stakeholders). Expected result R1.3.
- open calls for awards for top-scientists and excellent researchers winning ERCs. Expected result: R1.5.

In addition, the model adopted in Spoke 2 for the exploitation of research results in terms of products and for the enhancement of industrial research activities in terms of process technologies, both to be brought to industrialization, is based on the integration of research and business and on the involvement of early-career researchers. Planned activities will thus include training courses, organized in close collaboration with companies, providing an organizational management 4.0 model.
As mentioned above, also Spoke 6 offers several opportunities to young researchers that chose to move to Rome Technopole: this includes the possibility of creating new open labs in collaboration with enterprises and industries and to activate common research projects.

Furthermore, Rome Technopole recruitment processes will pay a special attention to inclusion and equity, ensuring as much as possible a proper gender balance and equal access to career opportunities for any potentially disadvantaged group. The European Charter for researchers and the EU principles from HRS4R will be the guiding documents to follow this inclusive path.

In conclusions, the main 4 actions that will be implemented for early-career researcher attraction are:

1) **Open calls for ERC and Marie Sklodowska-Curie attractiveness awards**. This action is motivated by the success of Sapiexcellence program (https://www.uniroma1.it/it/pagina/sapiexcellence) that is aimed at attracting the best and most promising researchers, encouraging them to actively participate in the Pillar "Excellence" of the Horizon 2020 Framework Program, and - in particular - in Marie Skłodowska-Curie (MSCA) Actions and ERC funding schemes. Rome Technopole will allow to make more and more attractive this type of program because it will offer to the applicant the possibility to receive a grant up to 500 kEuro, to make access to the research infrastructure IARI, and to set up new labs and joint labs with industrial partners of Rome Technopole to carry out their research activity.
2) **Open calls for awards for top-scientists and excellent researchers winning ERCs.** This action is finalized to attract winners of ERC grant (both starting or advanced) to Rome Technopole, offering: up

to 50% reduction of teaching activities, up to 1 Meuro of additional funding in order to: hire young researchers, engage PhD students, create new labs with state-of-art instrumentations, make use of research infrastructure IARI.

3) **3-year-term joint research&innovation positions,** which include the first two years of research activity with a university or Public Research Organization supervisor and an industrial co-supervisor, working in a research lab on fundamental and applied research, and the third year of activity focused on technology transfer and industrial development at the industrial site. These positions are finalized to the integration of research and business activities of early-career researchers. After the 3-year term, the researcher has the possibility to get a permanent position in the company. This type of research contract has been already experimented and had a relevant success, through the opportunity offered by MUR DM 1061/2022, MUR DM 1062/2022, open call for financing industrial PhD positions in 2021 and 2022, and addresses the needs of the industrial partners of Rome Technopole which have difficulties in hiring new technical staff with adequate profiles.
4) **Training package to enhance soft skills,** so enriching training path of early-stage researchers, including PhD students, also with a special focus on future non-academic careers. This activity is particularly supported by the strong experience of university partners of Rome Technopole (i.e. Sapienza has been awarded "HR Excellence in Research" by EC in 2020) and by the strong engagement by industrial partners.

Engagement with the local authorities

Rome Technopole will benefit from a close collaboration with local authorities such as Lazio Region and Rome Municipality, that will act as founding associated partners of the project.
This collaboration will strengthen the role of Rome Technopole as a relevant territorial R&I player, able of supporting local development and producing cultural, social and economic impact.
Within this context, it will be possible to foster the implementation of the regional smart specialization strategy (S3) and the resolution of relevant societal challenges both at urban and regional level also through open calls, hackathons and joint projects.
In addition, also with the support of other **relevant** founding partners highly involved in local governance, such as Lazio Innova, territorial Unions (i.e. Rome Chamber of Commerce and Frosinone-Latina Chamber of Commerce), Rome Technopole will cooperate to build competitive advantage by developing and matching research and innovation's own strengths to business needs to address emerging opportunities and market developments in a coherent manner, while avoiding duplication and fragmentation of efforts towards a research and innovation (R&I) strategic policy framework.

In conclusions, the main actions that will benefit from engagement with local authorities are:

1) **Realization of the new headquarter of Rome Technopole**: Rome Municipality will make available an area of about 15.000 sqm for the construction of the new campus and headquarter of Rome Technopole in Pietralata. The new campus will be realized according to the zero-carbon and NZEB criteria, and it will benefit from the results of the research activities performed in FP1, lead by COIMA.
2) **Strengthening of the innovation activities of Rome Technopole, to promote collaboration and technology transfer to industries and creation of new enterprises**, through financial resources that Regione Lazio is planning to allocate within PO FESR 2021-2017
3) **Strengthening of Rome Technopole's open research infrastructure for innovation IARI**, which has been constituted also thanks to resources allocated by Regione Lazio in 2018
4) **Open calls for innovation, open competitions for start-up and spin-off, open call for business acceleration** thanks to the collaboration and experience of Lazio Innova S.p.A, which is the in-house society of Regione Lazio for promoting research & innovation
5) **Communication towards society and public engagement** thanks to the collaboration and support of Regione Lazio's communication channels and to stakeholder network of Lazio Innova and of the Commerce Chambers of Rome and Latina-Frosinone.

The internationalization strategy

According to OECD, due to the "the current labour market requiring graduates to have international, foreign language and intercultural skills to be able to interact in a global setting, institutions are placing more importance on internationalization". In fact, the current age of knowledge and technology requires an interconnected network and global awareness as major and sought-after assets.
In this context, Rome Technopole clearly represents an environment to foster and support the internationalization of R&I excellence of Lazio Region, that is based on long-term and established partnerships with relevant European and international stakeholders through Horizon 2020 and Horizon Europe collaborative projects carried out by its partners as well as through international agreements for researchers' and students' mobility or for public-private exploitation of research results.

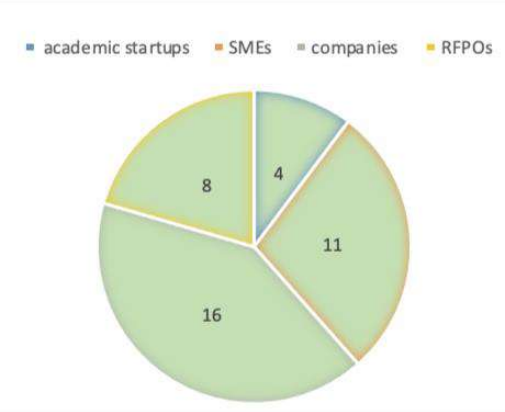
More in detail, Rome Technopole will:

- support calls for visiting professors coming from abroad;
- encourage the participation to international and EU projects;
- develop strategies to strengthen students' and Phd students' mobility (also by increasing English taught courses);
- promote the international dimension of academic start-ups and their access to international acceleration and incubation programmes;
- design professional courses to allow to the graduated students to operate at national and international level;
- present the project's results and impacts in international conferences and gatherings and by involving international stakeholders.

All details concerning the impressive amount of international collaboration of the funding partners are reported in each partner profile.

SME engagement and impact

Rome Technopole stakeholders' board (see detailed table at pg 80) consists of 39 organizations, whose number will increase after the project start.
More in detail, as shown in the following figure, the 80% of the stakeholders belong to the entrepreneurial sector including 4 academic startups and 11 SMEs.



In this sense, the board will represent a major engagement point between Rome Technopole and the regional ecosystem of small and medium enterprises, with the support as well of Rome and Frosinone-Latina Chambers of Commerce and LazioInnova that have joined the project as founding partners.
The foreseen engagement activities will be based on an accurate mapping of the local entrepreneurial actors active in the field of EnT, DgT, H&BP, in order to assess their strengths and weaknesses and to design measures and initiatives aiming at supporting their needs. Within this context, open calls, acceleration and incubation programmes and entrepreneurial/open innovation training paths will address SMEs and startups specifically.

Furthermore, the engagement and support to startups and academic startups is among the most promising activities of some of the project beneficiaries, such as ENI with the ENIJoule project, and, especially, L-Venture whose expertise, competences and core mission is entirely devoted to supporting startups and newcos.

D) PROGRAM IMPACT

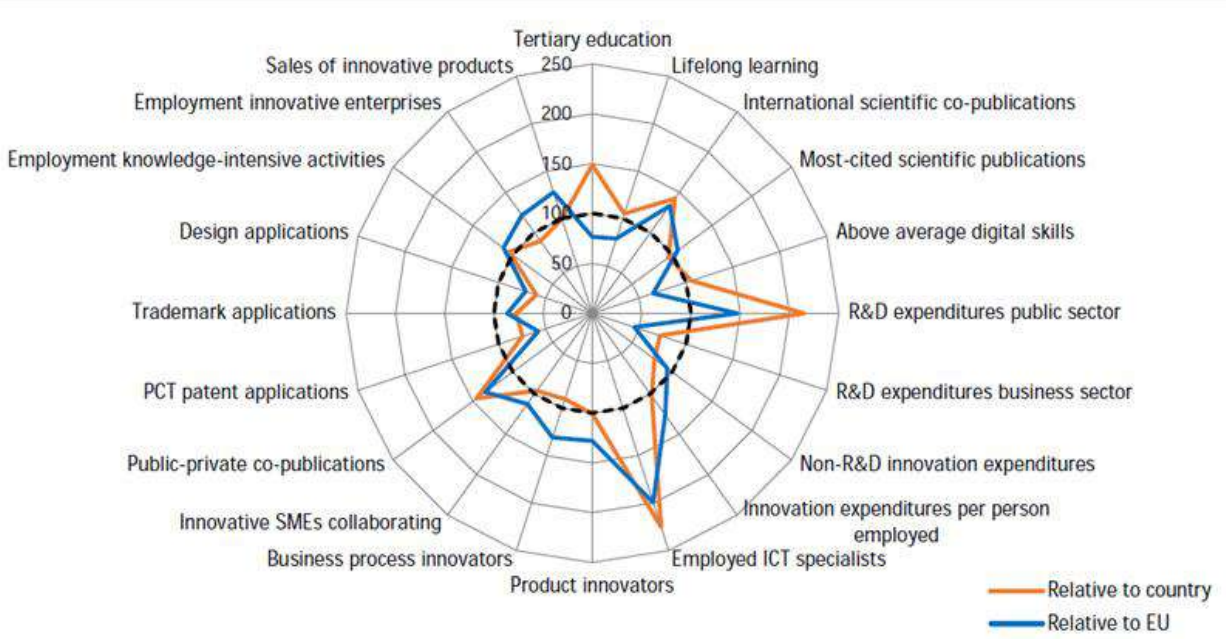
Impact evaluation analysis

According to the prudential estimates of the impact of PNRR measures on regional GDP in terms of additional millions of euros, for Lazio Region a cumulative added value of over 1 billion euros was calculated only with regard to mission 4 for the first three years of activation of the PNRR. The project and the investment planned for the Rome Technopole fit perfectly into this forecast scenario.

	2021	2022	2023
M1 – DIGITISATION, INNOVATION, COMPETITIVENESS AND CULTURE	369,7	961,3	1.602,6
M2 – GREEN REVOLUTION AND ECOLOGICAL TRANSITION	369,7	1.153,5	1.402,3
M3 – INFRASTRUCTURES FOR SUSTAINABLE MOBILITY	-	192,3	400,7
M4 – EDUCATION AND RESEARCH	184,9	576,8	400,7
M5 – INCLUSION AND COHESION	184,9	576,8	1.001,6
M6 - HEALTHCARE	184,9	192,3	400,7
Totale PNRR	**1.294,0**	**3.653,0**	**5.208,6**

❖ The positioning of Lazio in Europe on innovation

According to the latest (2021) Regional Innovation Scoreboard (RIS) of the European Commission, Lazio falls into the category of strong innovators. Lazio improved its previous positioning as a moderate innovator.



However, the following indicators remain negative compared to the Italian and European average:

- business R&D expenditure (-28 points compared to Italy and -55 points compared to Europe);
- international patent applications (-25 points compared to Italy and -42 points compared to Europe).

On the other hand, the main strengths are represented by:

- public sector R&D expenditure
- SMEs activating in-house innovation processes
- international scientific co-publications between public and private sectors
- the percentage of employees in the technology-intensive manufacturing and knowledge-intensive services sectors

❖ R&D expenditure of companies in Lazio: values and ratio to GDP

The companies of Lazio in 2018 invested about 1.3 billion euros in R&D activities, 8% of the total expenditure of Italian private companies (15.9 billion euros).
The value of R&D expenditure by companies in Lazio is equivalent to 0.7% of the regional GDP, against an Italian average of 0.9%. The highest levels in the ratio with regional GDP are reached in the most dynamic regions of the center-north: Piemonte 1.8%, Emilia-Romagna 1.5%, Lombardia 1%.
However, the number of companies within the region affects the relationship with GDP. It is no coincidence that Lazio records significantly better performances if we look at the average expenditure for innovation of enterprises per employee: 8,800 euros, absolutely in line with or higher than the previously mentioned regions, except for Piemonte which reaches 9,700 euros per employee.
In 2018, companies in Italy disbursed funds to universities for around 350 million euros, 2.5% of the national expenditure of companies to finance R&D (13.7 billion).
This value is slightly lower than the average value of the European Union (at 27) which in 2018 stood at 2.7%, but it is far from the German rates: in Germany 3.5% of the financing of companies for R&D goes to universities .
The relationship between companies and Universities and Research Centers, according to the ISTAT 2019 Permanent Census, which is based on a very representative sample of companies, appears significant in Lazio where 10% of the total collaborations of companies with the world of research are recorded, second Italian region even if significantly distanced from the first which is Lombardy with a double number of collaborations.
The Universities of Lazio in 2018 spent just over 690 million euros on R&D activities, 12% of the national total of the universities. Lombardy alone records a higher figure with around 870 million, 15% of the Italian total.

The data on the financing of Lazio companies to universities is not available but considering the relationship between the values of our region and the overall national ones, we can assume that the companies of the region have financed the universities in 2018 for about 30 million euros.
If we look at the average spending on innovation, at SMEs that innovate in-house, at the percentage of employed in highly technological sectors and at the significant public expenditure on R&D, we can affirm that Lazio is a region that tends to be virtuous in terms of innovation and research and development both for businesses and for universities.
At the same time, the negative indicators compared to the Italian and European average in the overall expenditure of the private sector in R&D and the few international patent applications, pictures a region in which the synergies between companies and the world of research must intensify and strengthen to produce processes of the most significant and industrially relevant innovations.
In this sense, The Rome Technopole can play a significant role in increasing the mutually advantageous relationship between regional universities, research centres, industries and enterprises supporting the territorial ecosystem in bridging the current gaps detected by the Regional Innovation Scoreboard (RIS).
As a consequence, among the major expected economic impacts could be listed:

- the increase in R&D spending by companies, in particular in collaboration with universities and research institutions (in comparison with future Regional Innovation Scoreboard);
- positive impact on patent applications (in comparison with future Regional Innovation Scoreboard);
- the increase in co-designed training courses (analyzing data from the University);
- the increase in scientific graduates in the three specialization sectors of the Rome Technopole (ISTAT data).

Given these premises, and considering the specialization trajectories defined by Rome Technopole, namely Energy Transition, Digital Transition, and Biopharma and Health, it is evident that the project could positively contribute to the most advanced and promising regional industrial sectors.
More in detail, Lazio could be considered excellent in the following domains:

- **Pharmaceutical:** One of the main production centers of European Pharmaceuticals is located in Lazio. Italy, in fact, is the leading drug producer in Europe, and 39 of national exports come from Lazio (average of the last three years);
- **Cinema/Audiovideo productions:** In the production of films, videos and television programs, Rome is the first pole in Italy with 28% of the companies and 43% of the employees.
- **Tourism and Culture:** Rome is the most attractive Italian city for tourists, with 31 million visits in 2019 (followed by Venice with 13 million), 243.000 beds, and the widest cultural heritage represented by 195 archaeological assets and sites, 423 historical architectural assets and 8 basilicas. Rome is also first for workers employed in the cultural sector with 16 % of the Italian employees.
- **ICT:** Rome excels, together with Milan, as an ICT pole with 83.000 employees, representing the 17% of the national sector, and over 4 billion euros of ICT services exported (5% of the national total)
- **Energy and Green:** Rome is the first province in Italy for employees in the energy sector 7 600 equal to 13% of the national total. In this sense, together with Milan, it clearly leads the ranking of companies investing in green technologies (30.400 companies).

In addition, Lazio is the region with the highest share of employees in high-tech manufacturing and knowledge intensity service sectors with 6,6% out of the total number of employees at national level. Similarly, Lazio is the first region for the number of universities, with 13 of the 87 universities present on the national territory, and Rome is the first province with 11 universities. Considering the number of graduates, Rome is the second province (42.000 per year), after Milan (45.000 per year). Moreover, in Lazio is concentrated the 32% of the research staff of public institutions (excluding universities) with 44% of expenditure.
This framework, reinforced by the actions, plans and milestones set out within the Rome Technopole project, will allow to tackle ambitious objectives dealing with competitiveness and growth of the entire territory such as:

- Strengthen and enhance the academic excellence of Rome in a single pole;

- Increase the number of master's degree graduates in the sectors of greatest regional perspective and strategic interest;
- Improve dialogue and synergy with companies in the regional and national productive system;
- Decrease the mismatch between the training offer and the most requested professional profiles;
- Increase public and private R&D spending;
- Increase patent capacity and promote innovative start-ups with an industrial vocation;
- Create a new multi technological and transdisciplinary pole of high international profile in Rome to promote and support research and innovation: a real "Innovation Ecosystem" for the benefit of the national context.

As a consequence, Rome Technopole could meet these important targets:

- **70% of research and technology transfer activities** in close collaboration between universities, research centers and companies, in a time frame of 3 years;
- Strengthening of **laboratories and research infrastructures** open to the territory and to stakeholders, in a time frame of 3 years;
- **More than 150 early-career researchers attracted on the region in 3 years for research and innovation activities;**
- Doubling of master's degree graduates in 5 years (**+700**) in RT areas of specialization, in a time frame of 5 years;
- **1500 two-year scholarships** in 5 years for high-quality students and to support inclusion policies.

Finally, the Rome Technopole project will have a positive impact on the skill mismatch. In this context, according to Unioncamere, also thanks to the expansionary effects of the PNRR, between 2021 and 2025 an overall need of approximately 1.2 million graduates in the world of work is expected in Italy.
To date, an annual shortage of about 35.000 graduates is expected, of which 20.000 from engineering and medical-health sectors.
The establishment of the Rome Technopole will lead to greater and better private and public investments in upskilling and reskilling, thus enabling: i) to strengthen the innovation, competitiveness and growth potential of the regional and national economy; ii) to support the creation of new jobs, iii) to contribute to fighting social exclusion and iv) addressing a shrinking working-age population and the increasing demand of highly qualified workers in high-tech and deep-tech related sectors, v) including sustainable and smart energy technology, digital transition technologies, biopharmaceutics and life-science technologies.
Furthermore, the creation of Rome Technopole is in line with the needs of the current and future labor market and of high-tech industries to accomplish with the green and digital transitions, with reference to the following three main challenges:

1. ***Challenge 1: Jobs and Growth***. Achieving a better match between research/innovation activities, university programs, industry employment needs, skills and labour market, will ensure that the national human capital is used to the fullest and will raise labour market participation, both from the qualitative and the quantitative points of view. The integration and coordination of existing capabilities and excellences already present in Lazio region, and well recognized at both national and international level, will allow to join and exploit the great potentiality of Rome, not only as “eternal city” but also as a highly attracting territory, with a high concentration of large industries and a new production and technology hub for industrial research, technology transfer and high education at the vanguarde in the sector of energy, sustainability, digital transition, life science.
2. ***Challenge 2: Twin transition***. The component will support large industries and SME to implement and integrate new technologies and processes enabling the green and digital transitions in order to renew and innovate product and relance their national and international leadership. It will contribute to the attainment of the EU targets of strengthening competition of Italian and European industries, impacting business investment decisions, including by encouraging gender balance in access to skills. Investments in upskilling and reskilling for the green economy, including the development of new skills needed in the context of a low carbon economy, will support the green transition.
3. ***Challenge 3: Social resilience***. The project will contribute to support university-to-work transitions, workforce adaptability, ease necessary job transitions. and can prevent periods of unemployment/inactivity or reduce their length, thereby strengthening social resilience. This requires special attention to those who need training the most, and often have the least access to training opportunities. Likewise, it can help adults to remain active on the labour market for longer. In this

context, digital skills are key to be able to access online services, remote working and distance learning – all elements that support economic and social resilience in the context of the current crisis.

In addition, Rome Technopole, according to the principle of green transition set out in the EU regulations, will concretely act to:

- achieve climate neutrality by 2050;
- reduce greenhouse gas emissions by 55% by 2030;
- support the green transition and the protection of biodiversity;
- favor the transition towards sustainable food systems and circular economy.

Rome Technopole will also be compliant with the DNSH principle by not causing significant damage to the environment: the DNSH respect will be assessed by yearly filling in the related checklist provided by the EC.

On the other hand, as regards the digital transition, the Rome Technopole will contribute to:

- improve the digital performance summarized by the Digital Economy and Society Index (DESI);
- foster the digitalisation of the public administration and the development of digital public services;
- support the improvement of connectivity also through very high capacity telecommunication networks at sustainable costs.

More specifically, as far as it concerns the **Green Transition, t**he Rome Technopole project has important implications, both direct and indirect, on the goal of achieving it.

Direct interventions:

- Construction of the Rome Technopole headquarters, according to a sustainable intervention plan, which meets the guidelines and plans on the energy efficiency in buildings and redevelopment works;
- Creation of a local "smart grid" at the Rome Technopole headquarters that can integrate energy cogeneration elements (photovoltaic panels).

The site will also be equipped with car parks with columns for electric recharging.

Furthermore, the RT will also provide training, research and technology transfer activities in the green transition sector in partnership with major companies operating in the field.

Dealing with **Digital Transition**, the intervention has important implications, both direct and indirect, on the goal of achieving it.

Direct interventions:

- Construction of the Rome Technopole headquarters according to an intervention plan to make all students and staff "connected".
- Definition of guidelines towards the digitisation of services.

Furthermore, the RT will also provide training, research and technology transfer activities in the digital transition sector in partnership with major companies operating in the field.

Lastly, the Rome Technopole will support and pursue the social mission of the university as a means of breaking down inequalities, equipping it with operational tools and resources necessary to attract young people who start from social conditions preclusive of university studies, breaking down barriers and inequalities that the pandemic has accentuated.

According to the most recent adult education survey, only 36% of adults aged 25-64 have participated in training in the past year (in contrast to the EU-wide target of 50% of adults to participate in training every year). The survey also shows the presence of barriers in access to training, linked primarily to social inequalities (cost, lack of time due to the need for a remunerative work commitment) or gender. In addition, there is the lack of specifically trained technical personnel with adequate skills and in line with the technological revolutions linked to the ecological transition and the digital transition that characterize the economic recovery policies of the country and Europe in the COVID-19 era.

The pandemic has also accentuated social and territorial inequalities, due to an economic crisis that has hit some specific sectors in a heavy and merciless way.

The challenge that is intended to be addressed with the project is therefore inherent to social and territorial inclusion and gender equality.

Its overall objective is to address the main obstacles to participation mentioned above. Although it is aimed at the entire population, it will have a specific focus on those who most need training, i.e. those who leave education and training prematurely due to socio-economic difficulties, despite having high potential and skills. It will also contribute to creating paths for non-abandonment and for the return to education and training, in particular for young people who leave prematurely, or for those who by necessity abandon their studies to pursue work activities, or for workers who, even if already employed in highly technological work environments, they have the opportunity to increase their professional qualification, retraining through transdisciplinary training courses relating to the areas of energy transition, digital transition and bio-pharmaceuticals.

Synergy with other PNRR and other public funding

In the paragraph describing the challenges of the "From Research to Business" component of Mission 4 of PNRR, it is explicitly clarified how Italy must strengthen the conditions for developing a knowledge-based, competitive and resilient economy. An **increase in public and private investment in R&D** is defined as an "essential condition for closing the gaps in productivity levels" with respect to more dynamic and value-creating economies.
The main objective of this component is to **transfer technology and support innovation** by encouraging the systematic use of research and innovation results by the economic system. The expected results consist of a **more effective level of collaboration between the public scientific base and the industrial world and the development of researchers' skills**, particularly in the field of digital technologies, environmental transition and management models.
It is evident how the Rome Technopole project fits perfectly into this groove.
Given the complexity and breadth of the ambitions of the Rome Technopole, which brings together research, teaching and training activities, there are several lines of action of the above component that the project can intersect.
First of all, the Fund for Research Infrastructures which proposes to strengthen research infrastructures (new or existing), encouraging their integration into the productive fabric. (endowment. 1.6 billion).
Moreover, Rome Technopole intersects the "national leaders of R&D on certain enabling technologies" as envisaged by line of action 2.1 of the component (endowment: 1.6 billion). In particular, it fits the topic of the national centers NC1 on HPC& Big Data, NC3 on pharmacology based on new RNA technology, NC4 on sustainable mobility.
Given the strong connection with the productive fabric of the territory in which it should operate, the **Rome Technopole fully intercept the funding of the line of action "creation and strengthening of innovation ecosystems, creation of territorial leaders of R & D"** (endowment 1.3 billion), corresponding to the investment 1.5 of Mission 4, Component 2. This line of action aims, in fact, to strengthen the ecosystems of innovation where researchers, laboratories and companies coexist in a structured and conspicuous way, feeding the circulation of ideas, energies and resources to the benefit of the development of research and its positive effects on the business environment and society.
Obviously, Rome Technopole can be a beneficiary of the new model of partnership between universities, research centers and companies that the Government intends to finance with PNRR resources. In fact, the project promotes the aggregation of small and medium enterprises, large private operators and public research centers, and it encourages collaborative and complementary research activities. R&D projects also involve investment by universities in new positions of researchers on fixed-term contracts and the attraction of top scientists from abroad.
Lastly, since it is also one of the activities that can be implemented most rapidly and the team of project promoters, the **Rome Technopole could immediately activate innovative doctoral courses** that respond to the innovation needs of businesses and promote the hiring of researchers by companies, as envisaged by activity line 2.4 of the component (endowment: 0.6 billion).

More in detail, as far as it concerns the active participation within the measures put in place in the framework of PNRR Mission 4, Component 2 it is important to underline that Sapienza, together with other spokes and affiliates of Rome Technopole, has been very active both on the National Centre (NC) and Research Infrastructures (IR) calls.

All the 5 NC themes enable high degree of cooperation and integration with Rome Technopole specialization areas that could enable further joint research and innovation initiatives and investments.
Particolari sinergie sono presenti sui seguenti CN.
More in detail, **Sapienza has joined a proposal for a National Research Center for HPC, Big data and Quantum Computing**, being spoke's coordinator on "Multiscale modeling and engineering applications" and affiliate on the following thematic spokes: Fundamental research & Space Economy; Environment & Natural disaster; Quantum computing. Among the objectives of this spoke, there is the development of modelling and simulation tools and algorithm for engineering application, and in particular of simulation tools for the digital twin in several field of application. There are significant synergies among some of Rome Technopole's partners (i.e. Thales Alenia Space and Leonardo) and the activities performed in the "Urban Mobility" spoke of NC1. In particular one of the objective of this spoke is to realize a model of smart sustainable mobility aimed to implement and test digital technology and green technology in a real contest realized, for instance, by Rome Technopole campus.
Dealing with the **National Center for Agricultural Technology Research (Agritech)**, Sapienza is affiliated with and participates in the activities of the following spokes: Integrated models for the development of marginal areas to promote multifunctional production systems enhancing agroecological and socio-economic sustainability; New technologies and methodologies for traceability, quality, safety, measurements and certifications to enhance the value and protect the typical traits in agri-food chains. Within this center, Sapienza is participating to a couple of spokes. Some affinities could be considered with reference to natural substances.
As far as it concerns the **National Center 3 for Research and Development of gene therapy and drugs with RNA technology**, Sapienza plays the roles of spoke on Cancer, and is affiliated to the spokes on Neurodegenerative diseases and on Immunoreactivity efficacy and biosafety. Therefore, Sapienza will actively contribute to concertation activity and cross-contamination with NC3, in the perspective of an innovation ecosystem, in which all activities and competences on the territory contribute to the growth and innovation of the regional system.
Of special interest as regards the strategic specialization area of energy transition is the **National Research Center 4 for Sustainable Mobility**, in which Sapienza plays the role of spoke on Urban Mobility and it is affiliated to other 5 spokes: Air Mobility; Rail Transportation; CCAM (Cooperative, Connected Automated Mobility), Connected Networks and Smart Infrastructure; Innovative materials and light-weighting; Electric traction systems & Batteries. The scope of the spoke "Urban mobility" is to use the city of Rome, as living labs, in order to demonstrate how new technologies can work to solve real problems in real cities by transporting people, freight and waste in smarter ways, through the implementation of a new model of urban transport, which integrates multiple technologies (KETs) and different types of vectors (on road, on rail, on water and air), in an effective approach of smart and green city. As lead of the spoke on urban mobility, Sapienza has proposed the realization of a living lab of sustainable mobility model that could take the Rome Technopole Campus as a study case. Some of the companies participating to Rome Technopole, are also participant of NC4 (i.e. Leonardo, Thales, Almaviva).
Finally, within the **National Research Center 5 for Biodiversity**, Sapienza co-coordinates the Outreach spoke and is affiliated to Terrestrial biodiversity and Urban biodiversity. Therefore, some request of contribution Sapienza will be founding associate of all the 5 NC.
Also the PNRR call for Research Infrastructures foresees a high degree of interaction with Rome Technopole initiatives, starting from the 8 projects to whom Sapienza is participating and that could contribute to enrich the Rome Technople open research infrastructure:

Infrastructure	Coordinator	Project Description
EBRAIN	CNR	EBRAINS-Italy European Brain ReseArch InfrastructureS-Italy
EuroNanoLab (ENL)	CNR	iENTRANCE@ENL Infrastructure for Energy Transition and Circular Economy @ EuroNanoLab
SoBigData	CNR	SoBigData.it: Strengthening the Italian RI for Social Mining and Big Data Analytics

Einstein Telescope (ET)	INFN	Einstein Telescope Infrastructure Consortium (ETIC)
KM3-NET	INFN	KM3NeT4RR - Kilometer Cube Neutrino Telescope for Recovery and Resilience
METROFOOD-RI	ENEA	Strengthening of the Italian Research Infrastructure for Metrology and Open Access Data in support to the Agrifood (METROFOOD-IT)
ELT e SKA	INAF	STILES: Strengthening the Italian leadership in ELT and SKA
GeoScience	ISPRA	GeoScience

Furthermore, the project partners of Rome Technopole will be highly involved also in the call for **extended partnerships,** launched under the PNRR Mission 4 - Components 2 – Investment 1.3.
To this regard, an accurate mapping activity to define possible integration and complementarity among Rome Technopoles and the extended partnership initiatives has been performed as described in the table below.
Rome Technopole would be a stakeholder of those extended partnership programmes, which are coherent with its three strategic specialization areas (EnT, DgT, H&BP) and with the flagship projects, in order to connect the regional innovation ecosystem with the national network of research and innovation. This approach will enable to strengthen the competitiveness of the national system at international level.
Activities performed in Rome Technopole will be complementary and synergic with respect to the ones developed within the National Centres and the Extended Partnerships.
As regards the National Centers, Rome Technopole will benefit from the possibility of being and external stakeholders and user of the relevant research infrastructures developed within those projects. In particular, great opportunities will be offered by the HPC IR realized in CN1 and by the leaving lab infrastructure developed within CN4, in the spoke on "Urban Mobility" coordinated by Sapienza. As regards the centre CN3, Rome Technopole would benefit of the availability of the new research infrastructure.
On the other hand, Rome Technopole will also benefit from the collaboration with the extended partnership which focus on low TRL, in a perspective of ecosystem, according to the needs and interest of the large industrial partners, but also respective of the specific peculiarities of the critical mass participating to Rome Technopole, who is well different from the one involved in the projects of the national centers and extended partnership.

Thematic of Extended Partnership (Investment 1.3 – M4C2)	**Synergies with Rome Technopole**		
	Complementarity	**SSA (EnT, DgT, H&BP)**	**Flagship project**
1. Artificial intelligence: funding aspects	High	DgT	FP1, FP3, FP5, FP6
2. Energy of the future	High	EnT	FP1, FP2, FP3
3. Environmental, natural and anthropogenic risks	Low	-	-
4. Quantum science and technology	High	DgT	FP5
5. Humanistic culture and cultural heritage as laboratories of innovation and creativity	Low	-	-
6. Innovative diagnostics and therapies in precision medicine	High	H&BP	FP4, FP7

7. Cybersecurity, new technologies and rights protection	High	DgT	FP5, FP6
8. Consequences and challenges of aging	Medium	H&BP	FP4
9. Economic and financial sustainability of systems and territories	Low	-	-
10. Models for sustainable nutrition	Low	-	-
11. Circular and sustainable Made-in-Italy	Medium	DgT	-
12. Neuroscience and neuropharmacology	High	H&BP	FP4, FP7
13. Emerging infectious diseases	High	H&BP	FP4, FP7
14. Telecommunications of the future	High	DgT	FP2, FP5, FP6
15. Space activities	High	DgT	FP5, FP6

As part of the PNRR funds, a package of complementary interventions has been established for the "Economic and social revitalization" of the 2009 and 2016 Earthquake Areas, managed by an integrated Coordination Cabinet, for the construction of four Research Centers in the 4 Regions of Central Italy affected by the earthquake (Lazio, Umbria, Marche and Abruzzo), which will form the Network for Innovation and Research of the 2009 and 2016 Earthquake Area.

In this context, Sapienza has been involved in the establishment of the **"Research Center for Innovation in the Circular Economy and Health"**, operating in the Lazio earthquake area, jointly with the University of Tuscia and the Scientific and Technological Park of Upper Lazio, for a value of € 14.250.000,00.
For the realization of these interventions, another 60 million euros have been allocated by the Budget Law 2021 with a call from the Ministry of Territorial Cohesion (funds from the Presidency of the Council of Ministers - Department for cohesion policies) to which Sapienza and the other components of the "Research Center for Innovation on the Circular Economy and Health" are participating. Also these measures has a great degree of complementarity with the interventions of Rome Technopole.

***

I declare that I have read the information on the processing of personal data provided in the "Privacy" section http://www.mur.gov.it/it/privacy of the Ministry of University and Research issued according to article 13 of the Regulation 679/2016 of the European Parliament of 27th April 2016.

Rome, June 13th 2022

The Legal Representative of the proposer
(Digital signature)

Attachments:

a) *Curriculum Vitae in European format of each resource engaged in the implementation of the research program of the NC, drawn up in English and containing the authorization to process personal data (According to law 679/2016 of the Regulation of the European Parliament of 27th April 2016, I hereby express my consent to process and use my data provided in this CV)*

Annex A – Flagship projects summary sheet

Flagship Projects summary sheet

Summary

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FP2 - Energy transition and digital transition in urban regeneration and construction 124
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FP5 - Digital transition through AESA (Active Electronically Scanned Array) radar technology, quantum cryptography and quantum communications 130
FP6 - Artificial intelligence, virtual reality and digital twin for advanced engineering and aerospace 132
FP7 - Advanced and automated innovation labs for diagnostic and therapeutic biopharma solutions 133

Title of Flagship Project 1

FP1 - Decarbonization and digitalization in research on new green energy sources

Partners involved

Lead industry: ENI S.p.A
Universities and EPR: Sapienza Università di Roma; Università di Roma Tor Vergata; Università degli Studi Roma Tre; Università degli Studi Cassino; Università degli Studi della Tuscia; CNR; ENEA; Università Campus Biomedico.
Industries and other entities: LVenture S.p.A

Description

This Flagship project covers all aspects of the value chain:

i) **Processes Decarbonization:** to reduce, capture, transform or store CO2, increasing energy efficiency, reducing emissions and promoting decarbonized energy vectors;
ii) **Circular & Bio products:** to reduce, recycle and reuse products and by-products, transforming wastes to valuable products for bio-refinery, sustainable mobility and green/circular chemistry.
iii) **Renewables & New energies:** to sustain the development of renewable energies and storage solutions and developing breakthrough energy technologies such magnetic fusion.

FP1 involves activities starting from fundamental and applied research, up to development of:

- **training programs** focused on the theme of **sustainable entrepreneurship** through the collaboration with ENI Joule;
- **training programs** capable of vertically specializing the best talents and developing resources through an innovative training offer, focused on the **new skills needed for green jobs**;
- **virtual reality tools**, which have the ultimate goal of supporting the energy transition;
- specific programs with activities that involve employees of partner companies and / or selected companies that correspond to the Technopole mission on intrapreneurship issues, favoring a "contamination"of experiences between the same participants from different companies.

Eni Gazometro Ostiense area has been identified as a possible space for the development of the initiative within a dedicated Join Lab.
Strategic specialization areas: EnT; DgT

Activities

The activities of this FP will cover the following domains (as detailed in the excel file attached “Rome Technopole_Mappatura Evidenze_Master File.xlsx”):
Spoke 1: Tasks 1.1, 1.2, 1.3, 1.4
Spoke 2: Tasks 1.1, 1.2, 1.3, 1.5, 1.6
Spoke 3: Tasks 3.1, 3.2, 3.4, 3.5
Spoke 5: all Tasks
Spoke 6: Tasks 1.1, 1.2, 1.3, 1.4

Scientific and technical objectives

Specific scientific and technical objectives concern the development of fundamental research, applied research, experimental and technological development, technology transfer, business incubation and start-up acceleration, patenting, educational and training activities, PhD and young research hiring, exploitation, dissemination, open research infrastructure and joint labs creation, on the following topics:

- New devices, new 2D & graphene-based materials and advanced materials for renewable energies and storage solutions.
- Green/circular chemistry for green energy.
- Innovative technologies for CO2 trasformation and storage.
- Research in artificial intelligence, deep leaning algorithm for optimization and smartization of energy sector with respect to green and renewable sources.

- Reliability analysis of power electronic devices for RES based on innovative models and measurement methods
- Optimization of the operating parameters of the hydrothermal carbonization process of wet waste biomass and its validation as an industrial technology for the valorisation of waste / residues to obtain energy products.
- Development of novel solution for safe and efficinet green energy storage based on metal hydrides and PCMs.
- Fabrication and multi-scale characterization of material and III gen solar cells (Perovskite, DSC etc.) with advanced properties.
- Design and tuning of molecular building blocks to produce nanostructures and semiconductors layers for catalytic conversion of CO2.
- Formulation/Optimisation of Ionic Liquids/ Eutectic Media for Green Chemistry.
- Development of methodologies, models, and technologies for smart sector integration, including design, development, and testing of solutions for enabling smart sector integration in order to reach a more resilient energy system based on the diversification of primary energy sources, a prevalent presence of renewables-based energy sources and digitalization of energy networks, thus addressing both decarbonization and digitalization needs.
- Optimization of the operating parameters of the hydrothermal carbonization process of wet waste biomass and its validation as an industrial technology for the valorisation of waste / residues to obtain energy products.
- Development of novel solution for safe and efficient green energy storage based on metal hydrides and PCMs.

TRL ranging from 1 up to 7.

Title of Flagship Project 2

FP2 - Energy transition and digital transition in urban regeneration and construction

Partners involved

Lead industry: COIMA Rem s.r.l.
Universities and EPR: Università La Sapienza, Università di Roma Tor Vergata, Università degli Studi Roma Tre, Università degli studi di Cassino e del Lazio Meridionale, Università della Tuscia,CNR, ENEA, INFN, Università Luiss, UCBM
Industries and other entities: Almaviva, BVtech, Lventure

Description

This project focuses on **development and application of digital and green technologies to urban regeneration and building construction**, according to the green city approach which assumes ecological quality as a strategic priority in order to ensure sustainability and resilience of programs and intervention projects in the era of the climate crisis, soil scarcity and other natural resources.
The project aims to investigate the **following main aspects**:

- the **sustainable use of existing buildings and infrastructures** improving their service life in terms of safety and resilience;
- adoption of a **sustainable concept design for new construction**, including the use of low or zero carbon emission materials and processes, with reduced energy and resources consumption;
- **development of low- or zero-emission remediation techniques** for the regeneration of brownfield sites in urban and peri-urban areas.

The **project cover all aspects of the open-innovation chain including**:

i) Technology development and innovation aimed at implementing digital transition and zero-emission in construction and urban regeneration;
ii) Scale-up of technology in order to enhance TRL of these technologies and apply it to the design of the new campus and headquarter of Rome Technopole, as a case-study for technology exploitation;
iii) Development of a model of sustainable mobility integrated in the project of green urban regeneration;
iv) Educational and training activities on these technologies to be integrated as "minor" courses in the existing ones.
v) v) Outreach and public engagement aimed at disseminating the culture of digital transition and green technology for urban regeneration in society.

Strategic specialization areas: DgT; EnT

Activities

The activities of this FP will cover the following domains:
Spoke 1: Task 1.1, 1.2, 1.3, 1.4
Spoke 2: Task 2.1, 2.2, 2.6
Spoke 3: Task 3.1, 3.3
Spoke 4: Task 4.3
Spoke 5: 5.1, 5.2, 5.3, 5.4, 5.5
Spoke 6: 6.3, 6.4, 6.5

Scientific and technical objectives

Specific scientific and technical objectives concern the development of applied research, experimental and technological development, technology transfer, business incubation and start-up acceleration, patenting, educational and training activities, PhD and young research hiring, exploitation, dissemination, open research infrastructure and joint labs creation, on the following topics:

- New sensors, new multifunctional smart nanomaterials and advanced materials for sustainable zero-emission construction and urban regeneration;
- AI for energy monitoring and digital transition in buiding energy management;

- Green/circular chemistry for green building;
- Development and use of innovative material such as concrete with zero carbon footprint coupled with not metallic reinforcement able to ensure at least 120 years of service life and a performed based design to ensure resilience and low maintenance costs
- Design and development of new materials for autonomous thermal-regulation of buildings and electromagnetic environment control.

The results of applied research will be exploited in experimental development and feasibility study of:

- The urban regeneration of the area of Pietralata aimed at the construction of the new campus and headquarters of the Rome Technopole;
- Energy management systems based on hydrogen-based technology;
- AI systems to ensure energy independence and carbon neutrality in new construction and urban regeneration;
- New construction materials, new construction techniques based on digital technologies in accordance with the parameters of the European taxonomy.

TRL ranging from 3 up to 8.

Title of Flagship Project 3

FP3 - Digital transition in the decarbonization process and in waste recycling processes

Partners involved

Lead industry: Maire Technimont
Universities and EPR: Università La Sapienza, Università di Roma Tor Vergata, Università degli studi di Cassino e del Lazio Meridionale, Università della Tuscia, Università Luiss, UCBM
Industries and other entities: Almaviva

Short description

The project will involve several building blocks of the innovation ecosystem being truly multidisciploinary, and it is transversal to both the areas of digital transition and energy transition.
Main research and technological innovation lines are:

i) **Development of AI-based predictive model** to forecast the characteristics of the inbound waste as feedstock;
ii) **Advanced waste sorting and characterization** based on mechatronic to map waste characteristics and to optimize the control strategies of the gasification reactor;
iii) **Thermodynamic simulation of gasification reactor** to optimize the design and its working conditions depending on waster variances;
iv) **Blockchain-based plastic credits certification** to track the quantity of plastics removed from environment by converting waste into chemicals.

Strategic specialization areas: DgT; EnT.

Activities

The activities of this FP will cover the following domains:
Spoke 1: Task 1.1, 1.2, 1.3, 1.4
Spoke 2: Task 2.1, 2.2, 2.3, 2.5, 2.6
Spoke 3: Task 3.1, 3.4, 3.5
Spoke 4: Task 4.2, 4.3, 4.6
Spoke 5: Task 5.1, 5.2, 5.3, 5.4, 5.5, 5.6
Spoke 6: Task 6.1, 6.2, 6.3

Scientific and technical objectives

Specific scientific and technical objectives concern the development of fundamental research, applied research, experimental and technological development, technology transfer, business incubation and start-up acceleration, patenting, educational and training activities, PhD and young research hiring, exploitation, dissemination, open research infrastructure and joint labs creation, on the following topics:

- Innovative AI-based predictive model to forecast the characteristics of the inbound waste as feedstock;
- Pyrolysis-based pretreatment technologies to improve the thermal behavior and syngas yield of waste and biomass gasifiers for input feedstock with variable characteristics in terms of composition and humidity.
- Thermodynamic simulation of gasification reactor to optimize the design and its working conditions depending on waster variances;
- Machine Learning and Artificial Intelligence algorithms to provide a Decision Support System to the waste to chemical / waste to fuel plant operator thus to proactively act in advance on the mix of wastes delivered to the plant as feedstock;
- Models for predicting CO2 reduction based on the quantity and quality of recycled waste
- Bio-plastics and organic residuals pretreatment technologies;
- Development of a digital passport for consumer products based on a flexible, hierarchical and agnostic data structure able to track the whole product life cycle, from design/manufacturing to end of life, in order to forecast the waste flows and the related environmental impacts, and to

favour closed-loop lifecycles (resuse, repair, remanufacturing), particularly for plastic-based products.

TRL ranging from 2 to 6.

Title of Flagship Project 4

FP4 - Development, innovation and certification of medical and non-medical devices for health

Partners involved

Lead industry: BVTech, Confindstria Dispositivi Medici
Universities and EPR: Università La Sapienza, Università di Roma Tor Vergata, Università degli studi di Cassino e del Lazio Meridionale, CNR, Università Luiss, UCBM, INFN, ENEA, ISS
Industries and other entities: Catalent Anagni, Takis

Short description

This project implement the ecosystem chain related to the process of designing, certifying and applying medical devices, starting with professionals and arriving at patients, in the consideration that every activity in the health sector provides for the use of a medical device.
The objective is to implement inside Rome Technopole, thanks to the multidisciplinary and wide range of expertise and partnership, the whole value chain involves:

i) **Development of new medical and non-medical devices for heath application and healthcare**: this include all steps starting from applied research to technology transfer and scale-up of technologies;
ii) **Experimental testing and validation** of the devices, including the various stages of certification and clinical investigation (e.g. approval by the committee ethics, conducting clinical investigations, etc.).
iii) **Creation of a new Joint Lab for assisting companies** in all process of development, testing and certification of medical and non-medical devices;
iv) **Training** for technician and longlife learning.

A final objective of the project is the creation of **new open research infrastructure**, in collaboration with Confindustria Dispositivi Medici, aimed at **supporting innovation, research, development, certification, life cycle of medical devices**, returning a systemic vision, with multidisciplinary skills, for all those interested in the design process, certification and application of medical devices, starting with the professionals and arriving at the patients, considering that every activity in the health field requires the use of a medical device.
Strategic specialization areas: H&BP

Activities

The activities of this FP will cover the following domains:
Spoke 1: Task 1.2, 1.3, 1.4
Spoke 2: Task 2.1, 2.2, 2.3, 2.4, 2.5, 2.6
Spoke 3: Task 3.4, 3.5
Spoke 5: Task 5.1, 5.2, 5.3, 5.4, 5.5, 5.6
Spoke 6: Task 6.2, 6.4

Scientific and technical objectives

Specific scientific and technical objectives concern the development of applied research, experimental and technological development, technology transfer, patenting, educational and training activities, PhD and young research hiring, exploitation, dissemination, open research infrastructure and joint labs creation, on the following topics:

- Design, development, testing of devices, components, instrumentation, system, implant, materials, reagents for medical applications, health care, health and weilbeing monitoring;
- Smart wearable monitoring systems, smart implantable devices, wearable smart system for drug release and drug delivery, with reference to all targets of population.
- Research on all multidisciplinary aspects ranging from sensor and device development, wireless communication systems for data exchange and control, AI and deep learning algorithm for control and system decision making;

- IoMT lightweight cryptography, access control means, security of the relevant wireless interfaces and communication protocols, cybersecurity related issues;
- Privacy related issues;
- New bio-multifunctional-nanomaterials for medical devices;
- Digital twin for medical devices;
- Implementation of an interoperable telemedicine platform equipped with vital data acquisition systems for clinical validations of drugs and devices.
- AI and BIG DATA analytics on data acquired with cloud-based analytics technologies by developing algorithms based on clinical knowledge.

TRL ranging from 3 to 9.

Title of Flagship Project 5

FP5 - Digital transition through AESA (Active Electronically Scanned Array) radar technology, quantum cryptography and quantum communications

Partners involved

Lead industry: Leonardo
Universities and EPR: Università La Sapienza, Università di Roma Tor Vergata, Università della Tuscia, CNR, Università Luiss
Industries and other entities: , Airbus Italia, Almaviva, Bvtech

Short description

The project will focus on the development of innovative processing architectures and AESA radars and on new technologies for quantum cryptography & communications, from satellite to ground.
Digital transition of the leading theme across this project and it is declined through the following main topics:

i) **Neural processing, compressive sensing, waveform optimization, micro doppler detection, sustainability, virtualization, digital twin**, with the scope also to set up a domestic line of production and overcome risks connected to a technological dependency and supply shortage, improve costs/performance ratio and increase the competitiveness of the national industry;
ii) **Multisensor and distributed processing** (considering also cyber resilience);
iii) **Artificial intelligence evolution and big data analytics**.
iv) Activation of **specific innovative curricula** in existing university courses in order to strengthen and widening knowledge of students in digital technologies, ICT and big-data engineering.

Moreover, in the perspective of innovation ecosystem, a **Joint Lab will be set up with the scope of analyzing and validating the performance of network components and key exchange protocols** in relation to the physical characteristics of the quantum signal, with a view to realize integrated terrestrial / satellite networks.
Strategic specialization areas: DgT.

Activities

The activities of this FP will cover the following domains:
Spoke 1: Task 1.1, 1.2, 1.3, 1.4
Spoke 2: Task 2.1, 2.2, 2.3, 2.5, 2.6
Spoke 3: Task 3.4, 3.5
Spoke 5: Task 5.2, 5.3, 5.4
Spoke 6: Task 6.2, 6.4

Scientific and Technical Objectives

Specific scientific and technical objectives concern the development of fundamental research, applied research, experimental and technological development, technology transfer, business incubation and start-up acceleration, patenting, educational and training activities, PhD and young research hiring, exploitation, dissemination, open research infrastructure and joint labs creation, on two main research lines.

A. Innovative processing architectures and AESA radars
   Innovative transversal and modular processing architectures including components and interconnection, to address requirements becoming more demanding day by day, in terms of processing capacity, latency and cyber resilience.
   The challenging requirements come from the roadmaps of Leonardo systems: AESA with thousands of channels, support systems to decision making, communication systems, electro-optical systems.
   Main topics of interest will be:

- Neural Processing, Compressive sensing, Waveform optimization, Micro doppler Detection, Sustainability (SWaP paradigm), Virtualization and Digital twin.
- As to components and packaging the interests will be: System-on-Chip/System-in-Package/Chiplet and enabilig technologis (packaging, interconnections, tools for modeling, simulations, design and integration of heterogeneous multi-chip components) to set up a domestic line of production and overcome risks connected to a technological dependency and supply shortage, improve costs/performance ratio and increase the competitiveness of the national industry.
- Multisensor and distributed processing (considering also cyber resilience);
- Artificial Intelligence evolution and Big data Analytics.

B. Quantum Cryptography & Communications

In the context of a European scenario that aims to guarantee security in the communications of the Member States, the use of technology for the exchange of cryptographic keys in quantum mode ("Quantum Key Distribution" or QKD) plays a crucial role, because offers the guarantee of authenticity and confidentiality of the keys themselves. The use of this technology, certainly innovative and highly promising for communications security, requires the creation of national key distribution networks made of optical fiber or based on satellite systems. These types of networks have been individually developed and tested on an international scale but the creation of a network that integrates both technologies has not yet been carried out.

In this context, the availability of a test laboratory capable of analysing and validating the performance of network components and key exchange protocols in relation to the physical characteristics of the quantum signal is therefore extremely useful, so as to maximize performance in terms of speed transmission (maximum length of the connections, transmission speed, stability of the signal according to the characteristics of the fiber or atmospheric, etc.). With a view to realize integrated terrestrial / satellite networks, this will allow to carry out analysis activities of problems deriving from the creation of a secure exchange node (or "Trusted Node") for the transfer of quantum keys from fiber optic networks to connections in free space. This would expect to allow to maximize performance in a scenario in which different detection, transmission and coding equipment will be adopted depending on the physical medium in use.

In particular, findamenta research sill focus on the following topics:

- Development of AI algorithms and neural processing for waveform optimization and inverse problem solutions;
- Modelling and simulation tools of high-speed & high-frequency packaging, interconnections heterogeneous multi-chip components and related EMC aspects;
- Innovative tools and methods for artificial intelligence evolution and big data analytics;
- Network components and key exchange protocols for quantum cryptography & communications;
- Advanced technologies and materials for high-frequency, microwave applications and satellite communications. This activity will be perfomed in sinergy with the national center CN1, in which Sapienza is Spoke Leader of "Multiscale modelling and engineering applications".

Title of Flagship Project 6

FP6 - Artificial intelligence, virtual reality and digital twin for advanced engineering and aerospace

Partners involved

Lead industry: Thales Alenia Space
Universities and EPR: Università La Sapienza, Università di Roma Tor Vergata, Università della Tuscia, CNR, Università Luiss, INFN, ENEA
Industries and other entities: Airbus Italia, Almaviva, Bvtech, MBDA, Thales, Unidata

Short description

This project is centered within the digital transition stream and involved different activities in the innovation ecosystem perspective: applied research, technology development and innovation; Open Research Infrastructures; higher education with industrial collaboration.
The scope is to create a Join Lab to promote a stable cooperation between universities, research centers and industries to develop proof-of-concept level activities in the field of advanced engineering, including space applications, aerospace, satellite technologies, exploiting digital technologies.
Main activities will focus on:

i) **Artificial intelligence** (Machin & Deep learning) and **big-data analytics**;
ii) **Virtual and augmented reality**;
iii) **Robotic collaboration**;
iv) **Virtual testing and simulation**;
v) **Co-design and co-engineering thinking** to discover new innovative and creative solutions to be tested, validated and integrated.

Strategic specialization areas: DgT; EnT.

Activities

The activities of this FP will cover the following domains:
Spoke 1: Task 1.1, 1.2, 1.3, 1.4
Spoke 2: Task 2.1, 2.2, 2.3, 2.4, 2.5, 2.6
Spoke 3: Task 3.3, 3.4, 3.5
Spoke 5: Task 5.1, 5.2, 5.3, 5.4
Spoke 6: Task 6.1, 6.2, 6.3, 6.5

Scientific and technical objectives

Specific scientific and technical objectives concern the development of fundamental research, applied research, experimental and technological development, technology transfer, business incubation and start-up acceleration, patenting, educational and training activities, PhD and young research hiring, exploitation, dissemination, open research infrastructure and joint labs creation.
Research will focus on:

- Development of new algorithms for AI, machine learning and deap learning for big-data analytics;
- Development of multiscale and multiphysics algorithms for digital twwin of complex systems;
- Development of autonomous or semi-autonomous robotic solutions, in man-robot cooperation environments, i.e. assistive robotics, cobot in industry, operations in remote and/or dangerous environments;
- Modeling, experimental characterization and numerical simulation of mechanical behavior of materials under extreme operating conditions and of engineered composites for aero/space applications.
- Modeling and simulation of additive manufacturing processes.

TRL ranging from 2 to 7.

Title of Flagship Project
FP7 - Advanced and automated innovation labs for diagnostic and therapeutic biopharma solutions
Partners involved
Lead industry: Takis, Catalent Anagni Universities and EPR: Università La Sapienza, Università di Roma Tor Vergata, Università degli studi di Cassino e del Lazio Meridionale, UCBM Industries and other entities: CNR, INFN, ISS,
Short description
The project is aimed to contribute to the development of an advanced open innovation Joint Laboratory focused on the accelerated development of biopharma solutions for enabing innovative characterization and large scale production of high-affinity monoclonal antibodies for diagnostic and therapeutic applications, and other emerging solutions for relevant pathologies. This laboratory will be directly shared as Joint Open Lab with the research partners of Rome Technopole specialized on the specific area of bio-pharma and with all the other interested Rome Technopole partners and stakeholders for technology transfer, innovation and training activities. **Strategic specialization areas:** H&BP.
Activities
The activities of this FP will cover the following domains: Spoke 1: Task 1.1, 1.2, 1.3, 1.4 Spoke 2: Task 2.1, 2.2, 2.3, 2.4, 2.5, 2.6 Spoke 3: Task 3.3, 3.4, 3.5 Spoke 5: Task 5.1, 5.2, 5.3, 5.4 Spoke 6: Task 6.1, 6.2, 6.3, 6.4, 6.5
Scientific and technical objectives
Specific scientific and technical objectives concern the development of fundamental research, applied research, experimental and technological development, technology transfer, business incubation and start-up acceleration, patenting, educational and training activities, PhD and young research hiring, exploitation, dissemination, open research infrastructure and joint labs creation. Fundamental research will focus on: - Molecular analysis of tumor tissues for the personalization of the diagnosis and treatment; - Novel nanophotonic biosensing platform; - Identification of biomarkers and therapeutic targets in carcinogenesis processes; - Identification of biomarkers and therapeutic targets in carcinogenesis processes; - Metabolomics and biomarker discovery, protein corona for precision medicine; - Development of protein nanoparticles for the targeted transport of drugs. Applied research will focus on: - Advanced biosensors and wearable sensors for diagnostics, therapeutics and controlled drug release: design, development and testing; - Nanomaterials for drug delivery and targeting: production and characterization. One of the main objective is to promote research on therapeutic platform, based on bioactive liposomes effective against multidrug resistant (MDR) infections. Main activities will focus on: i) to develop a novel combined host- and pathogen- directed therapeutic approach for the control of MDR infections: ii) to generate new immunomodulatory therapeutics for the control of immunopathological reactions. The Laboratory is classified as a P2 laboratory, equipped with specific instruments for the management of class II pathogens.

TRl ranging from 2 to 6.