



TECHNOLOGY TRANSFER PRODUCTS IN THE ROME TECHNOPOLE INNOVATION ECOSYSTEM

Spoke 2 / Rome Technopole

Introduction by Prof. Renato Baciocchi

The Rome Technopole program represents a unique opportunity for the construction of an innovation ecosystem in the Lazio Region and in particular for encouraging the technological transfer of innovative products from research laboratories to the production world and more generally to support the establishment and growth of innovative start-ups and spin-offs. The main public and private universities of Lazio, research centres such as CNR, ISS and ENEA, industrial associations and federations and individual companies participate in the program. The program is organized according to a Hub and Spoke structure, typical of projects financed by the PNR, with the addition of a third dimension, represented by the Flagship Projects (FPs). The Spokes have a functional nature, with reference to scientific research, technology transfer, training, joint laboratories and social engagement, while the FPs constitute wide-ranging projects within one or more of the three main thematic areas of the project, i.e. digital transition, energy transition, bio-pharma and health.

Spoke 2, dedicated to technology transfer and coordinated by the University of Rome Tor Vergata, has activated a series of actions aimed at the development of prototypes and proof-of-concepts in the three thematic areas of the project, and in concert with the FPs, to support for innovative business initiatives through incubation, acceleration, training and patenting support programmes. Thanks to the use of research funds made available by the PNRR, these actions promote the development of technology transfer products arisen within the Rome Technopole Ecosystem (technologies, prototypes, patents or services), both by Spoke 2 affiliates, and, through specific open calls, by companies external to the Ecosystem.

This catalogue summarizes the main technology transfer products developed following these actions.

It consists of five sections: the first, 'The products of technology transfer', highlighting the projects carried out by the Spoke 2 partners; the second 'The winning projects of the open calls'; the third 'Companies and new collaborations' dedicated to new companies that have expressed interest in developing collaborations with Rome Technopole; the fourth and fifth fall within the initiatives to support technology transfer and in particular 'Activities to support technology transfer' with particular attention to the creation and acceleration of spin-offs and start-ups and patenting and 'Training and Technology Transfer', with a vast training offer, in collaboration with IaD School and Companies. The catalogue is divided into single forms which illustrate a specific product/service, the title of which is given, the composition of the working group, the reference topic, with indication of any FPs, the summary description, the innovation contents compared to the current framework and the type of collaboration required to achieve further developments.

The catalogue represents a showcase of products in full evolution, as the projects behind each product are still ongoing and may therefore lead to new results, but also as new projects may arise within the ecosystem. It also represents a tool for creating new forms of collaboration between new and existing partners, expanding the Rome Technopole Innovation Ecosystem.

The online version of the catalogue will soon be available on the website of the Joint Laboratories and Relationships with Companies Office (https://web.uniroma2.it/it/percorso/laureati_e_impresa/sezione/laboratori-congiunti-e-rapporti-con-le-impresa) and on the Rome Technopole Foundation website (<https://www.rometechnopole.it/>).

As Spoke 2 leader, I hope that this catalogue can be of interest to stakeholders, in particular investors and corporates, and that it can constitute a useful tool to encourage the further development of the entrepreneurial ideas underlying the projects presented, enhancing interest in services to support entrepreneurship.

This catalogue, presented during the Tech Transfer Day, held on 10th April 2024, has been collected and edited by the Tor Vergata Task Force of the Rome Technopole project, composed of:

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4. **BP - CNR -2:** Regulatory Science and Technology Transfer in BioMedicine.
5. **BP - CNR -3:** Organs-on-chip for onco-immunology.
6. **BP - ISS -1:** Prototype Lab for Medical Devices.
7. **BP - ISS -2:** Development of advanced therapies based on anti-cancer Natural Killer cells.
8. **BP - ISS -3:** An integrated system for data collection in accidents and near misses involving workers of radiological departments (SIREN).
9. **BP - ISS -4:** Creation of the prototype of the National Registry of Implantable Prostheses (RIPI) data collection platform (π -RIPI).
10. **BP - Sapienza -1:** Wearable Systems based on nanomaterials for Health and Safety.
11. **BP - Sapienza -2:** Diagnostic procedure for the determination of the Nox2 protein.
12. **BP - UCBM -1:** 3D-printing and topological optimization for personalized orthotics.
13. **BP - UCBM -2:** Establishment of a laboratory as a one-stop solution for designing, producing, testing and validation lab/organ-on-chip solutions for applications ranging from point-of-care diagnostics to disease modelling and drug screening/development.
14. **BP - UCBM -3:** Characterization of bio-active molecules for various purposes (pharmaceutics, nutraceutics, cosmeceutics) using digital system based on sensors.
15. **BP - UNITUS -1:** Development of multifunctional bio-nanotechnology platforms for the selective detection of molecular markers in applied diagnostics, prognostics, and therapeutics of oncological diseases and viral infections, including personalized and precision medicine and research activity through OpenLabs (MULTIPLATFORMS).
16. **BP - UNITUS -2:** Novel Encapsulated Pigments enzymatically recovered from vegetable waste as food colorants (NEPI).
17. **BP - UTV -1:** Digital twins for medical applications – DTMed.
18. **BP - UTV -2:** Wearable sensors for human volatilome measurement.
19. **BP - UTV -3:** Development of a platform based on the implementation of biological models of increasing complexity to screen for reproductive toxicity of substances of environmental, occupational, and industrial interest.
20. **BP-DT - Catalent -1:** EBR.
21. **BP-DT - Catalent -2:** NITE.
22. **BP-DT - Catalent -3:** TIRTOR TRACK.
23. **BP-DT - Sapienza -1:** PHYGITAL TWIN TECHNOLOGIES FOR INNOVATIVE SURGICAL TRAINING & PLANNING. TL1: Advanced Medical Design and Engineering for Physical Anatomic Phantom.
24. **BP-DT - Sapienza -2:** PHYGITAL TWIN TECHNOLOGIES FOR INNOVATIVE SURGICAL TRAINING & PLANNING. TL2: Augmented Reality, System engineering and Deep Learning for Digital Anatomical Phantom.
25. **DT - Al maviva -1:** Voluntary plastic credits system based on blockchain technology.
26. **DT - Al maviva -2:** Proof of concept for the rainwater harvesting model through the creation of a digital twin.
27. **DT - Al maviva -3:** Automatic waste recognition through artificial intelligence algorithms.
28. **DT - CNR -1:** New materials, architectures and processes for transmission, modulation and sensing in the GHz and THz frequency range.
29. **DT - CNR -2:** Spintronic materials and wide-bandgap semiconductors.

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- 30. **DT - Sapienza -1:** Artificial intelligence, virtual reality and digital twin for advanced engineering and aerospace: Tissue biomechanics and advanced materials.
 - 31. **DT - Sapienza -2:** Mode division multiplexing of QKD and classical channels on multimode optical fiber (MULTIQKD).
 - 32. **DT - Sapienza -3:** Automated design of industrial plants through AI and Digital Twins.
 - 33. **DT - Sapienza -4:** Multifunctional graphene-based smart coatings for EMC and Sensor Applications.
 - 34. **DT - UNITUS -1:** Alphanumerix Srl – A UNITUS spin-off for digital transition of SME.
 - 35. **DT - UTV -1:** Eco-Friendly Electronic Labels for Plastic Waste (E-LEP-WA).
 - 36. **DT-ET - Sapienza -1:** Design and testing of a lab-scale smart hydrogen microgrid connected to a domestic end-user.
 - 37. **DT-ET - UTV -1:** Sustainable MATERIALS and pROcesses for eco-Tunnels (SMAR-T).
 - 38. **DT-ET - UTV -2:** Hydrogen Energy system with solid-state storage (HESS).
 - 39. **ET - Al maviva -1:** Building Information Modeling (BIM) and energy consumption management.
 - 40. **ET - Al maviva -2:** Energy consumption optimization solution for Intelligent Public Lighting System in Smart City ContextThe Smart.
 - 41. **ET - CNR -1:** Recovery, recycling and replacement of critical elements such as rare earths and precious metals.
 - 42. **ET - UCBM -1:** Prototyping of a biorefinery platform for the full valorization of agri-food wastes.
 - 43. **ET -UCBM -2:** Prototyping of a technological solution for the sustainable use of renewable energies and green hydrogen in the nautical sector.
 - 44. **ET - UCBM -3 :** Hydrogen District Management Tool (H2DMT).
 - 45. **ET - UNICAS -1:** New voltage regulators to support active users that include controllable loads, RES and storage systems in electric smart grids: Innovative LV regulation devices.
 - 46. **ET - UNITUS -1:** Study of the wood behaviour after heat treatment processes for low-durability woods (CLETA).
 - 47. **ET - UNITUS -2:** Magnetically Variable Performances Structural Module (MaVaP).

Section 2 - PRODUCTS FROM OPEN CALLS

- 48. **BP - Genechron:** Advanced support to melanomas precision diagnostic based on digitized histological images and the identification of genomic anomalies of germline and somatic DNA and RNA from a custom gene panel (DINTEST).
- 49. **BP - MIR / RadioGense / CNIT:** Innovative self-regulating ventilation system for the treatment of patients requiring ventilatory support capable of safeguarding the functionality of the muscles of the respiratory system (SMART CPAP).
- 50. **BP - Neomatrix Biotech:** Personalized Therapy in Breast Cancer: Customized Vaccine for Each Patient, Based on Their Mutations (VAP - Vaccine ad Personam).
- 51. **BP - Arterra Bioscience:** Development of a digitalized technology to isolate exosomes from plant cells and tissues (EXOPLANT).
- 52. **BP-DT - EHT:** Parkinson Assessment and Comprehensive Evaluation (PACE-ME).
- 53. **BP-DT - Nefrocenter:** A cloud service supporting predictive medicine for patients on hemodialysis (NefroCloud).
- 54. **DT - Dermatologia Myskin:** Controlled System for Dermatological Follow-up imaging (TARGET).
- 55. **DT - Latitudo 40:** Urban TOOL to Plan climate mitigation using satellite Imagery and Artificial intelligence (UTOPIA).
- 56. **DT - OPV Solutions / F.C.E / S.C.I.R.E.:** Powertrain diGitalE inNovativo per la mobilità Urbana soStenibile (GENIUS).
- 57. **DT - RBF Morph:** Digital Twin for Advanced Design in the Aerospace Industry (DigiPAD).

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- 58. DT - Tecno Energy:** A Robust Explainable Artificial Intelligence Approach for Measurement and Verification of Energy Efficient solutions (MeterXAI).

Section 3 - ENTERPRISES - NEW COLLABORATIONS


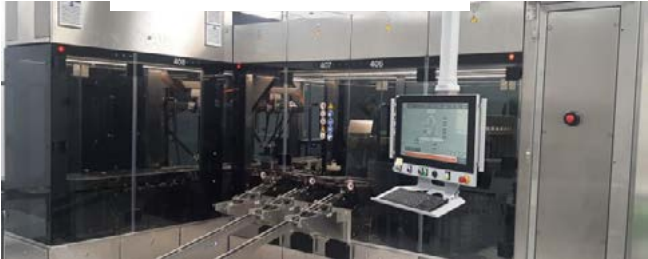
- 59. BP - AIR&HEALTH:** AIR&HEALTH Project (A&H Project).
- 60. BP – Tecnosens:** Safe Water Treatment System (SWaT).
- 61. BP-DT - Deep Blue:** Development of an integrated platform for reporting and collecting data on accidents and near misses of operators in nuclear medicine (SIREN 2).
- 62. DT - TransTec Services:** Spot The Mistake (STM).
- 63. DT - Medilife:** Creation and valorization of innovative products, processes or services through additive manufacturing.
- 64. DT - We-Com:** Data-driven Intelligent Assistant to Destination Managers (DIADeMA).
- 65. DT-ET – Mazzocchia:** Innovative technologies for sustainable processes intended for the production and use of Compactor Vehicles (ITAC).
- 66. ET – Tecalco:** ALLuminio Innovativo per Automotive Nobilitato con coating di grafene per il Trasporto dell'Energia elettrica (ALIANTE).

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- 67. BP-DT-ET - EEN / UTV:** Innovation Management Assessment.
- 68. BP-DT-ET - Lventure / WG 2.4:** Tèchne Accelerator - acceleration program for Startups and Spin-offs from the Lazio Region and Southern Italy Regions.
- 69. BP-DT-ET - UTV / WG Cross Cutting:** Start Cup Lazio - Business Plan Competition for the promotion of new start-ups and spinoff/ Patenting & licensing.
- 70. DT - UTV:** Research, Innovation and Creation Support Service (SARIC).

Section 5 - TRAINING ON TECHNOLOGY TRANSFER

- 71. BP - ENEA -1:** Digital Twin for Biomedicine and Biopharma (DT_BB).
- 72. BP - UCBM -1:** 3D Printing for Industrial and Biomedical Applications (3D PRI).
- 73. BP – ISS -1:** MD safety and effectiveness assessment: from clinical investigations to post-market surveillance.
- 74. DT - ENEA -1:** Digital Twin aim and solutions: an Introduction (DT_ASI).
- 75. DT - ENEA -2:** Digital Twin for HPC monitoring with Data Science Techniques (DT_HPC).
- 76. DT - RM3 -1:** Effective Team Management (ETM).
- 77. DT - RM3 -2:** Digital Twin, integration of GIS and BIM systems for the digital transition (DT_GIS_BIM).
- 78. DT - UTV -1:** Advanced Product Design and Optimization using (FEM APD_FEM).
- 79. DT - UTV -2:** Engineering and Management of Industrial Companies (EMIC).
- 80. DT - UTV -3:** Smart Maintenance (SM).
- 81. DT - UTV -4:** Innovative Process Technologies (IPT).
- 82. ET - UNITUS -1:** Use of Wood and Extension of Useful Life through Low Environmental Impact Methodologies (WEU).
- 83. ET - UTV -1:** Digital Twin for Energy and Production Management (DT_EPM).

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
PFS1 Project target is to implement a new technology for the site: the production of the Prefilled Syringes. The technology has a huge impact in the future of the drug administration to the patients, but the realization of a high speed line require a series of complex tests for the tuning of the line to guarantee functionality and quality of finished goods.	
Working group (researchers/enterprise)	
Catalent Anagni Group	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioPharma & Health	
Description of the TT product (technology/patent/prototype/service)	
Perform all test and activities to bring the first Pre-Filled Syringes Line to industrial running condition. To give an idea of the complexity of the system, the entire process is composed by the 10 primary equipment: <ul style="list-style-type: none"> • Inspection Machine • Compounding and other Docking Stations, COP-SOP Station, Trolley Tanks & Single Use Mixers • PFS Filling Machine • Debbagger for External Bag • Debbagger for Internal Bag • Lid/Liner Removal System • Aseptic Isolator • Tubs Conveyors and Reject System • Filling Line Automation Control System • 10-50-500 L Mobile SUMs for Building V and by 18 ancillary systems that needs to be fully validated to identify the working condition for a quality production.	 <p>Figure 1 - Filling machine.</p>  <p>Figure 2 - Inspection machine.</p>
Themes of innovation and R&D	
The production of Prefilled Syringes is the new frontier of aseptic production. The result is the elimination of the activities performed by nurses/doctors to prepare the injection with the elimination of bacterial contamination. Moreover, this technology is used for self-medication.	
Type of collaborations requested	
N/A	
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Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
PFS3 Project target is to implement a new technology for the site: the production of the Prefilled Syringes. The technology has a huge impact in the future of the drug administration to the patients, but the realization of a high speed line require a series of complex tests for the tuning of the line to guarantee functionality and quality of finished goods. The main differences vs. PFS1 are in the filling methodology, and in decontamination system.	
Working group (researchers/enterprise)	
Catalent Anagni Group	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioPharma & Health	
Description of the TT product (technology/patent/prototype/service)	
<p>Perform all test and activities to utilize an enhanced technology (vs. PFS1) to industrial running condition. The improvement that have been identified are:</p> <ul style="list-style-type: none"> • Double filling mode, both through the use of peristaltic pumps and through the time-pressure methodology • The PFS3 filling line has a SIRM station compared to the PFS1 – a fully automatic syringe inspection and reject machine • Decopulse decontamination system installed (latest technology developed by Optima) • MTC installed (very useful for long campaigns) entire process is composed by the 10 primary equipment: • Inspection Machine • Compounding and other Docking Stations, COP-SOP Station, Trolley Tanks & Single Use Mixers • PFS Filling Machine • Debbagger for External Bag • Debbagger for Internal Bag • Lid/Liner Removal System • Aseptic Isolator • Tubs Conveyors and Reject System • Filling Line Automation Control System • 10-50-500 L Mobile SUMs for Building V <p>and by 18 ancillary systems that needs to be fully validated to identify the working condition for a quality production.</p>	
Themes of innovation and R&D	
The production of Prefilled Syringes is the new frontier of aseptic production. The result is the elimination of the activities performed by nurses/doctors to prepare the injection with the elimination of bacterial contamination. Moreover, this technology is used for self-medication.	
Type of collaborations requested	
N/A	
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Section 1: PRODUCTS IN THE ECOSYSTEM**Name and acronym of the TT project with short presentation**

Sensors for the study of biomarkers and characterization of biological systems for biomedical research.
Nanomechanical sensors to monitor the presence of very small amounts of molecules and biomarkers in liquid environments and can also be used to assess the metabolic activity of small cell clusters through the analysis of their movement at the nanoscale.

Working group (researchers/enterprise)

Giovanni Longo and Marco Girasole, CNR-ISM
Collaboration with Ospedale Bambino Gesù

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

Biopharma & Health/FP4-7

Description of the TT product**(technology/patent/prototype/service)**

Nanomechanical and nanomotion sensors to characterize living biosystems and samples of interest in biomedical studies.

Semi-automatized nanosensing device to characterize living biosystems and samples of interest in biomedical studies. The system includes small sensors capable of monitoring the nanoscale vibrations and movements of biological systems to determine their activity in different environmental conditions.

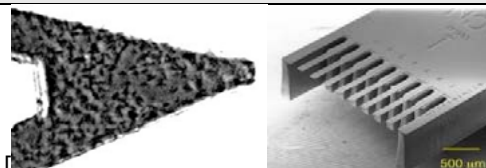


Figure 1 – Left: Sensor bearing living biological systems and right: array of nanomechanical sensors

The development of nanomechanical sensors for biotechnological applications can overcome limitations of current technologies to determine biomarkers. In addition, these sensors are an innovative method to link the metabolic response of living specimens to the administration of an external treatment.

Themes of innovation and R&D

Nanomechanical sensors can monitor the presence, even in trace amounts, of molecules and biomarkers present in the culture and can also be used to assess the metabolic activity of small cell clusters through the analysis of their movement at the nanoscale. In the case of sensors used for the detection of biomarkers, the adhesion of the molecules causes a static bending of the sensor that allows the identification of the presence of very small concentrations of molecules in the medium. In the case of the cell study, the adhesion of the cells to the sensor induces vibrations that are directly related to their metabolic state and allow to study their response to pharmacological stimuli with very high temporal resolution.

With these characteristics, it can be used for biological and clinical studies with particular interest in oncology. For example, by exploiting the great selectivity and sensitivity of nanomechanical sensors, we can identify the presence of specific combinations of biomarkers in cell or organoid culture media but also directly in the blood to assess the possible presence of a tumor. Moreover, the study of the nanostructured movement of small cell clusters in the presence of drugs or in specific environmental conditions can lead to determine with great speed and precision the efficacy of pharmacological treatments aimed at the best cure for specific tumors.

The originality of the project lies in the implementation of an innovative idea based on real-time monitoring of the response of a biosystem to external treatments. The idea is an innovation in the international arena and has considerable potential for industrial development in terms of parallelization of testing and detection systems and can pave the way for the development of new pharmacological treatments for personalized medicine.


Type of collaborations requested

The activity makes use of collaborations with groups related to cell growth, responsible for clinical trials or the development of cell models, to choose the molecules and biomarkers of interest in the field of oncology (see for example the Bambino Gesù Hospital). From these groups we obtained soil and cell samples to carry out analyses on real systems. For the cell study, in recent months we have begun to monitor the responses of live cellular systems exposed to different chemical and pharmacological stimuli, as well as different growth conditions, such as different temperatures, presence of CO₂, excess or lack of oxygen, stimulant drugs, etc.

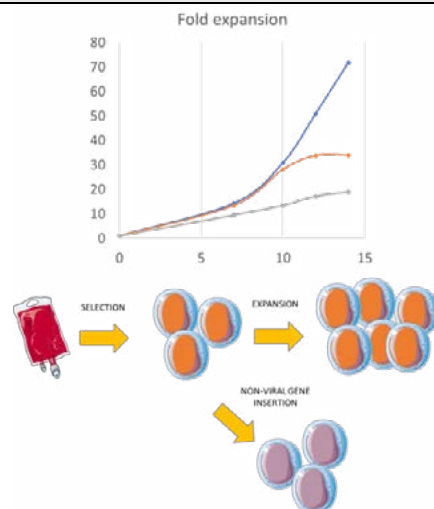
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Marco Girasole, marco.girasole@ism.cnr.it, 0645488161


Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Regulatory Science and Technology Transfer in BioMedicine. <p>The project focuses on scientific valorization activities and intellectual property for preclinical and clinical development projects of drugs and medical devices. It provides technical-scientific and regulatory support, thus having a strong impact at the scientific and networking level.</p> <p>The project involves collaborations with various entities and includes technology transfer activities, drug development, medical device characterization, and basic research, with a focus on enhancing scientific progress and innovation in the biomedical field.</p>	
Working group (researchers/enterprise)	
<p>Dr. Pasquale Pierimarchi- Scientific Responsible- CNR Dr. Gianluca Sferrazza-Technologist- CNR Dr. Manuela Zonfrillo-Researcher- CNR Prof. Vito Michele Fazio-Director Institute of Translational Pharmacology -CNR Gemelli's Clinical Trials Center - The Policlinico A. Gemelli (IRCCS)</p>	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
<p>BioPharma & Health - Flagship Project 4 Development, innovation and certification of medical and non-medical devices for health</p>	
Description of the TT product (technology/patent/prototype/service)	
<p>Development of activities to implement innovative TT models to increase the biomedical technologies development.</p> <p>Implement objectives aimed at encouraging applications from spinoffs in the biomedical sciences area.</p> <p>Evaluation of applications received and specifically for projects in the pharmaceutical, biotechnological, and medical technology sectors.</p> <p>Selection of spinoffs that will participate in accelerating activities.</p>	
Themes of innovation and R&D	
<p>The implementation of innovative technology transfer models to enhance biomedical technology development, As well as the organization of specialist training courses on technology transfer in biomedicine.</p> <p>Activities related to the translational and regulatory development of innovative drugs, focused on the pharmacological characterization of new molecules in preclinical models and medical device characterization.</p>	
<p>Expand collaborations that contribute to the consolidation of the scientific network, including in the industrial sector, by strengthening participation in calls or funding for experimental development activities and industrial research, and enhancing the involvement of public research groups.</p>	
Contacts	
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Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Organs-on-chip for onco-immunology. Design, fabrication and characterization of microfluidic platforms for organ-on-chip application in oncoimmunology, that enable the creation of an experimental ecosystem to reproduce and measure immune system response to tumors exploiting microfluidics, advanced microscopy and advanced image and data analysis.	
Working group (researchers/enterprise)	
Annamaria Gerardino CNR IFN Rome (Spoke 2); Cinzia Di Franco, CNR-IFN, Bari not critical mass CNR IFN Rome: Luca Businaro (Spoke 1); Farnaz Dabbagh Moghaddam (Spoke 3); Adele De Ninno (Spoke 6)	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioPharma&Health FP7	
Description of the TT product (technology/patent/prototype/service)	
Microfluidic chips fabricated using 'soft' lithography technologies at first, then transferring the processes to series moulding techniques and integration into research and industrial pipelines (integration into automated systems in laboratories and companies).	 <p>Figure 1: Microfluidic chips embedded in a multiwell</p>
Themes of innovation and R&D	
Exploiting research results to promote the adoption of organs-on-chip technologies at the level of research laboratories and companies in the area. Prototyping and validation of Industrially relevant on chip technology for drug and therapy testing- Enhanced data analysis with AI approaches. Increasing the TRL of the devices developed. Current TRL 4, with the adoption of mass production processes and design compatible with automated systems, it is expected to be raised to TRL6/7. Collaboration with other RT partners: Istituto Superiore di Sanità; Università Campus Biomedico; Takis Biotech S.r.l.; University of Rome La Sapienza.	
Type of collaborations requested	
<ul style="list-style-type: none"> • Microfluidic systems industrialization → Thermoplastic injection moulding • Microfluidic systems industrialization → Cartesian robot design and realization for silicone rubber chip cutting; • Development of dedicated platforms through the integration of chips and high-content and/or high-throughput dedicated microscope → design of dedicate microscopy platforms; • Specialized data analysis → AI based biological image data analysis platform. 	
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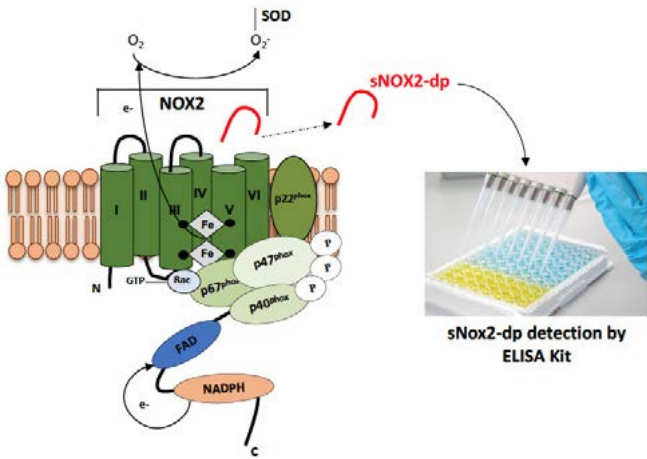
Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Prototype Lab for Medical Devices A stable ecosystem in which researchers and industry can find specific support for their ideas, projects and needs. Set-up a facility for transforming ideas into proof-of-concept or prototypes.	
Working group (researchers/enterprise)	
Giovanni Calcagnini, Federica Censi, ISS	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioPharma & Health. FP4 - Development, innovation and certification of medical and non-medical devices for health	
Description of the TT product (technology/patent/prototype/service)	
The prototyping laboratory is designed to support the following stages of developing electronic medical devices: 1) Proof of concept: providing basic equipment to test development boards for biomedical signal acquisition/processing 2) Prototyping: providing basic tools for PCB design, PCB realization (milling technology), Component placing (hybrid infrared/convection heating and pick and place), electrical and electronic validation (oscilloscope, signal generators, spectrum analyser and network analyser up to 3 GHz), physiological signal simulator for ECG, SaO2, Respiration and Defibrillation, antennas for E and B field measurements.	
The prototyping laboratory fills the gap in the tools available for fast prototyping, also in view of the new market trends in semiconductors packaging and sensor miniaturization, and of the opportunity provided by additive printing manufacturing. The following functional areas were defined and designed: 1) PCB milling 2) Component placing and soldering / Rework 3) Electrical qualification and validation 4) Electromagnetic compatibility and testing.	
Type of collaborations requested	
N/A	
Contacts	
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Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Development of advanced therapies based on anti-cancer Natural Killer cells.	
Working group (researchers/enterprise)	
Luciano Castiello, ISS, PI, critical mass 9 person month total Giovanni Torelli, Sapienza University, not critical mass Nadia Peragine, Sapienza University, not critical mass	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioPharma & Health - FP7	
Description of the TT product (technology/patent/prototype/service)	
Develop and validate a new process for the expansion of Natural Killer cells to be used in clinical trials of cancer immunotherapy according to Good Manufacturing Practice (GMP). The new process should increase yield while preserving antitumor activity. Moreover, there will be developed protocols for the insertion of a chimeric construct based on non-viral gene transfer systems to be combined with expansion process in order to generate clinically relevant doses of genetically engineered NK cells to be used in clinical trials in oncology settings.	 <p>Figure 1 – Schematic workflow of manufacturing process and the results, in terms of expansion, so far collected.</p>
Themes of innovation and R&D	
The project grounds on the clinical grade manufacturing process of NK cell-based therapy used in a phase I clinical trial. Despite the successful manufacturing and promising results, the low cell expansion yield and high operator processing, required an improvement of the manufacturing process capable of increase cell expansion rate, while preserving their antitumor activity. Moreover, to further expand the application and increase antitumor activity, non-viral based gene transfer method will be tested and evaluated for possible inclusion into our manufacturing process to generate novel advanced therapies for cancer.	
Type of collaborations requested	
Partners interested in exploitation of NK cell based immunotherapies in clinical trials.	
Contacts	
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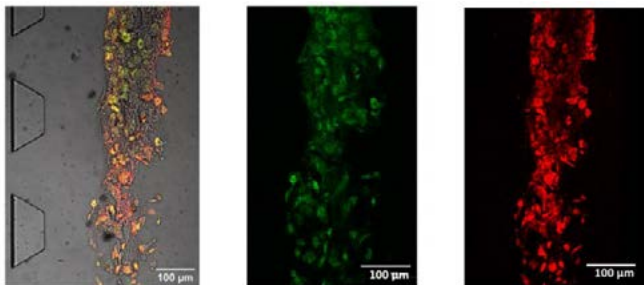
Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
SIREN. An integrated system for data collection in accidents and near misses involving workers of radiological departments.	
Working group (researchers/enterprise)	
ISS: Paola Fattibene (Critical mass); Giorgia Stendardo; Evaristo Cisbani. INAIL: Carmine Zicari Deep Blue S.r.l.: Giuseppe Frau, Alessandra Tedeschi	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioFarma & Health – FP4 Development, innovation and certification of medical and non-medical devices for health	
Description of the TT product (technology/patent/prototype/service)	
<p>SIREN is a tool addressed to workers and decision-makers to collect data on radioactive source and worker's movements in accidents and near miss, with the aim to analyse causes and dynamics and prevent future accidents. SIREN was developed under an INAIL funding and is now at TRL level 4: it has been tested in the relevant environment of patient rooms of nuclear medicine therapy departments. It is aimed to lead it toward TRL6 level. The system combines ML algorithms and IoT technologies, for motion tracking, online dosimetry and advanced computational techniques. The prototype is formed by five modules:</p> <p>(1) a module based on operator's position and pose tracking through visual recognition with cameras and AI, aimed at estimating the distance to the radiation source and analyzing the dynamics of the accident;</p> <p>(2) a system of wireless environmental detectors and sensors;</p> <p>(3) a radiation field map library calculated by advanced computational methods;</p> <p>(4) a reporting app to be used by operators;</p> <p>(5) a database gathering data from the SIREN modules and environmental/personal dosimeters available in hospitals.</p>	 <p>The diagram illustrates the SIREN Integrated system architecture. A central cloud is connected to several components: a dashboard displaying various charts and graphs, a smartphone, a dosimeter, a person walking, and a radiation field map. Arrows indicate the flow of data between these components and the central cloud, showing a highly integrated system.</p>
Themes of innovation and R&D	
<p>The strength of SIREN is to enable the collection of data about incidents that may occur in hospital radiology departments in two ways:</p> <ul style="list-style-type: none"> - either independently of operators through data collected automatically by ML algorithms, computer vision, wireless sensors, and computational codes, - by involving the operators through their accident description, by the app. <p>These modules can work separately and, if necessary, can be mutually exclusive, making the system architecture particularly flexible and adaptable to different types of facilities.</p> <p>In summary, the system introduces several benefits: it collects useful data to analyze the causes of accidents; it engages operators and familiarizes them with error culture; and it collects data independently of operators, easing their workload. The long-term goal is to have a single reporting system shared, for example, among different health facilities in the same region, thus facilitating the aggregation of data for statistical purposes and promoting the harmonization of radiation protection practices.</p>	
Type of collaborations requested	
We are looking for collaborations with front-end and back-end developers and software engineers to develop a graphical user interface, and with data scientists to implement advanced computational methods for fast data generation and visualization.	
Contacts	
Paola Fattibene, Core facilities, ISS. paola.fattibene@iss.it	

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Creation of the prototype of the National Registry of Implantable Prostheses (RIPI) data collection platform (π-RIPI). The objective of the project is to design the platform supporting the RIPI data collection and implement the module relevant to the identification and characterization of the implanted devices. RIPI was established at the Istituto Superiore di Sanità in 2017 (DPCM 3/3/2017) to monitor, at the national level, the safety of the implanted prostheses and to ensure patient quick traceability in case of adverse event (recall).	
Working group (researchers/enterprise)	
Marina Torre (PI), Duilio Luca Bacocco (co-PI), Eugenio Carrani, Paola Ciccarelli (Istituto Superiore di Sanità) Mauro Cislighi, Massimo Trentini, Marco Forlani, Arianna Mazzone, Martina Barrall (BVTech) Fernanda Gellona, Valeria Glorioso, Johnny Della Giustina (Confindustria-DM).	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioPharma & Health. FP4 (Development, innovation and certification of medical and non-medical devices for health), WG1 (Infrastructure on Medical and non-Medical Devices), Section 4 (Post-market)	
Description of the TT product (technology/patent/prototype/service)	
<p>The π-RIPI project has been conceived to capitalize what already designed by ISS, within previous national projects and a PhD project in Engineering in Computer Science. It has been partially implemented in an experimental context (TRL3) and will then be put into practice, by realizing a prototype of a complex IT infrastructure, including several registries of specific device categories (i.e. joint prostheses, defibrillators and pacemakers, spinal devices, heart valves and implantable hearing devices), integrated with the real context of some health regional services (moving toward TRL7). The π-RIPI platform will reflect the RIPI architecture structured as an umbrella including several standardized modules and components. The development of a pilot project on the specific component of the π-RIPI project concerning the identification and characterization of joint prostheses, and its implementation as Proof of Concept (POC) has been included in FP4 (WG1, Section 4) and developed in a partnership with BVTech and Confindustria-DM (Figure 1).</p>	 <p>Figure 1 – Project logo and activity plan.</p>
Themes of innovation and R&D	
<p>The platform, designed to fulfill the requirements of a modern registry of medical devices, requires to operate on high quality data coming from heterogeneous sources, respecting strong security and privacy constraints and interacting with other institutions. The advanced prototype of the RIPI platform component for medical devices identification and characterization, a first and unique example in Italy of a centralized system for the devices considered by RIPI, will be integrated in the local and regional health informatic systems, starting the accomplishment of what required by DPCM 3/3/2017 and EU Regulation on medical devices 2017/745 and supporting monitoring of the safety of implanted patients and further scientific studies in public health.</p>	
Type of collaborations requested	
<p>The project is currently carried on in cooperation with BVTech, partner of the Rome Technopole and coordinator of the Flagship Project FP4 together with Confindustria-DM</p>	
Contacts	
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Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Wearable Systems based on nanomaterials for Health and Safety	
Working group (researchers/enterprise)	
Prof. Maria Sabrina Sarto; Prof. Alessio Tamburrano; Prof. Alessandro Giuseppe D'Aloia; Researcher Fabrizio Marra; Researcher Hossein Cheraghi Bidsorkhi; Researcher Marco Fortunato	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
The proposed systems fall within the biopharma & health pillar.	
Description of the TT product (technology/patent/prototype/service)	
<p>The prototype of smart T-shirt integrates, in technical fabrics for workers, innovative sensors for physical, chemical and biological agents, based on nanotechnology and nanomaterials (graphene, ZnO nanostructures, nanoparticles and polymeric films with high biocompatibility, Bragg grating -FBG- functionalized fibers) with a wearable multi-sensory modular platform that through a wireless communication protocol is always connected with mobile devices (smartphones) and through bio-operational algorithms allows to assess the risk of injury of the individual worker. In addition, the proposed solution has characteristics of high wear ability, ease in washing, and cost and functionality that make it suitable for different scenarios, as a device for individual protection and risk mitigation in typical work environments in production and process sectors; as a system for monitoring sports performance. Further added value is related to communication with mobile first-interface media (smartphones) and contextual data transfer to a remote server (cloud) to build a data repository to be used later for subsequent analysis.</p>	 <p>Figure 1 – wearable t-shirt with Bluetooth systems for physiological monitoring</p>
Themes of innovation and R&D	
<p>Europe's commitment to improving health, well-being, and quality of life is embodied in actions aimed at supporting research, technology development, and innovation to promote smart, scalable, and sustainable solutions for overcoming the major health challenges of the modern era, as declined under Cluster 1 "Health" of Horizon Europe and including in particular: (i) staying healthy in a rapidly changing society; (ii) living and working in a health-promoting environment; (iii) unlocking the full potential of new digital tools, technologies and solutions for a healthy society; and (iv) maintaining a sustainable and globally competitive health-related industry. This is the context of the institutional goal of INAIL, the funder of the smart T-shirt project, about prevention in the workplace; specifically, to programmatic theme ID 10 "Smart Clothes for Workers."</p> <p>The project developed innovative multidisciplinary technology through the integration of nanomaterials for sensing; wearable electronics with high sensitivity; and bio-operational machine learning Algorithms. In addition, both cytotoxicity and biocompatibility of the sensorized fabrics were evaluated in vitro; and wear ability, multifunctionality, integrability, washability, cost, technology transferability, and performance were optimized.</p>	
Type of collaborations requested	
Support for industrial scale up from TRL 4/5 to TRL 7 through collaboration with companies in the textile, computer and electronics industries.	
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Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Diagnostic procedure for the determination of the Nox2 protein.	
Working group (researchers/enterprise)	
Roberto Carnevale ¹ , Cristina Nocella ² , Simona Bartimoccia ¹ , Isotta Chimenti ¹ , Pasquale Pignatelli ² ¹ Department of Medical-Surgical Sciences and Biotechnologies, Sapienza University of Rome, Latina, Italy; ² Department of Clinical, Internal, Anesthesiologic and Cardiovascular Sciences, Sapienza University of Rome, Rome, Italy	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioPharma & Health (FP4)	
Description of the TT product (technology/patent/prototype/service)	
<p>We developed an ELISA method for the evaluation of Nox2 activity by the analysis of soluble Nox2-derived peptide (sNox2-dp) released after the activation of the enzyme. We obtained a European patent n° EP3495821A1, Title: Diagnostic procedure for the determination of the Nox2 protein.</p> <p>We will realize a prototype of the Nox2 ELISA Kit and related RUO certification for the analysis of sNox2-dp in biological samples.</p> <p>Moreover, we will perform a clinical trial study on a large cohort of subjects with or without cardiovascular disease.</p>	 <p>Figure 1 - Nox2 activation and detection</p>
Themes of innovation and R&D	
<p>Cardiovascular diseases (CVDs) are the main cause of morbidity and mortality in the Western countries. There is a growing body of evidence suggesting that oxidative stress is implicated in vascular damage and is associated with several CVD, including hypertension, heart failure, stroke, diabetes, and atherosclerosis. Therefore, an accurate assessment of oxidative stress and choosing the most suitable biomarkers to analyze this are necessary. To date, oxidative stress is assessed by indirect methods that measure its effects on proteins, carbohydrates, nucleic acids and lipids, which can, therefore, be used more as biomarkers of oxidative damage than oxidative stress. For example, among these biomarkers, malondialdehyde (MDA), thiobarbituric acid reactive substances (TBARS), and 8-isoprostaglandin F2 (8- iso-PGF2) are commonly used to evaluate lipid peroxidation products. Furthermore, several methods have been developed to evaluate the oxidative modification of proteins, such as advanced oxidation protein products (AOPP), or oxidative damage to DNA. However, the measurement of these biomarkers represents a balance between their generation and removal, furthermore any increase in their levels could be an artefact caused by oxidative damage during isolation or analysis. Considering these limitations, the oxidative state should be measured through methods capable of evaluating the activity of enzymes involved in ROS production. Our prototype could represent a new approach for the analysis of oxidative stress based on the evaluation of the Nox2 enzyme activity by an ELISA method. This method evaluates the concentration of a soluble Nox2-derived peptide (sNox2-dp), released in the circulation after the activation of Nox2 enzyme.</p>	
Type of collaborations requested	
Manufacturers and distributors of ELISA kit.	
Contacts	
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Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
3D-printing and topological optimization for personalized orthotics. The project aims at the numerical mathematical modeling to produce environmentally friendly insoles using 3D printing and to analyse the mechanical response.	
Working group (researchers/enterprise)	
Letizia Chiodo (PI, UCBM), Alessio Gizzi (collaborator, UCBM), Daniele Bianchi (collaborator, UCBM), Lorenzo Zoboli (collaborator, UCBM). (UCBM, Università Campus Bio-Medico di Roma).	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioPharma & Health, FP 4	
Description of the TT product (technology/patent/prototype/service)	
<p>Designing and optimizing the structure of the insole infill prototype for sports and therapeutic applications. The approach integrates additive manufacturing and advanced engineering to produce lightweight mechanically suitable orthoses (e.g., insoles). The research combines experimental data and computational techniques to enhance the manufacturing process.</p> <p>Topology optimization, based on Finite Element analysis, determines an optimal material distribution for the forefoot. Validation analyses confirm the structural performance of the optimized shape, and the results can be integrated in a possible prototype.</p> <p>The insoles will be further optimized after insertion of sensors.</p>	<p>Figure 1 - Pre- and post- topology optimization insole.</p> 
Themes of innovation and R&D	
<p>1 - The research activities allow to predict a printing time reduction. This approach allows for an efficient and sustainable alternative to produce insoles, with a reduction of filament usage, in a sustainable perspective.</p> <p>2 – The insoles can be sensorized, with different sensor technologies, to develop devices with a double function.</p>	
Type of collaborations requested	
Collaboration with companies interested in testing and further developing the designed and optimized materials and devices.	
Contacts	
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Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Establishment of a laboratory as a one-stop solution for designing, producing, testing and validation lab/organ-on-chip solutions for applications ranging from point-of-care diagnostics to disease modelling and drug screening/development. The objective of the present task is the image analysis of microfluidic systems as in vitro models for pharmaceutical testing, as well as the creation of microfluidic devices for the conversion of batch processes into continuous flow processes for improved, safer and more sustainable formulation of nanodrugs. Also, a joint Lab for microfluidic technologies in oncology research has been established. Aiming to technology transfer to pharmaceutical and biotech industry.	
Working group (researchers/enterprise)	
Marcella Trombetta, Università Campus Bio-Medico di Roma Sofia Raniolo, Università Campus Bio-Medico di Roma	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioPharma & Health FP7	
Description of the TT product (technology/patent/prototype/service)	
Screening of nutraceuticals for bone regeneration through the use of PDMS chips. Each fluidically isolated culture chamber will allow different combinations of molecules of interest to be tested in parallel to measure their osteogenic potential. Synthesis of polymeric NPs as a viable technology for encapsulation and controlled release of drugs and promising biopharmaceuticals by a hydrodynamic flow focusing geometry microfluidic system.	 <p>Figure 1 - Immunofluorescence staining-on-chip (21 days); Expression of Actin and Bone Sialoproteine II.</p>
Themes of innovation and R&D	
Over the last decade, it has become apparent that conventional biological models require upgrading to suit the customization requirements of biological research and pharmaceutical testing, aligning with the complexities of human physiology and specificity. Organ-on-chip systems represent a new frontier technology facilitating the assessment of tailored therapies and validation of novel drug efficacy. In addition to these technologies, lab-on-chip systems offer a feasible substitute for traditional batch syntheses in the continuous flow production of new substances intended for controlled drug delivery applications.	
Type of collaborations requested	
Collaboration with pharma/biotech companies and research groups interested in high-throughput platforms for drug discovery and toxicity testing.	
Contacts	
Prof. Marcella Trombetta, Università Campus Bio-Medico di Roma, m.trombetta@unicampus.it	

Section 1: PRODUCTS IN THE ECOSYSTEM**Name and acronym of the TT project with short presentation**

Characterization of bio-active molecules for various purposes (pharmaceuticals, nutraceuticals, cosmeceutics) using digital system based on sensors.

Working group (researchers/enterprise)

Marco Santonico, Università Campus Bio-Medico di Roma (researcher)
Alessandro Zompanti, Università Campus Bio-Medico di Roma (researcher)
Giorgio Pennazza, Università Campus Bio-Medico di Roma (researcher)

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

BioPharma &Health
FP 7

Description of the TT product (technology/patent/prototype/service)

Activities will involve developing a chemical sensor capable of characterizing bioactive molecules present in different contexts (food, pharmaceuticals, etc.). The system's peculiarity will lie in its ability to be trained to recognize different bioactive molecules and provide a concentration value for them. This will ensure adequate control of production processes. Development of sensor platforms and protocols to characterize bio-active molecules for various purposes (pharmaceuticals, nutraceuticals, cosmeceutics).

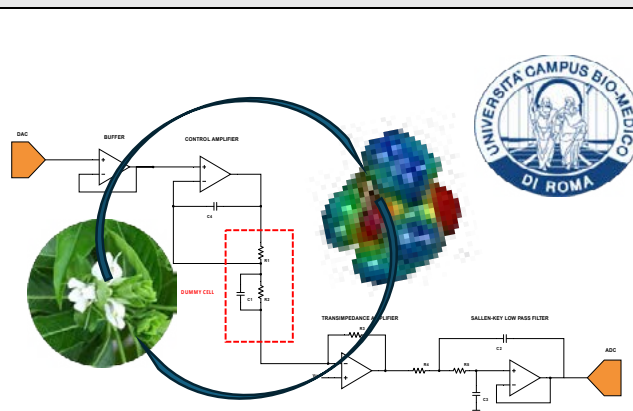


Figure 1 - Schematic overview of the electronic interface for the sensor system, with a graphical rendering of its capability in analyzing bioactive molecules from plant source.

Themes of innovation and R&D

The unit of Electronics for Sensor Systems of “Università Campus Bio-Medico di Roma” has defined the best strategy for electronic architecture. The core activities aim to optimize sensor performance in terms of resolution, sensitivity, noise, and reproducibility. These activities have required the definition of specifications for the electronic interface in terms of low power consumption and low noise. The study has required the simulation of circuit architecture and data remote managing. An electronic interface has been developed with different stages consisting of the amplitude, filtering and AD/DC converter blocks. Calibration protocols will be defined for electrochemical sensors to analyze antioxidant activity with a rapid method. The system will be compared with calibrations obtained through an optical system. The goal is to provide a repeatable and reproducible procedure for the application in an industrial context. Some measurements have been conducted so far for polyphenols substances to test the robustness of methods. The next step is to calibrate the sensors for different concentrations of bio-active molecules.

Type of collaborations requested

The collaborations requested are in the context of pharmaceuticals, nutraceuticals and cosmeceutics farm, to develop a sensor to monitor and optimize the production of bio-active molecules. The sensor could be specialized to be included in the line production of specific farm.

Contacts

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Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
MULTIPLATFORMS Development of multifunctional bio-nanotechnology platforms for the selective detection of molecular markers in applied diagnostics, prognostics, and therapeutics of oncological diseases and viral infections, including personalized and precision medicine and research activity through OpenLabs.	
Working group (researchers/enterprise)	
Spoke 2: Prof. Lorenzo Botta, Prof.ssa Anna Maria Timperio Spoke 1: Prof. Raffaele Saladino, Dr. Bruno Mattia Bizzarri, Dr.ssa Eliana Capeocchi	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioPharma & Health; FP7	
Description of the TT product (technology/patent/prototype/service)	
Prototype: Validation of biosensors for the determination of specific molecular marker. Short description: <ul style="list-style-type: none"> • Novel polyphenolic nano-devices will be developed for the stabilization and the controlled release of most promising lead compounds identified by pharmacological and pharmacokinetic in vitro assays. • The nano-platforms will be evaluated also as redox-active material and solid support for specific molecular recognizers able to selectively identify markers of diseases. • Platform technology as IoT devices for drug delivery and early-stage cancer identification will be generated within the project. 	
Themes of innovation and R&D	
New polyphenolic nano-devices will be developed as useful bio-platforms for the stabilization and controlled release of the most promising lead compounds. In addition, to further expand the applications of novel bio-platforms, these bionano-devices will be evaluated as redox-active materials and solid support for specific molecular recognizers that can selectively identify disease markers.	
Type of collaborations requested	
- Clinical partners for patient derived tumor samples - Electrochemical support	
Contacts	
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Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

Novel Encapsulated Pigments enzymatically recovered from vegetable waste as food colorants - NEPI

In a circular economy model, the valorization of fruit and vegetable waste makes it possible to recycle/reuse materials into the supply chain. The project idea deals with the application of a new enzyme assisted technology for the tailored recovery from unsold vegetable of GDO of natural pigments to be used as bioactive food colorants.

Working group (researchers/enterprise)

University of Tuscia: Marco Esti, Katia Liburdi, Ilaria Benucci, Claudio Lombardelli, Caterina Mazzocchi

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

BioPharma & Health

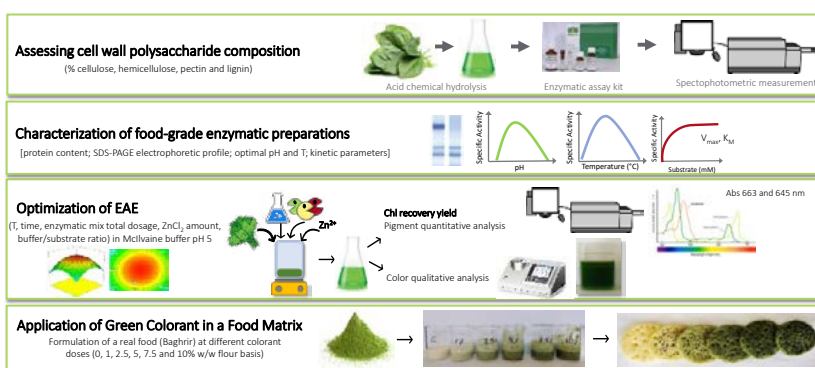
FP1

Description of the TT product**(technology/patent/prototype/service)**

The activities suggest tailored protocols, based on targeted substrate-enzymatic extraction, for the recovery and encapsulation of pigments (i.e. chlorophyll from spinach leaves). The procedures consist of applying specific enzymatic mix designed considering the vegetable cell wall composition. The recovery yield, as well as the colorimetric parameters of the extract, represent the main research drivers.

Tailored protocols for the enzymatic assisted solid-liquid extraction of green pigments from vegetables (leaves) under mild conditions.

Methods for chlorophyll encapsulation in beta cyclodextrins.

**Themes of innovation and R&D**

- Enzyme assisted extraction techniques for the recovery of natural pigments from vegetables.
- Novel stabilized pigments encapsulated in cyclodextrins for food application.

Type of collaborations requested

N/A

Contacts

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esti@unitus.it

Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

Digital twins for medical applications – DTMed.

DTMed is a pioneering project aims to leverage Digital Twin technology to revolutionize medical practices. Through advanced simulations and machine learning algorithms trained on synthetic datasets, DTMed focuses on creating patient-specific digital replicas, enabling personalized healthcare interventions and innovative medical training solutions.

Working group (researchers/enterprise)

RBF Morph s.r.l, LivGemini Start Up project, and MeDiTATe project consortium.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

BioPharma & Health domain, specifically focusing on Digital Twin technology, multi-scale simulation, and patient-specific digital medicine. FP4: development, innovation and certification of medical and non-medical devices for health.

Description of the TT product

(technology/patent/prototype/service)

DTMed aims to develop three prototypes:

Digital Twin of an Operating Theatre: In collaboration with the Istituto Superiore di Sanità, this prototype ensures continuous monitoring and control of air quality in operating rooms.

Parametric Human Airways: This prototype allows for the customization of patient-specific anatomical models by adjusting 64 geometric parameters.

Interactive Surgery: A Virtual Reality (VR) application designed for surgical training, where the digital twin of the patient can be interacted with in a virtual environment.

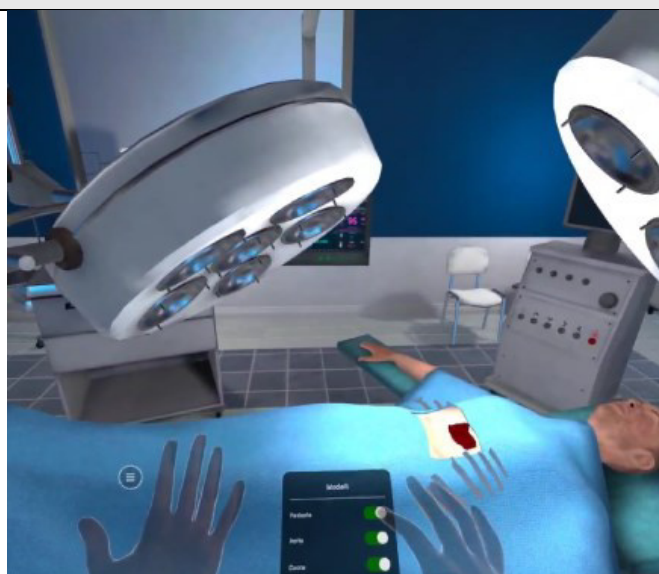


Figure 1 - An interactive patient in an operating theatre. The VR scene allows seeing the hands of the user and a panel to control the visibility of internal organs.

Themes of innovation and R&D


DTMed leverages Digital Twin technology, which is at the forefront of innovation, to revolutionize medical applications. By combining high-fidelity simulations, machine learning, artificial intelligence, and advanced visualization techniques (including VR/AR), DTMed aims to pave the way for next-generation MedTech solutions. The ultimate goal is to substantially enhance the success of treatment and prevention in healthcare.

Type of collaborations requested

The project seeks to strengthen existing partnerships and establish new collaborations. Key industrial partners such as the RBF Morph Company provide advanced mesh morphing technology crucial for the project's success. Support from stakeholders like Ansys Inc. Group, Istituto Superiore di Sanità, and Chiesi Farmaceutici is instrumental in gaining exposure and advancing project outcomes. The LivGemini Start Up project aims to bring the cardiovascular prototype into the healthcare market.

Contacts

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<https://meditate-project.eu/>

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Wearable sensors for human volatilome measurement. Device for breath analysis made of a protective face mask modified with conductivity variation sensors placed on the internal surface of the mask.	
Working group (researchers/enterprise)	
Corrado Di Natale, Alexandro Catini, Valerio Allegra, Rosamaria Capuano, Sergio Bernardini, Annalisa Noce (University of Rome Tor Vergata).	
Reference pillar (Digital Transition / Energy Transition / BioPharma &Health) and FP topic	
BioPharma and Health; FP4 Spoke 2	
Description of the TT product (technology/patent/prototype/service)	
<p>The prototype is a FFP2 protective face mask modified with conductivity variation sensors placed on the internal surface of the mask. The sensors were designed to maximize sensitivity to volatile compounds typical in the breath of patients suffering from chronic kidney disease.</p> <p>The mask is connected via a cable to an electronic board where the resistance of the sensors is measured. The data are then stored in an SSD card and subsequently imported into a computer. The electronic system is battery powered and can be used in any practical condition.</p> <p>The measurement protocol requires that the patient, after wearing the mask, is instructed to perform two cycles of breathing at different speeds. Sensor signals analyzed by a machine learning algorithm classify patients into predefined categories. TRL from 4 to 6(7).</p>	 <p><i>Figure 1 - View of the complete sensor. The plug connects the disposable sensorized mask to the electronic interface. The display leads, step by step, the operator during the breath measurement.</i></p>
Themes of innovation and R&D	
Innovative method of diagnosis based on breath chemical composition. Development of a sensorized disposable facemask for safe and painless analysis. Application to the monitoring of chronic diseases, and therapy progressions.	
Type of collaborations requested	
Collaborations with: clinical subjects to extend the tests; electronic board manufacturers to standardize the production of the electronics interface; with thin film technology companies to standardize the production of the disposable sensor units.	
Contacts	
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Section 1: PRODUCTS IN THE ECOSYSTEM

Development of a platform for reproductive toxicity screening

Development of a platform based on the implementation of biological models of increasing complexity to screen for reproductive toxicity of substances of environmental, occupational, and industrial interest.

Development of a platform based on the implementation of biological models of increasing complexity to screen for reproductive toxicity of substances of environmental, occupational, and industrial interest, such as for example chemicals, environmental pollutants, incidental or intentionally produced nano- and microparticles, and newly synthesized drugs. This platform is intended to be a high throughput system applicable in industrial settings to enable integrated assessment of the toxic potential of substances whose effect on reproduction is little known or unknown.

Working group (researchers/enterprise)

- Prof Andrea Magrini, University of Rome "Tor Vergata", PI
- Prof Luisa Campagnolo, University of Rome "Tor Vergata", Team member
- Dr. Valentina Lacconi, University of Rome "Tor Vergata", Team member
- Dr Dolores Lobresca, University of Rome "Tor Vergata", Team member

Reference pillar (Digital Transition / Energy Transition / BioPharma &Health) and FP topic

BioPharma &Health

Description of the TT product

(technology/patent/prototype/service)

The platform comprises 3 models of increasing complexity :

1. 2D/3D mouse model mimicking the fetal-maternal interface (TRL2-4) in vitro.
2. "Humanization" of the mouse model reported above.
3. Human fetal-maternal interface model based on 3D bioprinting of endometrial tissue (current TRL2-3, planned TRL5).

The 2D/3D mouse model has already been developed in our laboratory and it is currently used to study the toxic potential of micro- and neoplastics.

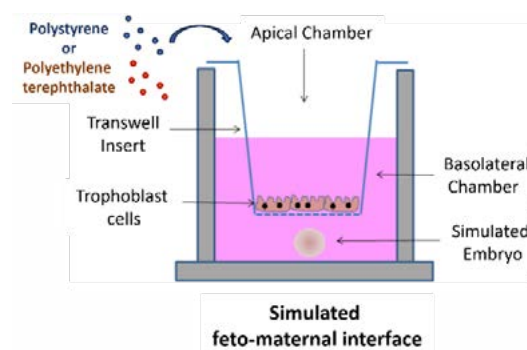


Figure 1 - Schematic representation of the model reproducing the fetal-maternal interface already developed and ready for testing.

Themes of innovation and R&D

Use a 3D printer for biomaterials and cells to develop a 3D model that faithfully reproduce endometrial tissue from human endometrial stromal and epithelial cells (using both primary cells and cell lineages). Trophoblast spheroids and/or embryoid bodies obtained from human induced pluripotent stem (iPS) cells are introduced into the model to simulate the embryo and used to evaluate the embryotoxic potential of test substances.

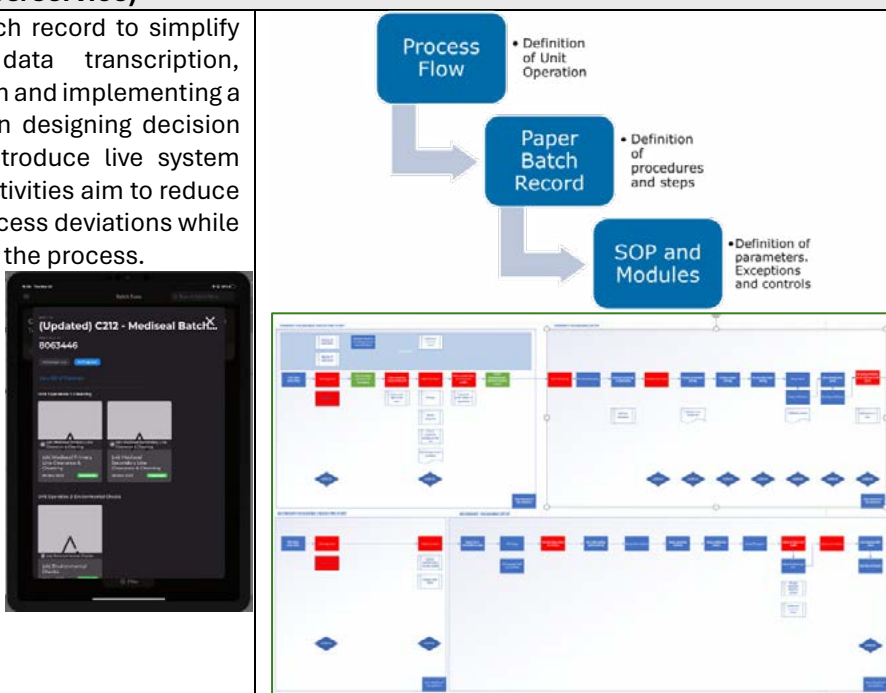
Type of collaborations requested

Companies interested in the commercial application of one or more components of the platform.

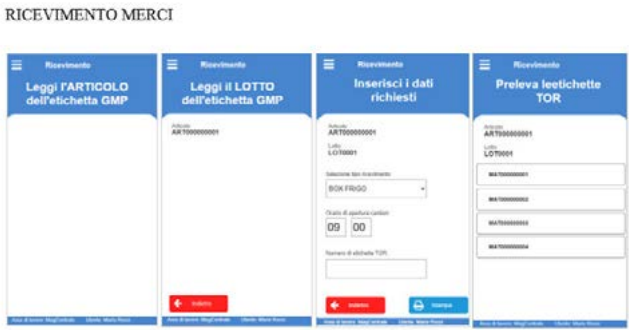
Contacts

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Luisa Campagnolo, PhD, campagnolo@med.uniroma2.it

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
EBR This project aims to digitalize the most important document produced during production in the pharmaceutical industry: the Batch Record. The work is performed in step: the first step is the digitization, and the subsequent steps is the digitalization which allow the elimination /reduction of manual entry and manual calculation progressively integrating the system with the process equipment.	
Working group (researchers/enterprise)	
Salvatore Belli / Catalent; Matteo Monti / Catalent; Angelo Pacilli / Catalent; Silvia Brodini / Catalent; Floris Torriani / Catalent; Emiliano Tuffi / Catalent	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioPharma & Health and Digital Transition	
Description of the TT product (technology/patent/prototype/service)	
<p>Re design the legacy paper batch record to simplify data acquisition, reducing data transcription, eliminating all manual calculation and implementing a modular procedure approach on designing decision trees. For all data captured introduce live system controls and ranges. All these activities aim to reduce the manual error and reduce process deviations while removing paper documents from the process.</p> <p>Within the scope falls the integration of the MES with internal ERP, environmental monitoring system and line equipment as well as the internal training program (Batch record designers, manufacturing, quality). Other game changer will be the utilization of the iPad for recording all on field activities.</p>	
Themes of innovation and R&D	
Target of this activity is to reach a full process digitalization eliminating the paper and integrating equipment in the full direction of integrated manufacturing.	
Type of collaborations requested	
N/A	
Contacts	
Augusto Giardini – augusto.giardini@catalent.com Salvatore Belli – salvatore.belli1@catalent.com	

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
NITE In the digital world, we are not able yet to transform everything in a digital information. A startup coming from Salerno University has created a software able to read the human writing giving a level of reliability of the interpretation of the results.	
Working group (researchers/enterprise)	
Salvatore Belli / Catalent; Luca Martuscelli / Catalent-Università di Tor Vergata; Santoro / Nite	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioPharma & Health and Digital Transition	
Description of the TT product (technology/patent/prototype/service)	
The opportunity of this project is to acquire and digitize handwritten information with an high level of accuracy giving the possibility to manage the information that need a human intervention to be understood. This application could be used in a GMP environment as well as in non GMP environment. Project target is to perform two POC: <ul style="list-style-type: none"> a) POC in non GMP Environment b) POC in GMP environment 	
Themes of innovation and R&D	
The innovation consist in the speedup of the process of data acquisition, and the opportunity to make an analysis of the acquired data when these datas are used for deterministic decisions.	
Type of collaborations requested	
At the moment Tor Vergata University is collaborating with a student that is working to the project.	
Contacts	
Augusto Giardini – augusto.giardini@catalent.com Salvatore Belli – salvatore.belli1@catalent.com	

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
TIRTOR TRACK Test the possibility to use in the industrial contest a brand-new software for material tracking and evaluation of the time outside of the cold room. In the pharmaceutical environment the control of temperature condition of a thermos-sensible material is connected to a series of calculation that must be done for each single vials. These calculations are complex due to the number of activities performed in the pharmaceutical production. The project aims to delivery automatic results thanks to a real time monitoring.	
Working group (researchers/enterprise)	
Salvatore Belli / Catalent; Matteo Monti / Catalent; Paolo Chiappini / Catalent; Fabiana Lucini / Catalent; Luca Fattori / Catalent; Emiliano Tuffi / Catalent / Esisoftware	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
BioPharma & Health and Digital Transition	
Description of the TT product (technology/patent/prototype/service)	
Digital tool that will allow to track for each pack / batch or pallet the end-to-end cold chain and logistics associated to the goods movements. Data will be presented in a report that will be CFR21 validated according to the data integrity principle.	 <p>Figure 1 – Ricevimento merci.</p>
Themes of innovation and R&D	
The application allows a complete mapping of single vials / pack during the entire production cycle. The system is able to certify in a simple manner the “Time Outside of Range” that is one of the critical parameters of biological products to be monitored during the production at ambient temperature.	
Type of collaborations requested	
N/A	
Contacts	
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Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

PHYGITAL TWIN TECHNOLOGIES FOR INNOVATIVE SURGICAL TRAINING & PLANNING. TL1: Advanced Medical Design and Engineering for Physical Anatomic Phantom. The project aims to develop Physical Phantoms for surgical simulation capable of replicating an anatomical segment both from a physical point of view, through Additive Manufacturing, and digitally, through the simulation of 3D models. TL1 aims to develop and prototype Physical Anatomical Phantoms for basic and advanced surgical training and planning, useful both for teaching surgical anatomy and for experimenting with surgical techniques and procedures. Starting from the development of protocols for the acquisition of diagnostic images via MRI and CT for the generation of parametric 3D models and exploiting Additive Manufacturing technologies, the Physical Anatomical models will be able to faithfully simulate the anatomical complexity of the affected portion both in morphological terms and physical characteristics of color, consistency and elasticity of the tissues, with the aim of reproducing exactly the same proprioceptive feedback that a live operation would provide to the surgeon.

Working group (researchers/enterprise)

The research group is made up of 12 researchers divided into the following key competences: MEDICAL ADVANCED DESIGN & BEHAVIORAL SCIENCE ANALYSIS (n°3); INNOVATIVE SURGERY & PRECISION MEDICINE (n°5); BIO-ENGINEERING & PRODUCT-SERVICE SYSTEMS (n°4).

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

The Project is consistent with the FP4 (Development, innovation, and certification of medical and non-medical devices for health) and Digital Transition and BioPharma & Health pillars.

Description of the TT product (technology/patent/prototype/service)

The expected result is a Physical Anatomical Phantom for basic and advanced surgical training and planning, useful both for teaching surgical anatomy and for experimenting with surgical techniques and procedures. This Phantom will be able to faithfully simulate the anatomical complexity of the affected portion both in morphological terms and in physical characteristics of color, consistency, and elasticity of the tissues, with the aim of reproducing the same proprioceptive feedback that a live operation would provide to the surgeon. Moreover, the Phantom is developed to be customized according to specific diseases. The design and component definition phase has been completed and a "beta prototype" has been realized for the first testing phase. Additive Manufacturing technologies were used for the direct and indirect production (silicone resin molds) of the Version 1 and 2 components of the prototype. At this moment the submission for a Patent is under the revision of the Sapienza Commission for its approval.



Figure 1 - V.1 Prototype of the Physical Anatomic Phantom - Chassis and internal structures.

Themes of innovation and R&D

The project develops innovation in Digital Health, exploiting in a multidisciplinary manner both the innovations linked to 3D modeling from radiological images and digital manufacturing (LT1) and those for robotics, deep learning, digital twins (LT2) for development of innovative systems for surgical training. Furthermore, the project aligns with the 'Health & Bio-pharma' pillar through: i) the development and technological transfer for the industrialization of new medical and non-medical devices, falling within the production line of innovative instruments for precision surgery; ii) offering advanced training programs (third level), life-long learning and offering specific services to healthcare facilities in the surgical field.

Type of collaborations requested

We are interested to develop collaborations with: Bio-pharma Companies interested in the manufacturing production of the Phantom; Hospital Surgical Divisions interested to test the Phantom; academic Research Units with expertise in the field of Bio-manufacturing.

Contacts

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Angela Giambattista, angela.giambattista@uniroma1.it Sapienza Università di Roma

Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

PHYGITAL TWIN TECHNOLOGIES FOR INNOVATIVE SURGICAL TRAINING & PLANNING. TL2: Augmented Reality, System engineering and Deep Learning for Digital Anatomical Phantom. The project aims to develop Phygital Phantoms for surgical simulation capable of replicating an anatomical segment both from a physical point of view, through Additive Manufacturing, and digitally, through the simulation of 3D models. TL2 aims (1) to "augment" the experience of the surgeon's interaction with the Physical Phantom using the information obtained from the digital twin during the performance of the procedure; (2) to build virtual environments for training and simulation of the surgical procedure that include the Digital Phantom, the virtual surgical instruments, possibly supported by robotic systems, 3D viewers, and haptic interfaces to command the virtual instruments and receive physical feedback from the virtual interaction. The development of this environment will also eventually allow remote interaction with the Physical Phantom, through the use of a robotic surgery system (such as the da Vinci surgical system, in the case of minimally invasive surgeries).

Working group (researchers/enterprise)

The research group is made up of 9 researchers divided into the following key competences: ROBOTIC SYSTEMS MODELLING AND CONTROL (n°3); AI AND MACHINE LEARNING (n°3); 3D MODELLING (n°3).

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

The Project is consistent with the FP4 (Development, innovation, and certification of medical and non-medical devices for health) and the two Smart Specialization Strategic areas of the Rome Technopole: Digital Transition and BioPharma & Health.

Description of the TT product

(technology/patent/prototype/service)

The prototype that the project hopes to develop concerns a Digital Twin (namely, Digital Phantom) of the Physical Anatomical Phantom for basic and advanced surgical training and planning, useful both for teaching surgical anatomy and for experimenting with surgical techniques and procedures. The Digital Phantom will be developed to reproduce high-fidelity interaction (e.g., by simulating the deformation of the tissues, the interaction forces and the surface temperature), also by the means of haptic interfaces. Moreover, the Digital Phantom should also track surgical tools operating on the Physical Phantom, in order to reproduce them on the Digital Phantom. At the moment, some of the components have been designed and they are currently in the implementation phase. In particular, a novel methodology for real-time simulation of deformable objects has been proposed and is currently under validation.

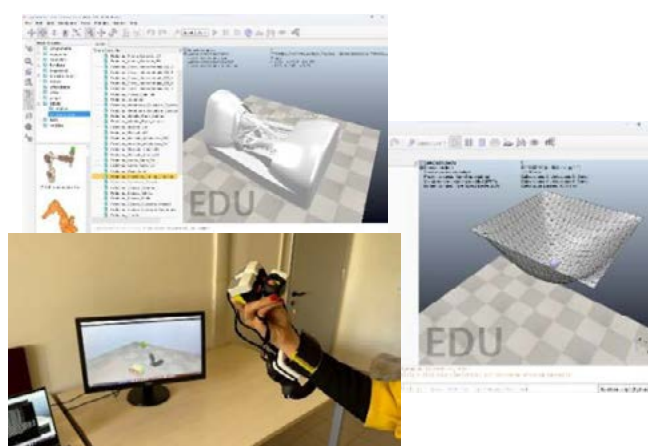


Figure 1 – Components of the prototype of the Digital Phantom. 3D model, simulation of deformable surfaces and haptic feedback

Themes of innovation and R&D

Within the Digital Transition pillar, the project develops innovation in Digital Health, exploiting in a multi-disciplinary manner both the innovations linked to 3D modeling from radiological images and digital manufacturing (TL1) and those for robotics, deep learning, digital twins (TL2) for development of innovative systems for surgical training. Furthermore, the project aligns with the 'Health & Bio-pharma' pillar through: i) the development and technological transfer for the industrialization of new medical and non-medical devices, falling within the production line of innovative instruments for precision surgery; ii) offering advanced training programs (third level), life-long learning and offering specific services to healthcare facilities in the surgical field.

Type of collaborations requested

We are interested to develop collaborations with: Bio-pharma Companies interested in the manufacturing production of the Phygital Phantom; Hospital Surgical Divisions interested to test the Phygital Phantom; academic Research Units with expertise in the field of high-fidelity digital twins.

Contacts

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 Emanuele De Santis, emanuele.desantis@uniroma1.it, Sapienza University of Rome

Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

Voluntary plastic credits system based on blockchain technology.

In the context of the circular economy, we want to provide a tool capable of triggering a virtuous process between the recycling supply chain and industry with strong exploitation of new plastic to compensate for plastic footprint, developing a certification system based on blockchain technologies.

Working group (researchers/enterprise)

D'Agostini Emanuele, Fantasia Nicola, Magni Riccardo, Tassi Carlo, Vitelaru Elena (Almaviva). Appolloni Andrea, Cheng Wenjuan, D'Amato Alessio (Tor Vergata). Angeletti Fabio, Italiano Giuseppe F., Martino Alessio (LUISS).

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

Digital Transition – valorization and application of blockchain technologies to certificate plastic reduction in the waste process ecosystem through rewards model.

Description of the TT product

(technology/patent/prototype/service)

The ongoing climate crisis and the increase in global impacts are the main factors that have led to a high interest in removing plastic out of the environment. Plastic credits are a type of (voluntary or regulatory) financial incentive designed to encourage businesses to reduce their use of single-use plastic products and packaging and to encourage recycling. By using blockchain, businesses can easily provide verifiable proof of their actions, such as reducing the amount of single-use plastic they use. In addition, the use of blockchain can help to improve the efficiency by automating the credit award process. The Plastic credit platform will use both fungible and non-fungible tokens and will allow companies to submit a credit request by providing the required documentation and once the audit is done, they will be assigned plastic credits in the form of NFT tokens. By using tokenization, the plastic credits could be better traced, and the immutability of data ensured. Therefore, using blockchain technology, we ensure that all trades are recorded and verified in a decentralized manner so that users are able to easily verify the authenticity of any operation.



Figure 1 – example: plastic reduction rewards model

Themes of innovation and R&D

Plastic credits market system design we aim at investigating the economic and environmental properties of a (voluntary policy) tool capable of triggering waste reduction or recycling efforts within industrial sectors. *Distributed ledger technology (DLT)* allows greater traceability, reliability and transparency for the parties involved, with particular interest in the process of exchanging any type of digital data on a peer-to-peer (P2P) basis with reduction or absence of intermediaries.

IPFS (InterPlanetary File System) is a decentralized, peer-to-peer file sharing system that allows users to share and access files over the internet without the need for a central server or authority. It will be used to store and share information related to the plastic tax credits NFTs, that could be accessed by anyone enabling transparency and accountability in the trading of plastic tax credits.

Selective disclosures refer to the practice of selectively disclosing certain pieces of information, while keeping other information private, allowing the holder of the credits to prove the authenticity of the credits to a third party without revealing sensitive details about the credits themselves.

Type of collaborations requested

Collaboration with certification authorities and companies operating in the plastic sector and/or in the plastic recycling chain that intend to participate in the voluntary plastic credit market.

Contacts

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Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

The idea of creating a proof of concept for the rainwater harvesting model through the creation of a digital twin is based on the need to address challenges related to water resource management, urbanization and environmental sustainability. The digital twin offers the ability to virtually design, monitor and optimize rainwater harvesting infrastructure, enabling the identification of hot spots, prediction of system behavior and optimization of water efficiency. The project proposes an approach applied to a single building within a larger complex (Rome Technopole) under construction but can be extended to other civil and commercial buildings. The integration of extended reality technologies offers the possibility of carrying out analyzes and the system based on realistic and not just hypothetical scenarios.

Working group (researchers/enterprise)

Armando Mennini (Almaviva, Technical coordination), Luca Fortunato (Almaviva, Developer), Marco Merlin (Almaviva, Developer), Marco Race (Prof. UniCassino - Environmental Health Engineer), Francesco Bianco (Dott. Engineer UniCassino, RTD of Sanitary Engineering), Nicola Fantasia (Almaviva, Project Manager).

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

The activity of building a rainwater model can be framed in an activity that falls within the scope of studies for the Digital Transition: the objective is to allow the analysis of data by digital technologies, innovating traditional processes, with the aim of making them more efficient, in quantity and quality, making the evaluation simpler and more accessible through Extended Reality applications.

Description of the TT product

(technology/patent/prototype/service)

The first version of the prototype of the Mixed Reality application has been created. In the application, the user wearing the helmet has the perception of reality but interacts with the 3D objects: the user, interacting freehand, displays a custom menu, anchored to his wrist, with which he can add the building taken as a reference to replace one of the buildings of the Technopole complex, and deciding to anchor it in space. The rainwater circuit, including collection tanks, was anchored to the building, defined to support the use of water as a replacement for the connection to traditional supply systems such as aquifers. Once the digital twin of the building has been loaded, the user can resize and move the model to focus the study on the analysis details: resize the tanks freehand or via numeric keypad to change their volume; make the building transparent to observe the circuit and the drainage pipes; select the 3D components of the sensors to view descriptive menus, including real images to understand their introduction and use.



Themes of innovation and R&D

- Development of an immersive single-player experience in Mixed Reality
- Integration of external systems and tools for the conversion of .ifc BIM files into Unity models
- Experimenting with the potential of CMS tools such as Strapi to manage 3D assets and content to display.
- Study of rainwater collection systems and its main components, such as tanks and sensors
- Study of the best architectures to structure a Mixed Reality solution for Meta Oculus Quest PRO.
- Analysis of the UI solutions most compliant with the MR experience, using hand tracking.

Type of collaborations requested

Support for the definition of the water collection circuit model; definition of the necessary volumes and sizing of the system; collection and trend of rainfall data for the building construction area.

Contacts

Armando Mennini – a.mennini@almaviva.it, 3488903519; Luca Fortunato – l.fortunato@almaviva.it, 3457924076; Marco Merlin – m.merlin@almaviva.it, 3440351503; Nicola Fantasia – n.fantasia@almaviva.it, 3457942296

Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

Automatic waste recognition through artificial intelligence algorithms.

The system utilizes Generative AI and Machine learning techniques, including Foundation Models and Convolutional Neural Networks, to distinguish recyclable items from non-recyclable ones, wet items from dry ones, aiding in removing impurities and prevent scams within the recycling chain.

Working group (researchers/enterprise)

Bracalello Gianmarco; Mattera Andrea; Mulattieri Manuel; Previtali Fabio; Ros Alessandro; Saqib Najmus; Nicola Fantasia.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

Digital Transition - Valorization of research results for industrialization.

Description of the TT product

(technology/patent/prototype/service)

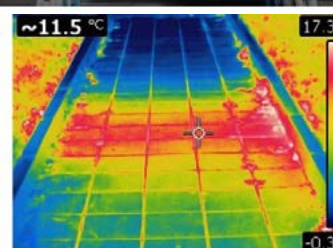
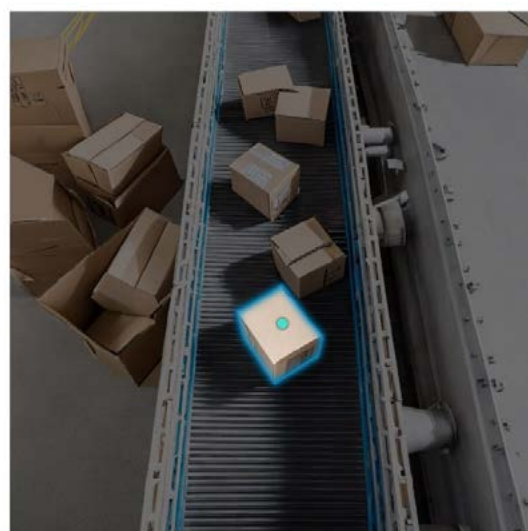
The project aims to implement a multi-stage process in which garbage is detected, analyzed and eventually displaced by using robotic arms.

The first step consists into detecting and classifying waste, from plastic items to paper boxes. State-of-the-art Foundation Models, belonging to the Generative AI field, are used to generate images of specific kind of garbage, that are then labeled and used to train object recognition models, allowing on-premises and real-time processing.

Garbage is then further analyzed by using thermal images, which provide an indication of the eventual presence of moisture, which is linked to the presence of water, sometimes used to artificially increase the weight of garbage.

The resulting output is passed to the IoT module, which is in charge of deciding whether to activate a robotic arm to differentiate different kind of waste.

This process is non-intrusive and allows enhancing recycling efficiency and reducing environmental impact.



Themes of innovation and R&D

Usage of Generative AI to train traditional AI models: Generative AI allows to gather the data needed to train traditional Supervised machine learning models, which are much faster and allow real-time image processing.

Usage of Generative AI to label datasets for traditional AI models: Generative AI allows to generate labels for traditional Supervised machine learning models in an automatic and semi-automatic way, saving 90% of time usually dedicated to the labeling process.

Plastic sorting quality: the system can detect the recyclable items from non-recyclable ones enhancing the quality of sorting chain outcome (high purity).


Environmental impact reduction: implementing AI-driven plastic sorting systems minimizes waste contamination, enhancing recycling efficiency and reducing environmental impact significantly.

Type of collaborations requested

We'd like to collaborate with waste processing facilities in order to test the effectiveness of our solution.

Contacts

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Nicola Fantasia - n.fantasia@almaviva.it

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
New materials, architectures and processes for transmission, modulation and sensing in the GHz and THz frequency range. Regarding Spoke 2, the activity is aimed at valorizing the results relating to the actions carried out in SPOKE 1 and focused on: (a) development of devices in the THz range of frequencies for next generation communication (beam steering arrayed devices, static and beam-scanning antenna); (b) development of a scalable process for the fabrication of IR sensors based on 2D materials.	
Working group (researchers/enterprise)	
Dr. Massimiliano Benetti, CNR – Istituto per la Microelettronica e i Microsistemi Structured Researcher. Dr. Ivano Lucarini, CNR – Istituto per la Microelettronica e i Microsistemi Recruited Technologist. Dott.sa Gaetana Petrone – PhD in ENGINEERING AND APPLIED SCIENCE FOR ENERGY AND INDUSTRY. Dr.ssa Tiziana Ritacco, CNR – Istituto per la Microelettronica e i Microsistemi Recruited Researcher.	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
Digital Transition - FP5	
Description of the TT product (technology/patent/prototype/service)	
<p>The activity is focused on the design and fabrication of a novel co-linear setup for Rx-Tx characterization combining broadband THz-TDS and narrow band (<10 MHz) equipment (TRL 5/6).</p> <p>This shall comprise:</p> <p>(a) Novel co-linear setup for Rx-Tx characterization combining broadband THz-TDS and narrow band (< 10 MHz) THz -FDS (prototype).</p> <p>(b) PC-controlled 2-axis motorization of the collinear THz-TDS & FD-TDS for near field and far field radiation patterns (prototype).</p> <p>In the contest of the PhD in ENGINEERING AND APPLIED SCIENCE FOR ENERGY AND INDUSTRY 38° CYCLE, the object is the fabrication of a proof-of-concept detector in long-wavelength infrared region based on two-dimensional materials from liquid processing (TRL4/5).</p>	
Themes of innovation and R&D	
<p>The main objective is the development of adequate experimental set-up for testing devices operating in the range of THz frequency. The functional characterization of these devices in terms of their radiation diagram is a fundamental need for detection and ranging as well and for wireless communication. This relates to basic and applied research as well as to technology transfer to industrial partners that still lack the capability to perform such characterization.</p> <p>As regards the activity of the PhD course, the use of two-dimensional materials, and in particularly a scalable manufacturing technique, will reduce production costs and integration problems of silicon-based photodetectors, offering new opportunities for the application of IR imaging.</p>	
Type of collaborations requested	
Any companies or research groups interested in the functional characterization and testing of devices in terms of their radiation diagram in the range of THz.	
Contacts	
massimiliano.benetti@cnr.it	

Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

Spintronic materials and wide-bandgap semiconductors

Design, fabrication and adaptation of diamond detectors for neutrons & ionizing radiation for space observation and of flexible spintronic devices as memories and sensors for the space sector.

Working group (researchers/enterprise)

Research groups nM2 (<https://www.ism.cnr.it/it/laboratorio-materiali-magnetici-nanostrutturati.html>) and DiaTHEMA (<https://www.ism.cnr.it/it/diathema-lab.html>) Labs of the Institute for Structure of Matter of the National Research Council.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

Digital Transition – FP6 (WG5 Advanced materials and manufacturing)

Description of the TT product

(technology/patent/prototype/service)

Wide bandgap semiconductor devices and flexible spintronic devices have the potential to revolutionise the aerospace industry by enabling the development of advanced electronic systems with unprecedented flexibility, durability, and energy efficiency. Wide bandgap semiconductors can manage high power applications and sensing for instrumentations, whereas flexible spintronic sensors could be used to monitor the structural health of aircraft or spacecraft, providing real-time information on stress, deformation, and other critical parameters.

Two technologies are being adapted to the specific space application:

- Diamond detectors for neutrons & ionizing radiation for space observation
- Flexible spintronic devices as memories and sensors.

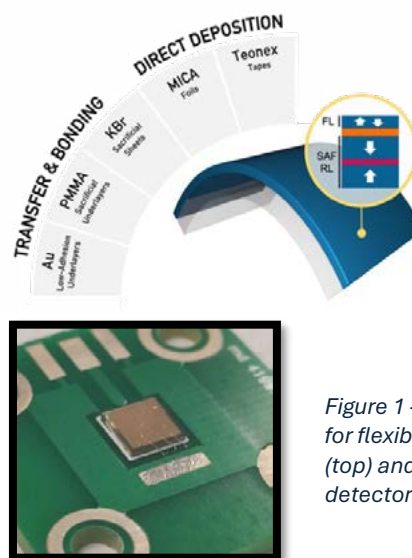


Figure 1 – Fabrication strategy for flexible spintronic materials (top) and a typical diamond detector prototype (left).

Themes of innovation and R&D

The diamond detectors are extremely robust and compact solutions for monitoring extra-terrestrial particles such as neutrons, charged particles, UV and x-ray, combined with a insensitivity to magnetic fields and high-energy gamma rays. The technology developed for terrestrial applications is being adapted to the severe mechanical, thermal, radiation conditions of space observation.

The activity of spintronic materials is evidencing the advantages and disadvantages of various approaches including i) the direct deposition on two different flexible substrates, i.e., Teonex® polymer tapes and freshly cleaved inorganic MICA foils, and ii) transfer-and-bonding approaches exploiting wet lift-off methods based on sacrificial substrates/layers soluble in water and polar solvents as well as dry lift-off process exploiting the low adhesion of Au metal underlayers on SiOx/Si(100) substrates. The results suggesting Teonex® tapes are the best choice to obtain high-quality spintronic thin films on large area, provided that relatively low processing and operating temperatures (< 525 K) are required. On the other hand, the use of a low adhesion Au underlayer has proven to be very effective for the fabrication of complex spintronic thin film systems on large area flexible substrates, with the potential to be also exploited for systems requiring high processing temperatures.

Type of collaborations requested

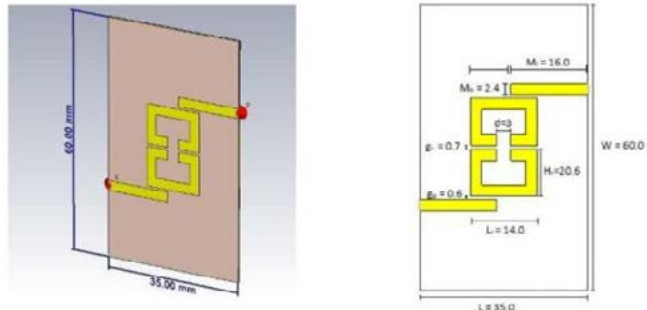
Industrial collaboration to accelerate the TRL of technologies and/or partners supporting the EU project planning.

Contacts

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CNR-ISM Unit Montelibretti – Via Salaria km 29.300 – 00015 Monterotondo Scalo (RM)

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Artificial intelligence, virtual reality and digital twin for advanced engineering and aerospace: Tissue biomechanics and advanced materials. Objectives: Development of novel testing devices for the characterization of the mechanical and/or dielectric properties of cells, tissues or artificial mock-ups. Test pathological cells and/or tissues.	
Working group (researchers/enterprise)	
Emanuele Rizzuto, Sapienza University Collaboration with the University of Tor Vergata.	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
Digital Transition. FP6	
Description of the TT product (technology/patent/prototype/service)	
A novel microwave-based sensor for the measurement of skeletal muscle's dielectric properties has been designed. The sensor was designed to test murine skeletal muscle from different pathological model in which alterations in the skeletal muscle composition are already known, such as in the mdx, a mouse model of Duchenne Muscular Dystrophy.	 <p>Figure 1 - Design of the microwave- based sensor for muscle testing</p>
Themes of innovation and R&D	
The measurement of cells and tissues dielectric properties could lead to the identification of pathological conditions.	
Type of collaborations requested	
Support to fill the gap between laboratory testing and widespread use.	
Contacts	
Emanuele.rizzuto@uniroma1.it	

Section 1: PRODUCTS IN THE ECOSYSTEM**Name and acronym of the TT project with short presentation****Mode division multiplexing of QKD and classical channels on multimode optical fiber (MULTIQKD).**

The prototype will demonstrate the possibility to multiplex both quantum channels and classical channels into the same multimode fiber, by using modal multiplexers and demultiplexers based on the multi-plane light conversion (MPLC) technology.

Working group (researchers/enterprise)

Stefan Wabnitz, Mario Zitelli, Gonzalo Carvacho, Danilo Zia, Fabio Sciarrino, Francesco Basso Basset

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

Digital Transition (FP 5)

Description of the TT product**(technology/patent/prototype/service)**

In classical communication scenarios, space division multiplexing systems are widely used to transmit information through fibers over long distances. In our prototype, multiplexing by the MPLC technology is exploited to couple multiple single mode fiber inputs to a single multimode fiber, allowing for multiple signal transmission in a single fiber, before demultiplexing at the receiver into different single mode fiber outputs. Our objective is to develop prototype apparatus (Figure 1) for secure communications based on transmitting both quantum or QKD and classical signals in the telecom window around 1550 nm, by combining both mode division multiplexing and wavelength division multiplexing, in order to ensure a sufficiently crosstalk among classical and quantum channels.

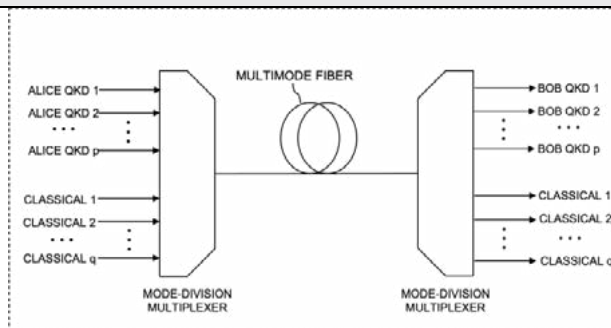


Figure 1 – Mode division multiplexing of classical and QKD channels on multimode optical fiber

Themes of innovation and R&D

Most of the research in secure quantum communications has been focused on deployment of keys over single mode fibers. However, local area networks and cloud data centers employ multimode fibers instead. Hence there is a considerable interest in fully exploiting the capacity of multimode fibers, by spatially multiplexing both classical and quantum signals in different modes of the same fiber. Here we will undertake a new approach for making this one step forward, by exploiting spatial light multiplexers and demultiplexers based on the MPLC technology, which have a low insertion loss and crosstalk among non-degenerate modes (critical properties for QKD applications), and are scalable to large mode numbers (up to >50 modes), leading to an effective single-mode path for the sub-single-photon quantum pulses to travel through. Our project will pave the way towards a more capillary distribution and deployment of QKD systems in already installed LANs and cloud data center networks, for a cost-effective transition towards a new generation of quantum-safe networks.

Type of collaborations requested

External partners are sought for a field trial of our QKD MDM system. The idea will be to perform QKD over an installed LAN. We envision using as a testbed for a field trial the facility of the Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT), i.e., the National Laboratory of Advanced Optical Fibers for Photonics, based on the INCIPICT project multimode fiber infrastructure in the city of L'Aquila.

Contacts

Stefan Wabnitz, stefan.wabnitz@uniroma1.it, +393927932437

Section 1: PRODUCTS IN THE ECOSYSTEM**Name and acronym of the TT project with short presentation****Automated design of industrial plants through AI and Digital Twins.**

The project aims to develop a software tool to support the design of industrial plants. A Digital Twin of the plant is used to evaluate a given design choice, whereas AI-based methods are used to efficiently explore millions of design choices in a reasonable amount of time. This synergic use of Digital Twin and AI technologies allows effective optimization of the plant design.

Working group (researchers/enterprise)

Giovanni Morabito¹, Benigno Ansanelli², Toni Mancini², Enrico Tronci²

¹Thales Alenia Space

²Computer Science Department, Sapienza University of Rome

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

Reference pillar: Digital Transition

Flagship 6: Artificial intelligence, virtual reality and digital twins for advanced engineering and aerospace

Description of the TT product (technology/patent/prototype/service)

The project aims to develop a software tool to support the design of industrial plants.

A Digital Twin of the plant is used to evaluate a given plant design. In our implementation, we use the Siemens Tecnomatix Plant Simulator to model the plant as well as Key Performance Indicators (KPIs) evaluating the plant design.

Black-box Optimization is the main AI technique used to efficiently explore millions of possible plant design choices in order to select the one that optimizes the given plant KPIs.

**Themes of innovation and R&D**

Automated design of industrial plants. Digital twins of industrial plants. Simulation-based optimization of industrial plants. AI-driven optimization of industrial plants. Black-box-optimization.

Type of collaborations requested

N/A

Contacts


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Toni Mancini: toni.mancini@uniroma1.it

Benigno Ansanelli: benigno.ansanelli@uniroma1.it

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Multifunctional graphene-based smart coatings for EMC and Sensor Applications.	
Working group (researchers/enterprise)	
Prof. Maria Sabrina Sarto; Prof. Alessio Tamburrano; Prof. Alessandro Giuseppe D'Aloia; Researcher Fabrizio Marra; Researcher Hossein Cheraghi Bidsorkhi; Researcher Marco Fortunato	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
The proposed systems fall within Digital Transition pillar in particular in the FP 6 "Artificial intelligence, virtual reality and digital twin for advanced engineering and aerospace "	
Description of the TT product (technology/patent/prototype/service)	
<p>The graphene-based multifunctional smart coating prototype was developed from an international patent owned by La Sapienza University: "Water-based piezoresistive conductive polymeric paint containing graphene for electromagnetic and sensor applications" (2016) PCT/IB2016/0699.</p> <p>The proposed technology can be applied as protective coatings of composite laminates for aviation use; such a system has been developed to provide combined sensing and electromagnetic shielding properties, to be used for distributed structural monitoring and reduction of electromagnetic interference related to natural phenomena, such as direct lightning strikes, or man-made phenomena, such as aircraft interaction with antenna systems.</p> <p>Such coatings are produced by spray deposition of a polymer matrix aviation paint containing graphene-based nanostructures.</p>	 <p>Figure 1 – Structural monitoring system assembled with EMI interference solution</p>
Themes of innovation and R&D	
<p>The project fully responds to the S3 "smart specialization" strategy of the Lazio Region with respect to the AdS "Aerospace", as it proposes an innovative and low-cost sensing technology, specifically designed for structural monitoring, and offers simultaneous protection against electromagnetic interference for composite aeronautical structures.</p> <p>The proposed approach follows the current direction of specialization of the regional economy, aiming to integrate research excellence with the needs of technological and industrial innovation. This strategy moves beyond the logic of "technology push", adopting instead a "problem solving" perspective; that is, effective support from the world of research to the entrepreneurial world of Lazio, which aims to consolidate and enhance its competitiveness both nationally and internationally arena, by shifting toward production with higher added value.</p> <p>The aerospace sector in the Lazio Region is characterized by a high concentration of companies and boasts an overall performance in continuous growth. The co-presence on the regional territory of aerospace companies of international excellence and the recent localization in Rome of the registered office of some of the major industrial stakeholders in the aeronautical field at the international level (LEONARDO S.p.A, AIRBUS) represent a clear confirmation of the sector's growth trend and the need to support this growth with knowledge-intensive initiatives and a strong impulse of research and technological innovation in the sector. Moreover, the Lazio region is home to paint companies (such as Vemarl, SafeNanotech, for example), which may be interested in possible business collaborations.</p>	
Type of collaborations requested	
Support for industrial scale up from TRL 4/5 to TRL 7 through collaboration with aviation company and paint manufacturer based in the Lazio region.	
Contacts	
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Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Alphanumerix Srl – A UNITUS spin-off for digital transition of SME	
Working group (researchers/enterprise)	
University of Tuscia: Prof. Nico Sanna, Prof. Ines Delfino, Dr. Costantino Zazza LV Srl Esalogic Srl	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
Digital Transition	
Description of the TT product (technology/patent/prototype/service)	
<p>The spin off ALPHANUMERIX S.r.l. intends to offer different types of products and services on the market to companies that will be increasingly involved in the digital transition in a continuously expanding and evolving market and in eco-sustainable development. Among other, here are a summary of initial solutions offered to the market for digital transition of SME:</p> <ul style="list-style-type: none"> • Frame-IoT an Internet of Things (IOT) Framework (Highly reliable solutions based on Kubernetes); • ETL Framework with particular reference to the retrieval of data from commercial databases of scientific literature; • Consulting for HPC and elastic computing solutions; • Innovative modeling solutions for Structural Health Monitoring; • Design and development of sensing methods using optical techniques. 	 <p><i>Figure 1 – DSSM logo. A innovative modeling solution tof monitoring vibrations in civil building.</i></p>
Themes of innovation and R&D	
IoT – High Performance Computing – Big Data and Analytics	
Type of collaborations requested	
<p>Companies interested in exploiting big data & analytics workflows by using HPC technologies in areas of civil and electronic engineering, information technology.</p> <p>Academics involved in pre-prototype studies to develop a time to market plan and industrial prototypes in areas of civil and electronic engineering, information technology, and application of IR/Raman spectroscopy devices.</p>	
Contacts	
Nico Sanna – n.sanna@unitus.it, alphanumerix@pec.it	

Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

Eco-Friendly Electronic Labels for Plastic Waste (E-LEP-WA)

The *Eco-Friendly Electronic Labels for Plastic Waste (E-LEP-WA)* project aims to develop intelligent labels integrated onto food packaging, utilizing cutting-edge technologies like Laser Induced Graphene (LIG) and microfluidics together with the more assessed RFID and NFC devices for advanced sensing. These labels facilitate real-time monitoring of food quality and package integrity, contributing to the reduction of waste.

Working group (researchers/enterprise)

Research team: Prof. Cecilia Occhiuzzi, Prof. Gaetano Marrocco, Dr. Giulio Maria Bianco, Eng. Alessio Mostaccio, Eng. Francesco Lestini. Industrial collaborations: Radio6sense srl, ILIP spa (from ILPA group).

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

Reference Pillar: Digital Transition. FP topic: FP3, Digital transition in the decarbonization process and in waste recycling processes.

Description of the TT product

(technology/patent/prototype/service)

The Technology Transfer product developed within the E-LEP-WA project is an ecosystem of electronic labels for plastic waste management and food packaging applications. These labels are capable of real-time monitoring and data transmission to minimize food and plastic waste. The main technologies of the ecosystem are:

1. **Laser Induced Graphene (LIG):** LIG allows for the creation of RFID labels directly on food packaging materials without adding any metal to food packaging.
2. **Microfluidic Sensors:** These electronic labels are equipped with microfluidic channels that enable comprehensive monitoring of food quality and package integrity.
3. **Lab-on-package:** chemical sensing performed by passive labels can allow for fast, accurate and on-site analyses of food pieces.
4. **Artificial Intelligence:** the data gathered by the sensor above can be used to feed Machine Learning tool to predict shelf life and ripening of food.

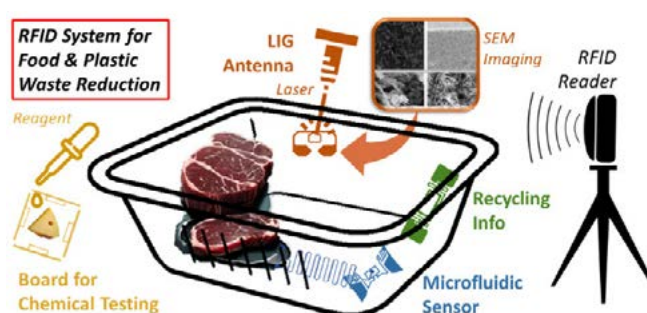


Figure 1 – Concept of the ecosystem of radiofrequency sensors for reducing food and plastic waste.

Themes of innovation and R&D

The themes of innovation of the project can be summarized as follows.

1. **Digitalization and IoT (Internet of Things):** The project leverages digital technologies and IoT principles to enable intelligent packaging solutions by embedding electronic labels with sensors.
2. **Sustainable Packaging:** E-LEP-WA emphasizes the development of eco-friendly packaging solutions aimed at reducing plastic waste and promoting environmental sustainability.
3. **Waste Reduction and Circular Economy:** By providing real-time monitoring and data-driven insights, E-LEP-WA contributes to the reduction of food and plastic waste in the supply chain while increasing food quality.

Type of collaborations requested

The E-LEP-WA project seeks collaborations to maximize its industrial impact. Industrial partnerships that may benefit from the research achievements are: *Packaging companies*, especially in the sectors of conventional plastics and eco materials; *Food producers* (meat, fish, vegetables and fruits), to benefit from the physical-chemical analyses on food degradation; *Food retailers*, to maximize food quality and safety while reducing waste. *Large-scale food distributors*, to verify the effectiveness and increase the efficiency of their food preservation.

Contacts

Prof. Cecilia Occhiuzzi: cecilia.occhiuzzi@uniroma2.it.

Prof. Gaetano Marrocco: gaetano.marrocco@uniroma2.it

Dr. Sara Amendola: amendola@radio6sense.it.

Website: http://www.pervasive.ing.uniroma2.it/RomeTechnopole_Food.htm

Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

Design and testing of a lab-scale smart hydrogen microgrid connected to a domestic end-user.

Working group (researchers/enterprise)

Borello Domenico, Rispoli Franco, Palone Orlando, Cava Carmine, Cosentini Carlotta

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

Digital Transition, Energy Transition – FP1

Description of the TT product

(technology/patent/prototype/service)

Technology

The lab-scale microgrid includes: a polymer electrolyte membrane (PEM) water electrolyser for hydrogen production, metal hydride tanks for hydrogen storage, a stack of PEM fuel cells for hydrogen conversion to electricity, electrochemical storage (batteries), and an electronic load to emulate different operating conditions of the final user. The auxiliary systems required for the proper operation of the system are represented by: mass flow controllers, a chiller, DC/DC converters, fans, pressure gauges and pressure reducers, gas detection sensors, etc. The whole system is managed under LabVIEW and it is fully scalable from lab-scale (hundreds of Watt) to real-scale (MW) systems. The renewable electricity production supplies the electrolyser and hydrogen storage as well as the batteries. Fuel cell systems and batteries feed the required load (houses, power request, mobility devices). A measuring and monitoring station is developed aiming at collecting, classifying the most important parameters of the devices such as the electrolyzer, the mass flow controller, the batteries, fuel cells and the electronic load (by simulating a load curve). An 'optimal' algorithm is developed to support the electricity share delivered to electrolyzers or batteries (in charge) as well as the power required to fuel cells or batteries when end users require the electrical power.

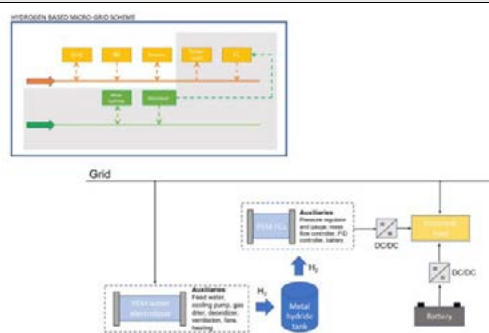


Figure 1 – Schematic of the hydrogen-based microgrid



Figure 2 - Control system - LabVIEW code

Themes of innovation and R&D


The objective of this research activity is to implement, monitor, and characterize a hydrogen-based micro-grid connected to a typical domestic end-user. The integrated system is composed of innovative equipments with limited technological maturity such as: a PEM water electrolyser, which provides a faster response to fluctuating power supply compared to the more widespread alkaline electrolysis technology but is still affected by high costs; a metal hydrides storage system, which significantly increases the system total weight (more indicated for stationary applications), but involves milder temperature and pressure storage conditions (10 bar) compared to the high pressure cylinders or hydrogen liquefaction; a stack of PEM fuel cells; a lead acid battery bank. A programmable electronic load is used to set a power demand which simulates the end-user. A remote monitoring and measurement station has been realized in LabVIEW environment to constantly monitor the main operating parameters and analyze the performance of each device. Even though the scales are small compared to real applications, this circumstance will not invalidate the significance of the configuration provided that all the devices will be scaled accordingly and that the difference in efficiency can be properly estimated. The developed testbench is expected to facilitate the testing and validation of alternative technologies, while identifying the bottlenecks and drawbacks of such smart system.

Type of collaborations requested

Optimisation of Labview scripts. Applications to final uses. Supercaps to be included in the optimal scheme.

Contacts

Domenico Borello, domenico.borello@uniroma1.it, Office phone: 0644585263 int. 25263

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
SMAR-T: Sustainable MAterials and pRocesses for eco-Tunnels.	
Working group (researchers/enterprise)	
Prof. Renato Baciocchi Researcher Simone Spagnuolo	
Reference pillar (Digital Transition / Energy Transition / BioPharma &Health) and FP topic	
Digital Transition/Energy Transition FP2	
Description of the TT product (technology/patent/prototype/service)	
<p>The project aligns with industrialization and sustainability goals, optimizing the production process of the structural tunnel segmental lining. The proposed technology addresses logistical challenges related to storage space, transportation, and on-site congestion, particularly in urban areas. The ability to achieve high early strengths without energy-intensive steam curing systems enhances production rates and allows for rapid clearance of storage areas.</p> <p>This approach could revolutionise the concept of prefabrication, shifting it from manufacturing facilities to construction-sites. This paradigm shift, effectively serving TBMs and their advancement speed, involves casting and producing segments on-demand, minimizing transportation issues.</p>	
Themes of innovation and R&D	
<p>The project includes research and development activities for the sustainability of precast concrete tunnel segments, reinforced with steel-FRC or hybrid solution consisted to GFRP-FRC reinforcement. The project aims to achieve net-zero emission of precasting supply chain and to minimize its socio-economic impacts, by working to short and long-terms aspects. The short-time impacts refer to energy-intensive production and construction stages for which high CO2 emission process and materials are commonly used. The long-time impacts are related to the maintenance and repair actions need to guarantee the performances of the tunnels during their service life. In the project, focus will be placed on the development of innovative eco-friendly concrete with fast setting and hardening process, without the use of energy-intensive steam curing fossil fuel-based, typically adopted in the prefabrication to speed-up the production. Modelling activities will concern life-cycle assessment and structural analyses aimed to define an “eco-structural” design in which the performances are combined with a minimization of environmental and socio-economic impacts.</p> <p>The expected results are the improvement of performances, sustainability, and durability by reducing carbon emissions and maintenance of the tunnels. In this way, the CO2 emission of the production stage will be balanced during useful life, leading to a net-zero emission.</p>	
Type of collaborations requested	
<ul style="list-style-type: none"> - Cement/concrete manufacturers/Companies - Composite materials manufacturers/Companies - Steel wire transformation and coating technologies manufactures/Companies - Structural health monitoring Companies 	
Contacts	
Simone Spagnuolo: spagnuolo@ing.uniroma2.it	

Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

Hydrogen Energy system with solid-state storage (HESS).

Realization of a hydrogen-based energy system for the “Lotto B” building of the Rome Technopole. Green hydrogen will be produced through an electrolyzer, powered by the photovoltaic arrays on the top of the building. The produced H₂ will be stored at low pressure and ambient temperature through a hydride-based, solid-state accumulation system, with remarkable characteristics in terms of safety and reliability. The stored hydrogen will be exploited in a PEM fuel cell, to deliver the electrical power necessary for the “Lotto B” electrical utilities.

Working group (researchers/enterprise)

Prof. Giacomo Falcucci (coordinator, Tor Vergata); Prof. Fabio Crescimbeni (Roma Tre); Prof. Davide Astiaso Garcia (Sapienza), Prof. Benedetto Nastasi (Tor Vergata); Dott. Fabio Beretta (Sapienza); Prof. Fabrizio Tucci (Rome Technopole Referent).

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

Digital Transition and Energy Transition

Description of the TT product

(technology/patent/prototype/service)

Green H₂ will be produced and stored at low pressure and ambient temperature through a hydride-based, solid-state accumulation system, with remarkable characteristics in terms of safety and reliability.

The stored hydrogen will be exploited in a PEM fuel cell, to deliver the electrical power necessary for the “Lotto B” electrical utilities. The system will be “a first” both for the type of implementation and for the size required by the Lotto B specifications.

The prototype will be realized through the implementation of an electrolyzer powered by the Photovoltaic array, the metal hydrides to store the produced hydrogen and the fuel cell to supply the electrical power at night.

The storage will be designed on a seasonal basis and it will be made of different hydrides: the passage of H₂ between different hydrides will provide a thermal flux that will be employed for the production of hot water or refrigeration.

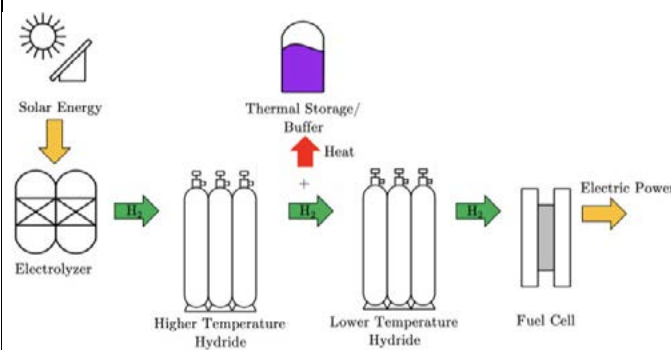


Figure 1 - Scheme of the energy system for the Lotto B.

Themes of innovation and R&D

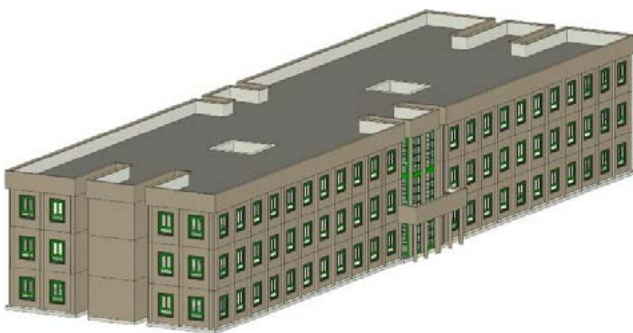
Adoption of Metal Hydrides for a reliable and practical storage of hydrogen, also for domestic applications. Exploitation of Metal Hydrides for air conditioning and hot water.

Type of collaborations requested

Industrialization of the process; production of hydrides without Critical Raw Materials; scale-up of the results.

Contacts

Prof. Ing. Giacomo Falcucci: giacomo.falcucci@uniroma2.it

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Building Information Modeling (BIM) and energy consumption management. The development of a digital twin in the context of Building Information Modeling (BIM) merged with VR tools, by harnessing the power of AI algorithms and IoT technology to collect and analyze the information needed to optimize energy consumption management.	
Working group (researchers/enterprise)	
Working group 7 “Energy Efficiency with AI techniques” Nicola Fantasia, Fernando Chiarello, Fabio Previtali, Andrea Mattera, Matteo Sperandio, Valter Santellocco, Armando Mennini, Marco Merlin, Parise Orania, Pierpaolo Valentini, Cristina Cornaro, Ilaria Giannetti.	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
Energy Transition - Artificial intelligence, virtual reality and digital twin (FP6)	
Description of the TT product (technology/patent/prototype/service)	
<p>The goal is to develop a modular platform, aimed at all stakeholders in the construction industry, that performs the functions of asset inventory energy management and eventually facility management as well.</p> <p>Providing support for informed decisions based on predictive models and what-if analysis thus moving from a traditional smart building to a "cognitive building" paradigm.</p> <p>Leveraging Building Information Modeling (BIM), a digital twin will be developed and used to simulate an energy management system to reduce energy consumption.</p> <p>The implementation of sensors within buildings and the data they collect is a solution for accurate real-time energy management and the identification of an optimal energy profile.</p> <p>Provide a context of immersive virtual reality environment to analyse and manage building energy behaviour.</p>	 <p>Figure 1 – Digital twin of use case building.</p>
Themes of innovation and R&D	
<p>Development of XR's virtual reality application to enable navigation within the building environments and run simulations, study performance issues and generate possible improvements to the original physical system on energy consumption.</p> <p>Energy Management through predictive models: with a robust "model-driven" predictive model, it is possible to have a proactive understanding of consumption patterns, enabling anticipation of fluctuations, identification of inefficiencies, and implementation of targeted strategies for optimized energy use.</p>	
Type of collaborations requested	
<p>For the project is requested a collaboration with architectural studio to provide BIM and Digital model from projects, survey and point cloud, with XR reality group for VR component and AI group for training algorithm based on energy data.</p>	
Contacts	
Al maviva – The Italian Innovation Company www.almaviva.it ; Università degli Studi di Roma “Tor Vergata” web.uniroma2.it	

Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

Energy consumption optimization solution for Intelligent Public Lighting System in Smart City ContextThe Smart

Lights project aims to develop a lighting system that uses the latest technology to improve energy efficiency, convenience and safety in public areas. This system will be able to automatically adapt to environmental conditions and user preferences, providing a personalized lighting experience. This project aims to create a smart light system that is easy to use, energy efficient, and improves the quality of life of the population.

Working group (researchers/enterprise)

Working group 7 “Energy Efficiency with AI techniques”

Nicola Fantasia, Fernando Chiarello, Fabio Previtali, Andrea Mattera, Matteo Sperandio, Valter Santellocco, Parise Orania, Andrea Zingoni, Gianluca Morciano, Daniele Melloni, Jose Alcalde Llergo.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

Energy Transition - Artificial intelligence, virtual reality and digital twin (FP6)

Description of the TT product

(technology/patent/prototype/service)

The infrastructure will provide motion sensors to monitor and control outdoor lighting based on presence and predictive models.

The motion sensor will provide dynamic lighting, causing the lights to adjust their brightness based on the presence of pedestrians, bicycles, or cars.

As a result, the lights will automatically dim during off-peak hours or when no one is nearby. When human presence is detected, all lights in the surrounding area will return to previously user-defined brightness levels, thus creating a safe circle of light.

With predictive models, adaptive lighting will reduce energy consumption by up to 80 percent without compromising public safety and citizen comfort.



Figure 1 – Intelligent Public Lighting System.

Themes of innovation and R&D

The goal of the project is twofold, on the one hand there is the optimization of energy consumption through predictive models, and on the other hand a model for detecting dangerous situations in public places such as for example fight between people or breaking glass of a shop. The AI component will provide algorithms for the recognition of certain patterns to improve safety within the city and for the citizen himself. Specifically, the results of the analyses provided by the Artificial Intelligence algorithms will be used to modify the lighting in a specific area of the city to improve visibility and consequently safety.

The idea is to create a solution that involves the use of three algorithms:

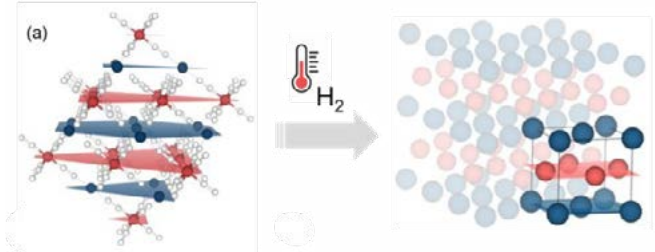

- recognition through video analysis;
- recognition through audio analysis;
- recognition through audio analysis of a key word.

Type of collaborations requested

Especially for detecting dangerous situations, it would be interesting to cooperate with law enforcement agencies to provide a personal security service to the citizen.

Contacts

Almaviva – The Italian Innovation Company www.almaviva.it; Andrea Mattera a.mattera@almaviva.it; Orania Parise o.parise@almaviva.it; Nicola Fantasia n.fantasia@almaviva.it; Università degli Studi della Tuscia www.unitus.it Andrea Zingoni andrea.zingoni@unitus.it; José Manuel Alcalde Llergo jose.alcalde@unitus.it; Gianluce Morciano gianluca.morciano@unitus.it; Daniele Melloni daniele.melloni@unitus.it.

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Recovery, recycling and replacement of critical elements such as rare earths and precious metals	
Working group (researchers/enterprise)	
CNR, University of Rome "Tor Vergata"	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
Energy Transition, FP3	
Description of the TT product (technology/patent/prototype/service)	
<p>A. Sustainable permanent magnets. Innovative chemical synthesis route that exploits the use of pre-ordered salts to obtain rare-earth free L1₀-FeNi alloy nanoparticles of potential interest for manufacturing sustainable high-performance permanent magnet, which play a crucial role in numerous technological applications, including electric vehicles, wind turbines, and various electronic devices.</p>	
<p>B. Permanent magnet recycling. Novel process for extracting rare earth elements from end-of-life magnets. This process combines conventional hydro-metallurgical methods with purification treatments using ionic liquids, aiming to significantly improve the purity of the final products while keeping costs in check.</p>	
Themes of innovation and R&D	
<p>A. The newfound strategy overcomes the limitations of previous approaches, presenting an exciting opportunity to revolutionize the market for high-performance permanent magnets. The successful utilization of pre-ordered salts in the synthesis process not only eliminates the dependence on rare-earth elements but also streamlines the production method, making it more economically viable and environmentally friendly. The inventors of this innovative strategy have recognized its immense value and have taken steps to protect their intellectual property by filing a patent application.</p> <p>B. The process involves an initial hydro-metallurgical treatment, including dissolution using mineral acids (e.g., HCl), as well as multiple stages of precipitation and heating of the obtained intermediates. The process results in the production of rare earth oxides with iron impurities, which are subsequently removed through purification processes using common ionic liquids. This approach allows for cost-effective production of rare earth oxides with a purity level exceeding 99%. Additionally, the overall process generates useful secondary products such as FeCl₃ and gaseous H₂, the latter of which can be utilized, for example, to fuel gas furnaces required for demagnetizing the magnets.</p>	
Type of collaborations requested	
N/A	
Contacts	
Gaspare Varvaro – gaspare.varvaro@cnr.it	

Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation
<p> Project 1: <i>Project 1 Name</i> (Acronym) - Short presentation of the project. </p>
<p> Project 2: <i>Project 2 Name</i> (Acronym) - Short presentation of the project. </p>
<p> Project 3: <i>Project 3 Name</i> (Acronym) - Short presentation of the project. </p>
<p> Project 4: <i>Project 4 Name</i> (Acronym) - Short presentation of the project. </p>
<p> Project 5: <i>Project 5 Name</i> (Acronym) - Short presentation of the project. </p>
<p> Project 6: <i>Project 6 Name</i> (Acronym) - Short presentation of the project. </p>
<p> Project 7: <i>Project 7 Name</i> (Acronym) - Short presentation of the project. </p>
<p> Project 8: <i>Project 8 Name</i> (Acronym) - Short presentation of the project. </p>
<p> Project 9: <i>Project 9 Name</i> (Acronym) - Short presentation of the project. </p>
<p> Project 10: <i>Project 10 Name</i> (Acronym) - Short presentation of the project. </p>

Prototyping of a biorefinery platform for the full valorization of agri-food wastes

Working group (researchers/enterprise)

Luisa Di Paola – PI

Mauro Parise – Research Associate

Ludovico Sacco – Associate company WINGED srl

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic
<p> Digital Transition / Energy Transition / BioPharma & Health </p>

Energy Transition

Description of the TT product

(technology/patent/prototype/service)

The TT product focuses on designing a biorefinery process that turns wine production waste into valuable products (bioactive compounds, energy, while managing wastes). The technology follows the most advanced circular economy approach to integrate the bioactive compounds extraction with the energy conversion of biomasses, in a Near-Zero-Waste process.

The technology follows the most advanced circular economy approach to integrate the bioactive compounds extraction with the energy conversion of biomasses, in a Near-Zero-Waste process.



Themes of innovation and R&D	
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This initiative revolutionizes agri-food waste management by transforming it into valuable products using a pioneering biorefinery approach. It employs circular economy concepts to process a variety of by-products, extracting premium compounds and converting biomass into energy through state-of-the-art techniques like pyro-gasification. The strategy improves environmental and economic efficiency by maximizing the value of waste. A key element is the development of a simulation prototype, essential for testing and refining the technology ahead of a full-scale demonstration. The project's goals are to demonstrate the process, gauge environmental benefits, and explore socio-economic impacts, paving the way for a sustainable commercial solution in the agri-food sector.

Type of collaborations requested
<p>1. Academic collaborations: We seek partnerships with researchers and institutions in the fields of artificial intelligence, machine learning, and data science to advance our understanding of the cognitive and neural mechanisms underlying human decision-making.</p> <p>2. Industry collaborations: We are interested in collaborating with technology companies, startups, and established firms to develop innovative AI-driven solutions for decision-making in various sectors, including healthcare, finance, and logistics.</p> <p>3. Government and policy collaborations: We aim to work with government agencies and policy makers to explore the ethical implications, regulatory challenges, and societal impacts of AI-driven decision-making systems.</p> <p>4. Non-profit and social impact collaborations: We are committed to leveraging AI for social good and are seeking partnerships with non-profit organizations to address global challenges such as poverty, climate change, and healthcare access.</p>

The initiative has already involved an UCBM spin-off, for the technical implementation of the prototype, which is the long-term goal. At this stage, the executive project for the pilot will be provided.

To improve the project exploitation, it will be crucial to involve end-users (wine producers) in the development process.

Contacts

Luisa Di Paola: l.dipaola@unicampus.it (UCBM)

Ludovico Sacco: ludovico.sacco@hotmail.it (WINGED srl)

Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

Prototyping of a technological solution for the sustainable use of renewable energies and green hydrogen in the nautical sector

Working group (researchers/enterprise)

Luisa Di Paola – PI
Mauro Parise – Research Associate
Claudio Serangeli – Associate Company AGC98 srl

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

Energy Transition

Description of the TT product

(technology/patent/prototype/service)

The task involves the prototyping of an advanced nautical system, based on the upgrading a current sailing catamaran with an additional electric propulsion system. Energy, including non-engine uses, comes from renewable sources (solar, wind, micro-hydroelectric). Extra energy is stored as green hydrogen via electrolysis and reused through a fuel cell.

In the period, the following activities were conducted:

- Defining the power inputs and the cutting-edge technologies for the procurement and prototyping.
- Developing new technologies arising from the integration of commercial advanced technologies.
- Planning of experimental activities.

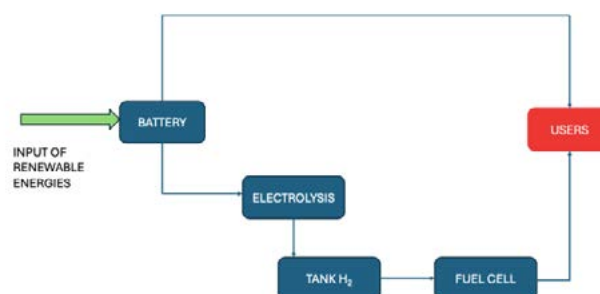


Figure 1 – Scheme of the innovative energy production and storage system for the nautical sector.

Themes of innovation and R&D

The project's innovation lies in developing a prototype adopting an innovative approach to harness green hydrogen (H₂) for storing excess renewable energy, overcoming the limitations of current market electrolyzers that depend on continuous, stable power sources. Unlike conventional systems, our approach integrates an advanced system to manage the fluctuating energy supply from renewable sources.

This leading-edge storage solution is currently in an active design phase to fine-tune the system configuration for peak storage efficacy. Parallely, we've launched a state-of-the-art simulation platform employing professional engineering software, AspenPlus, to forecast and decode experimental data, ensuring a ground-breaking advancement in energy storage technology.

Type of collaborations requested

The initiative has already involved a company working in the blue economy sector, that will play a central role in promoting the adoption of the innovation in the field. We are interested in involving companies and stakeholders in the blue economy sector, to allow a wider diffusion.

Contacts

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Claudio Serangeli: agc@agc98.net (AGC98 srl)

Section 1: PRODUCTS IN THE ECOSYSTEM

Name and acronym of the TT project with short presentation

H₂DTM - Hydrogen District Management Tool

The H₂DTM is a web-based tool for monitoring and controlling Renewable Energy Communities (RECs) and/or smart districts including Hydrogen Based Energy Storage Systems (HESSs).

Working group (researchers/enterprise)

Francesco Conte, Università Campus Bio-Medico di Roma, Anna Rita Di Fazio e Mario Russo, Università degli Studi di Cassino e del Lazio Meridionale, with the collaboration of IESolutions SRLS, spin-off of the Università degli Studi di Genova

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic

Energy Transition

FP1 decarbonization and digitalization in research on new green energy sources

Description of the TT product

(technology/patent/prototype/service)

The H₂DTM will be the result of the activities A2.1.1 and A2.2.3 of the Rome Technopole Spoke 2.

The tool will implement the following specific **functionalities**: real time monitoring of renewable generation, users' consumption, batteries state of charge, level of hydrogen; forecasting of renewable generation and users' consumption; day-ahead and real-time control of distributed resources. The tool will allow to yield the following **objectives**: energy cost reduction; maximization of renewable energy self-consumption; participation to the energy market and to the ancillary services market.

At the end of the activity, we will realize a prototype able to communicate with a wide class of smart sensors and ready for further engineering and eventual commercial development.

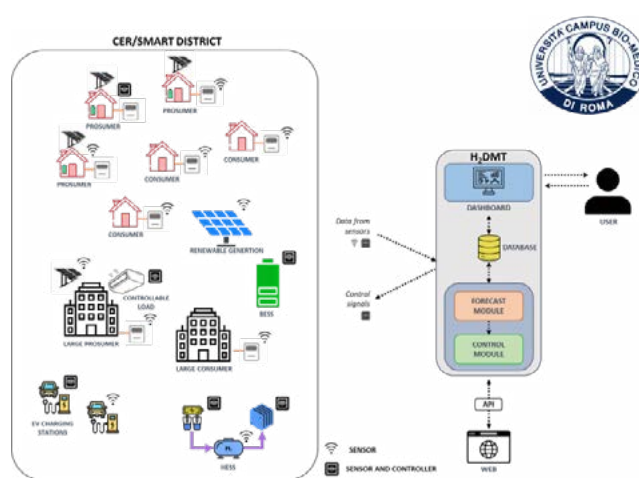


Figure 1 - General concept of the Hydrogen District Management Tool.

Themes of innovation and R&D

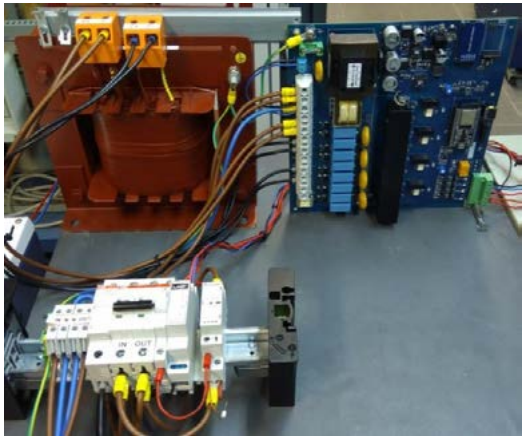
The tool will implement innovative methodologies today aligned with the academic state of the art. For load forecasting, Quantile Linear Regression methods are adopted. For renewable generation forecasting, deep learning techniques are applied. For control, scenario-based optimization and reinforcement learning methods are implemented.

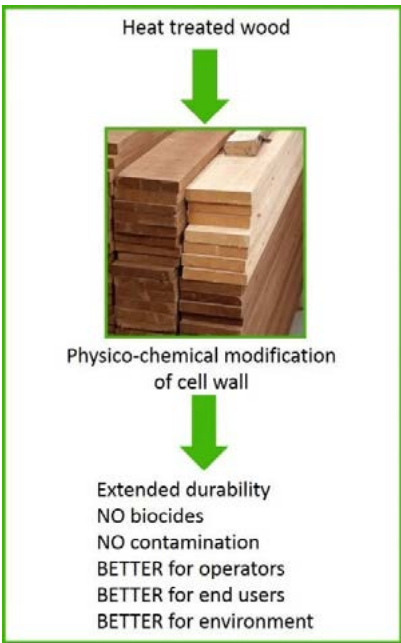
Type of collaborations requested

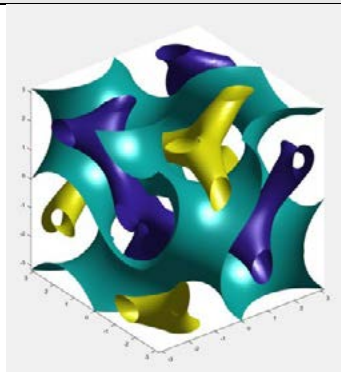
We are looking for collaborations with companies interested in taking the technological development of the tool forward. In particular, the aspects that we believe should be most developed are those of communication with distributed resources, security aspects, and user experience. We would also be very interested in companies, organizations, and/or institutions that could constitute case studies, providing us with data and access to their distributed resources.

Contacts

Francesco Conte, Università Campus Bio-Medico di Roma, f.conte@unicampus.it

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
New voltage regulators to support active users that include controllable loads, RES and storage systems in electric smart grids: Innovative LV regulation devices Technological transfer aiming at the realization of a new Low Voltage Regulation Device to support the operation of active users that include controllable loads, renewable energy resources and storage systems.	
Working group (researchers/enterprise)	
Reserchers: Giovanni M. Casolino, Mario Russo, Andrea Danzo (Technologist). Entereprise: REPL ITALIA S.r.l. (Gruppo REPL®), D.A.C. Engineering & Research S.r.l. (Startup).	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
Reference pillar: Energy Transition. FP Topic: Decarbonization and digitalization in research on new green energy sources.	
Description of the TT product (technology/patent/prototype/service)	
<p>Prototype of a single-phase two-winding transformer that can change its configuration through static switches to ensure proper power supply at the Point of Common Coupling. It keeps the voltage within a range of $\pm 5\%$ of nominal value, against a supply voltage variation from -10% to $+15\%$, exploiting three operating modes: boost, buck, and neutral.</p> <p>Presently a laboratory prototype (in the Figure 1) has been realized, tested, and validated. Currently, five pre-industrial prototypes are being realized for on-field validation; the prototypes are to be installed in existing distribution systems and their operation tested in real operating conditions.</p> <p>Future developments will concern extension from single to three-phase devices and new devices with higher regulation capacity.</p>	 <p>Figure 1 – LV regulation device</p>
Themes of innovation and R&D	
The general scope of the R&D is to develop and realize novel devices needed to operate active distribution grids so as to overcome technical barriers to the connection of distributed generation exploiting renewable energy sources and help the transition toward the smart grids.	
Type of collaborations requested	
Potential synergies with the activities of Spoke 1 of Uniroma3 and Uniroma2.	
Contacts	
Email: casolino@unicas.it; russo@unicas.it	

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Study of the wood behaviour after heat treatment processes for low-durability woods - CLETA	
Working group (researchers/enterprise)	
University of Tuscia : Angela Lo Monaco, Rodolfo Picchio, Rachele Venanzi Vasto legno SpA	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
Energy Transition. (FP 1 Decarbonization and digitalization in research on new green energy sources)	
Description of the TT product (technology/patent/prototype/service)	
<p>The project aims to develop heat treatment processes for poorly durable wood, such as Ayous (<i>Triplochiton schleroxylon</i> K. Shum). This experience allows us to move on to other poorly durable species, which for this reason have little use in the external environment. With heat treatment, wood becomes less susceptible to attack by microorganisms and in this context, the increase in durability translates into a contribution to decarbonisation, since, despite not using biocides that are dangerous for the environment and for humans, the material remains in place longer. Furthermore, the wood material can be used more efficiently by also including the sapwood areas, which must always be eliminated in external environments. The proposed activities and general objectives fall within the decarbonization processes based on wood products. The project intends to implement technological transfer actions of the scientific findings obtained to operators in the forest and wood sector (FP1). Furthermore, the results will allow the implementation of useful databases in contexts supporting companies in the wood sector.</p>	 <p>Figure 1 – Graphical abstract.</p>
Themes of innovation and R&D	
<p>The heat treatment modifies the cell wall of the wood on a physico-chemical level by means of high temperatures. Modification of wood by high heat treatment process is a valid alternative to chemical preservatives. The advantage is that natural durability is extended, without biocides, therefore contamination problems in the environment are not created, but also better working conditions for operators and better use for end users. Extending durability contributes in a general sense to decarbonization because the material remains in place longer, postponing replacement due to the end of efficiency. Furthermore, heat treatment contributes to the general productivity of the process of using the wood material. The species with undifferentiated heartwood and the sapwood areas of the species with coloured heartwood, which are notoriously not durable, acquire greater durability with heat treatment. In this way, the planks can be used in their entirety, even those with original colour differentiation, because the heat treatment also makes the colour uniform. Therefore, heat treatment contributes to a better use of all the material, reducing processing waste, which is generally directed to energy production, further contributing to decarbonization.</p>	
Type of collaborations requested	
N/A	
Contacts	
<p>Angela, Lo Monaco, Università degli Studi della Tuscia - Dipartimento di Scienze Agrarie e Forestali (DAFNE), Via San Camillo de Lellis snc Viterbo, 01100, Italy 0761 357401 lomonaco@unitus.it.</p>	

Section 1: PRODUCTS IN THE ECOSYSTEM	
Name and acronym of the TT project with short presentation	
Magnetically Variable Performances Structural Module - MaVaP	
Working group (researchers/enterprise)	
University of Tuscia: Pierluigi Fanelli, Gianluca Rubino, Chiara Stefanini, Simone Minucci	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and FP topic	
Energy Transition. (FP 1 Decarbonization and digitalization in research on new green energy sources)	
Description of the TT product (technology/patent/prototype/service)	
<p>The project aims to develop a prototype structural component with optimized and variable multiphysical properties, fabricated by additive manufacturing. The component, composed of a metamaterial that couples the polymer structure to magnetorheological fluids sensitive to magnetic fields, will be able to provide variable structural performances depending on working conditions.</p> <p>The goal of the project is to make a prototype of metamaterial structural module to be tested in a relevant environment for an application of industrial interest. A key feature of the designed geometry is the ability to incorporate two distinct channels that remain separate from each other (see yellow and blue channel in fig.1). The project's objective involves fabricating a small-scale metamaterial sample where a pump circulates MRF through channels subjected to an electromagnet mounted on a compression testing machine.</p>	 <p><i>Figure 1 - Conceptual design of the structural module, starting point of the project.</i></p>
Themes of innovation and R&D	
<p>The applications range stands from aerospace to big sciences and new energies.</p> <p>The notion of a Magnetically Variable Performance Structural Module represents a natural progression from the group's prior achievements in exploiting a specific metamaterial geometry. Recent research has shed light on the inherent benefits of employing Triple Periodic Minimal Surfaces (TPMS) geometry, highlighting its prowess in maintaining structural integrity, achieving a low equivalent density, and facilitating clear volume separation. Leveraging insights from these studies, the project is poised to advance beyond the theoretical realm. This virtual model stands as the cornerstone for the subsequent phases of the project—namely, the intricate processes of design, fabrication, and rigorous testing of the prototype—within the ambit of the project's current objectives.</p> <p>The R&D and innovative activities are connected to the field of additive manufacturing and metamaterial design. The prototyping phase and TRL enhancement here presented, as a consequence, has the additional scope to validated the digital twin approach proposed by the group in their research activity.</p>	
Type of collaborations requested	
Companies interested in exploiting engineering application of metamaterials.	
Contacts	
<p>Pierluigi Fanelli, University of Tuscia, pierluigi.fanelli@unitus.it</p> <p>Gianluca Rubino, University of Tuscia, gianluca.rubino@unitus.it</p> <p>Chiara Stefanini, University of Tuscia, chiara.stefanini@unitus.it</p>	

Section 2: PRODUCTS FROM OPEN CALLS

Name and acronym of the TT project with short presentation

DINTEST (Advanced support to melanomas precision diagnostic based on digitized histological images and the identification of genomic anomalies of germline and somatic DNA and RNA from a custom gene panel).

The project aims at realizing a Database of clinical cases fully described by digital High Resolution images of melanocytic lesions and deep genetic screening of germinal and somatic DNA and RNA through gene panel from Whole Exome Sequencing and RNA transcriptomic. The Database will be exploited by a web application for supporting onco-dermatologic diagnostics.

Company description and working group

Genechron Srl is an innovative SME operating in the area of Medical Diagnostics. It operates a Specialized Laboratory of Medical Genetics, it works on R&D pipelines for the identification of new biomarkers from liquid biopsy, realizing all translational activities needed to bring them on the market.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

BioPharma & Health: Advanced Digital solutions for health screening and development of drugs and medical tools

Description of the TT product

(technology/patent/prototype/service)

The TT product will consist of a webservice accessible to specialists, which allows the classification of a new lesion to be diagnosed. Classification (made according to the more advanced WHO ontology for melanocytic lesions) will be supported by the correlation between structural data of the lesion (through a comparison between high res digitalized histological images) and their correlation with both DNA germinal and somatic setting of the patient. Transcriptomic analysis will also be available for comparison in special classes of lesions, where particular cellular pathways are compromised. AI interaction will also be available for supporting diagnostics through direct calls available within the webservice to the main AI sources.

The Database will grow to successive introduction of further clinical cases, in a cooperative process which will allow benefit to the diagnostic community.

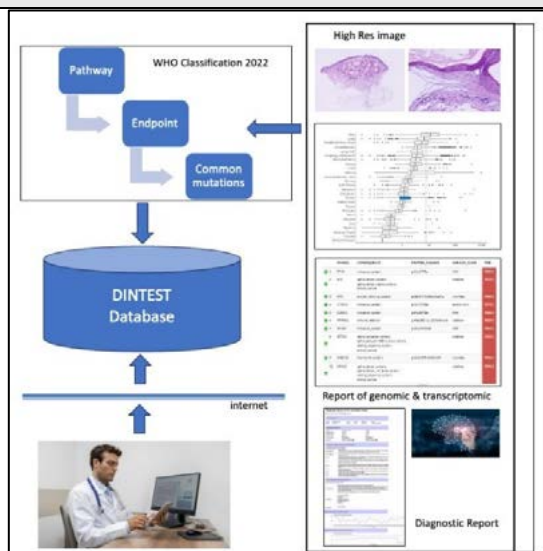


Figure 1 – DINTEST Database architecture: contents and application usage.

Themes of innovation and R&D

Project DINTEST will leverage on and combine a number of innovative technologies, deployed for supporting complex diagnostic procedures like those occurring for melanocytic lesions:

- High resolution images of fully reported clinical cases belonging to the different classes (pathways) identified by the latest available WHO classification scheme
- A deep genomic and transcriptomic description of the lesion from both somatic and germinal viewpoint, accompanied by a complete correlation description (based also on the use of AI)
- A supporting workspace (provided by the webservice) enabling a visual comparison among histological tracts of the known and unknown (queried) lesions.

Type of collaborations requested

The DINTEST project partnership is composed by a biotech company (Genechron Srl) which has provided the design of the project and will manage the different parts (i.e. creation of the Database, genomic and transcriptomic analysis on the case studies which will constitute the realization of a complete set of clinical cases to describe the whole WHO ontology of melanocytic lesions, interaction with AI engines) and a company (SPEE Srl) managing and operating 24/7 the webservice. Collaborations are required with Hospital and Research Center in onco-dermatology for the validation and the clinical use of the Service which will be offered.

Contacts

Dr. Michele Donati (Specialist in Dermatopathology) micheledonati25@gmail.com

Dr. Vittorio Rosato (Genechron Srl) v.rosato@genechron.com

Ing. Marco Cardelli (SPEE Srl) m.cardelli@spee.it

Section 2: PRODUCTS FROM OPEN CALLS

Name and acronym of the TT project with short presentation

Innovative self-regulating ventilation system for the treatment of patients requiring ventilatory support capable of safeguarding the functionality of the muscles of the respiratory system (SMART CPAP).

Design and development of a medical breathing aid equipment (SMART CPAP) capable of self-regulating its operation in an adaptive and dynamic manner based on the actual respiratory deficit of the subject.

Company description and working group

MIR S.p.A (Principal Investigator): a manufacturing company specialized in the development of biomedical devices;
Radio6ense S.r.l. (Partner): an innovative SME specialized in the development of wireless monitoring solutions based on RFID sensor networks;
CNIT (Consultant): a research organization engaged in research and innovation activities in the field of cyber risk and data security.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

BioPharma & Health - Sensors and device for healthcare

Description of the TT product

(technology/patent/prototype/service)

The project aims to develop a prototype of an innovative respiratory assistance device (SMART CPAP) capable of self-regulating its operation adaptively and dynamically in response to the actual respiratory deficit of the individual. This prototype will integrate wireless sensors for real-time measurement of respiratory pressures MIP/MEP and will be able to modulate its operation based on these measurements. The device will be equipped with appropriate control algorithms based on Artificial Intelligence, used to dynamically adjust the ventilation intensity and thus the positive pressure of the CPAP through feedback rules, to create the most suitable ventilation modulation for the patient's conditions. The innovative ventilatory support device, suitable for home and clinic use, will thus be capable of preserving the functionality of the respiratory system musculature, overcoming the issues of current devices on the market.

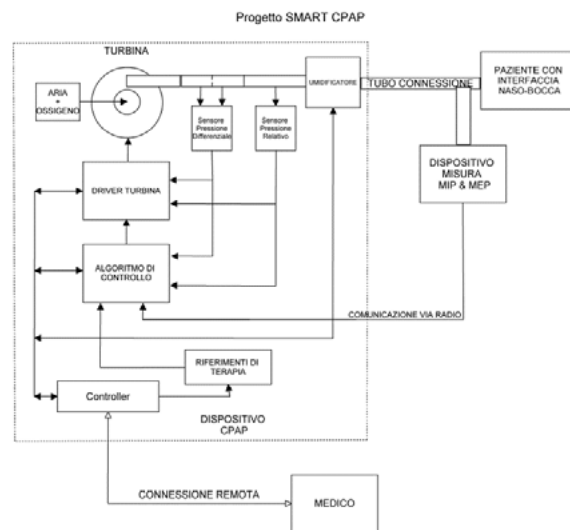


Figure 1 – System architecture of the initial prototype of the SMART CPAP device

Themes of innovation and R&D

1. Ability to modulate the ventilation of a CPAP device
2. Development of CPAP ventilation generators with high reactivity, featuring very short variation times
3. Adoption of wireless RFID pressure sensors for monitoring MIP/MEP respiratory pressures and radio communication of data to the CPAP device
4. Development of a MIP/MEP device capable of housing both sensors in a single stand, conducting both measurements from a single device
5. Development of a control algorithm enabling self-regulation of ventilation modulation based on patient MIP/MEP measurements and CPAP functional parameters

Type of collaborations requested

Specialist Consultancy: LEAF Srls, XYZ Design

Suppliers: Beta engineering s.r.l, Neos Sistemi s.r.l, Scame s.r.l., STMicroelectronics Spa

Contacts

Project Coordinator: Adriano Mencarini, MIR – Medical International Research Spa, adriano.m@spirometry.com, +39 3357695727

Sara Amendola, RS – Radio6ense srl, amendola@radio6ense.com, +39 3383195467

Section 2: PRODUCTS FROM OPEN CALLS*Name and acronym of the TT project with short presentation**

Personalized Therapy in Breast Cancer: Customized Vaccine for Each Patient, Based on Their Mutations
VAP (Vaccine ad Personam)

Company description and working group

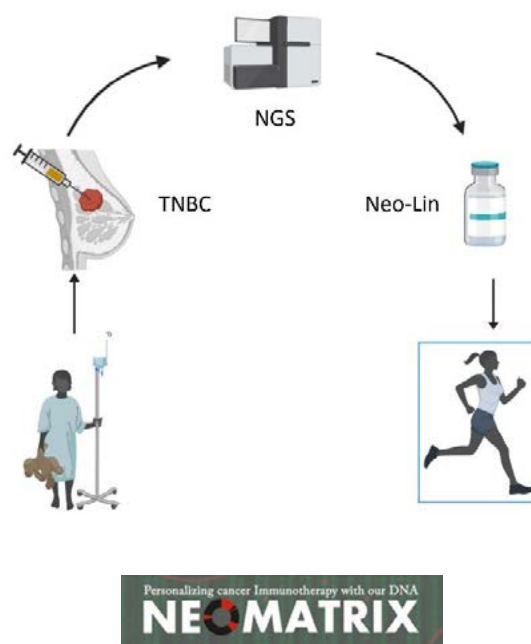
Neomatrix Biotech is a recently established small biotech company funded last year by two investors (I2I and 2invest). Located in Castel Romano, our focus lies in immunogenomics, drawing from a robust academic and pharmaceutical background. Our mission is to harness cancer-specific mutations, referred to as "neoantigens," to pioneer personalized cancer therapy.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

BioPharma & Health

Description of the TT product**(technology/patent/prototype/service)**

VAP (**Vaccine Ad Personam**) aims to establish a new therapy based on personalized therapy in the context of breast cancer. This technology has been developed in recent years at Neomatrix, a company entirely dedicated to the development of personalized vaccines targeting neoantigens, which are immunogenic mutations identified by ext generation sequencing (**NGS**). In order to understand the feasibility of this innovative therapeutic approach, we have entered into collaboration with Prof. Silvia Piconese (Sapienza University) to perform molecular and immunological characterizations in the complex context of breast cancer. In particular, we aim to target the most challenging condition, namely triple-negative breast cancer (**TNBC**), who are the most difficult to treat patients. The collaboration brings together the excellence of academic research with emerging technology of synthetic vaccines (**Neo-Lin**). This is the only approach that offers the possibility of transforming genomic information relevant to the patient into an effective drug, quickly and at costs manageable by the national health system.

**Themes of innovation and R&D**

The innovation that VAP aims to generate is instrumental to Phase I clinical trials in triple negative breast cancer (TNBC). To date, there have been no clinical trials involving personalized vaccines for this type of tumor, and more generally, the approach of synthetic linear DNA administered through electroporation (EP) has never been studied in a clinical context. Therefore, the project ambitiously seeks to establish the necessary conditions to enable a therapeutic possibility based on scientific evidence that has shown efficacy in preclinical models. VAP will utilize all the acquired knowledge, from the most advanced project in lung cancer and the innovative vaccination system, to study the feasibility of this therapeutic approach in a clinical setting with a dismal prognosis.

Type of collaborations requested

We are actively pursuing collaboration with clinical oncologists to strategize and design the optimal Phase I clinical trial. In pursuit of this goal, we are currently in search of an undilutive grant totaling 2.5 million dollars, which is essential for funding the entirety of the Phase I clinical trial. This grant will enable us to conduct comprehensive research, gather essential data, and ensure the successful execution of the trial. By securing this funding, we can advance our mission of pioneering personalized cancer therapy and potentially revolutionize treatment approaches for TNBC patients.

Contacts

Fabio Palombo (palombo@neomatrixbiotech.com), Neomatrix s.r.l., Via di Castel Romano n. 100, 00128 Rome, Italy www.neomatrixbiotech.com

Section 2: PRODUCTS FROM OPEN CALLS

Name and acronym of the TT project with short presentation

Project EXOPLANT. Development of a digitalized technology to isolate exosomes from plant cells and tissues.

The project aims to pioneer a new technology that can isolate plant exosomes, vesicles that contain bioactive compounds and signaling molecules, which can trigger biological responses in target tissues and hosts. Despite the widespread use of mammalian exosomes, the use of plant exosomes is still in its early stages, largely due to the challenge of isolating and recovering them. The EXOPLANT project aims to develop a prototype for a fully automated and digitalized plant exosome production line and to develop active ingredients based on plant exosomes for the cosmetic and biomedical market.

Company description and working group

Arterra Bioscience (ABS) and Innovation & Technology Provider (ITP), two companies with 20 and 10 years of history respectively, are partnering together for the EXOPLANT project. ABS develops biotechnological solutions in various fields and has consolidated experience in the cosmetic active ingredient market. ITP specializes in engineering and innovative solutions, especially in the food sector. The partnership is completed by Prof Marra's group, plant physiologist of the University of Tor Vergata. The project aims to digitally produce exosomes in different media (cell cultures, hairy roots, plants), characterize them physically, and purify them on a laboratory scale. On one hand, ITP will identify suitable methods for scaling up the purification process while on the other hand, ABS will carry out biological validation and develop active ingredients based on exosomes for the cosmetic and biomedical markets.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

This project aims to develop a cost-effective, sustainable and digital process for producing purified exosomes from different plant biomasses, to be used in innovative dermatological, cosmetic and nutraceutical formulations. The project's goals include promoting innovation processes that focus on sustainable development, smart specialization, technological transfer to support SMEs, and addressing the thematic area of "Health & Bio-Farma", fully aligned with the objectives of Spoke2 in the Rome Technopole Ecosystem.

Description of the TT product

(technology/patent/prototype/service)

The project aims to develop an innovative tool for isolating exosomes from plant biomass, including cell cultures, radicals, and plants. The resulting technology could be used for various industrial applications, beyond the cosmetic and nutraceutical ones that the project intends to approach, and it could be presented and licensed to other companies.



Themes of innovation and R&D

The proposed project aims to bring innovation in the scientific, technological, economic, and environmental fields. By using plant biomass grown in vitro to produce exosomes, the project unveils new insights into plant biology and extracellular vesicle production. The use of plant biomass grown in a controlled laboratory environment could significantly reduce environmental impact and promote the efficient use of natural resources, contributing to the sustainable management of vegetable crops. From a technological perspective, the project will utilize advanced culture systems and highly digitalized purification methods to produce exosomes from plant biomass, leading to new infrastructures for large-scale production and job creation. From a business standpoint, the project will open new commercial opportunities by developing innovative products for cosmetic and nutraceutical/biomedical applications.

Type of collaborations requested

Prof Marra's group, plant physiologist of the University of Tor Vergata.

Contacts

Arterra: Project coordinator, Professor Vincenzo Fogliano: vfogliano@arterrabio.it;

ITP: Partner, Professor Roberto Nigro: rnigro1957@gmail.com

Section 2: PRODUCTS FROM OPEN CALLS

Name and acronym of the TT project with short presentation

Parkinson Assessment and Comprehensive Evaluation - PACE-ME.

The Project is a response to the urgent need for developing a wearable device aimed at improving the quality of life for patients with Parkinson's disease by mitigating the debilitating phenomenon of FoG (Freezing of Gait, a severe impairment of motor function during walking, often triggered by environmental factors such as tight spaces, obstacles, or barriers).

Company description and working group

EHT is an aggregator of innovative small and medium-sized enterprises (SMEs), playing a crucial role in the country's digitization process. EHT has a longstanding experience in defining and implementing complex innovation projects, often managing them as project coordinator, thanks to a dedicated R&D Business Unit.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Pillars: (i) digital transition, (ii) biopharma and health; Topics: (i) Sensors and device for healthcare e (ii) Artificial intelligence, Virtual reality, Digital Twin and communication technologies.

Description of the TT product

(technology/patent/prototype/service)

The PACE-ME platform aims at managing and understanding FoG (Freezing of Gait, a severe impairment of motor function during walking, often triggered by environmental factors such as tight spaces, obstacles, or barriers) related to Parkinson's disease. This comprehensive monitoring platform integrates wearable sensors, including cameras and inertial sensors, supported by intelligent algorithms dedicated to the classification and prediction of freezing episodes. The incorporation of inertial sensors and cameras into the PACE-ME platform is a key feature, enabling it to capture complex details about the environmental and motor conditions that cause FoG episodes. This capability ensures that the device not only contributes to significantly improving the motor conditions of individuals with FoG. Thanks to the implementation of a dedicated data lake, it also plays a crucial role in enriching the scientific community's understanding of the disorder and its root causes.



Themes of innovation and R&D

The PACE-ME project embodies a multifaceted approach to innovation and research & development (R&D) within the field of healthcare technology, specifically targeting Parkinson's disease management. Its foundation lies in the seamless integration of environmental and motor data collection with the application of artificial intelligence (AI) algorithms for in-depth event classification and the predictive analysis of Freezing of Gait (FoG) episodes. This approach encapsulates several key themes of innovation and R&D: Wearable Technology Development; Advanced Data Analytics and AI; Open Data and Collaborative Research Infrastructure; Environmental and Motor Condition Analysis

Type of collaborations requested

M3Lab at the University of Niccolò Cusano: contributes to the engineering aspects of PACE-ME, particularly in the development of wearable devices equipped with sensors for physical quantity measurements, and algorithms for data analysis. Department of Human Neuroscience at Sapienza University of Rome: its clinical and translational research activities and its clinic which serves approximately a thousand Parkinson's patients across various stages, provides an invaluable resource for clinical insights, patient recruitment, and empirical data.

Contacts

Scientific Coordinator: Wladimiro Carlo Patatu (vladimiro.patatu@eht.eu)
Technical Coordinator: Miriam Raccuglia (miriam.raccuglia@eht.eu)

Section 2: PRODUCTS FROM OPEN CALLS**Name and acronym of the TT project with short presentation****NefroCloud: A cloud service supporting predictive medicine for patients on hemodialysis.****Company description and working group**

Nefrocenter will focus on building the specifications of a software service delivered through the cloud, which acquires data from hemodialysis devices and healthcare providers and predicts the trend of dialysis efficiency. It is clear, therefore, that the presence in the project of the first group in Italy in the nephrology and diabetes medical sector is of fundamental importance for the success of the initiative. Nefrocenter will be supported by IT SVIL company - an innovative SME with almost 20 years of experience in the health-care sector - whose know-how will be functional for carrying out specific activities as they are extremely competent and knowledgeable of the most modern software technologies for the creation of mobile and web-oriented IT platforms and for achieving the expected results.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Biopharma and health: Nefrocloud proposes an advanced digital tool (the NefroCloud cloud service) which, through the clinical observations of healthcare professionals and the data acquired from dialysis devices, supports predictive medicine for hemodialysis patients. Coherent with the following thematic: *health screening e medical tools, development of diagnostic tools* thematic.

Digital transition: Nefrocloud is a healthcare application. AI is used to define dialysis efficiency predictors used to send alerts to healthcare workers.

Description of the TT product**(technology/patent/prototype/service)**

The efficiency of hemodialysis has a strong impact on the expected duration and quality of life as well as on healthcare costs (e.g., stemming from cardiovascular complications) for patients on hemodialysis. This motivates the development of methods and tools to predict a decrease in the efficiency of hemodialysis in order to increase quality and decrease costs for healthcare.

On such a basis, this project proposes the development of a digital service, namely a cloud-based software service, that acquires data from hemodialysis devices and healthcare operators and detects the efficiency of hemodialysis. When the system detects a decrease in efficiency an alert is sent to the healthcare operators who will take appropriate actions to counteract the drop in efficiency detected. Nefrocloud uses the predictors available in the scientific literature and already validated through observational clinical studies. The project is based on open-source software (e.g., Linux, PostgreSQL).



Figure 1 – Nefrocloud System architecture and information flow.



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**Themes of innovation and R&D****Innovation with respect to clinical objectives:**

aims to predict a decrease in dialysis efficiency in order to direct the attention of healthcare workers towards optimal management of metabolic disorders known to be responsible for increased morbidity and mortality.

Innovation with respect to algorithms:

AI algorithms used in the NefroCloud project will have to estimate structural relationships (i.e. persistent over time) between the patient's pathophysiology and the clinical data collected and offer long-term estimates. This feature (difficult to achieve) is not required for short-term forecasts of currently available systems.

Type of collaborations requested

In order to ensure accessibility to a wider audience, it may be useful to seek collaborations with other healthcare organizations or technology companies to further expand the use of the software and ensure its long-term success and start discussions with all stakeholders immediately (patients, healthcare workers, funders) to help ensure ongoing support for the project.

Contacts

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Section 2: PRODUCTS FROM OPEN CALLS

Name and acronym of the TT project with short presentation

Controlled System for Dermatological Follow-up imaging (TARGET).

The project involves the development of a web application, assisted by an artificial intelligence algorithm, dedicated to skin imaging standardization. The system, by its nature, will be usable with any smartphone, tablet, or PC camera, making it easier, faster, and more reproducible for dermatologists to acquire skin images over time, allowing them to track the evolution of skin lesions.

Company description and working group

The proposal is submitted by a single company, Dermatology Myskin Srl, a healthcare facility that carries out activities as a specialist medical and surgical outpatient clinic and engages in digital health development. The team is composed by: **Alessandro Martella**: graduated in Medicine and Surgery and specialized in Dermatology and Venereology with expertise in skin imaging for the acquisition and processing of skin lesions for diagnostic purposes. **Alberto De Prezzo**: software architect with skills in software analysis, design, implementation of functional tests, and software integration. **Rocco De Marco**: IT systems management and software development (UI and UX) and functional analysis.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

TARGET belongs to BioPharma & Health pillar, With the goal of achieving accurate and reproducible acquisition of clinical images of chronic and/or acute skin lesions for remote assessment by the physician through telemedicine or telehealth systems.

Description of the TT product**(technology/patent/prototype/service)**

TARGET will develop a prototype of the APP, released as a standalone product, or simply as a service through APIs to be integrated into the telemedicine systems already used by dermatologists. Analyzing the process of managing a patient with a dermatological lesion, we can define advantages for each element of the figures involved: **The dermatologist subscribing to the app**: i) Expanded user base; ii) Reduced time in follow-up management; iii) Precise, rapid, and easily archivable follow-up. iv) Continuous connection with patients. **The patient accessing the App**: a) Reduction in travel; b) Examination performed at the desired time; c) Certain and rapid results. **Territory where the app is used**: 1) Reduced patient travel support; 2) General practitioners and/or pharmacies that could subscribe to the app services, directly benefiting from direct dialogue with a territorial reference dermatologist specialist.

**Themes of innovation and R&D**

Challenges in Dermatological Image Acquisition: Diagnosis and monitoring of skin conditions often require the acquisition of clinical images. However, due to the three-dimensional characteristics of the skin (including grooves, folds, and protrusions) and to the different acquisition parameters in terms of distance, light, angles, etc, the reproducibility of clinical images over time is a subject of research. This reproducibility is crucial for accurate evaluation of dermatological conditions and monitoring lesion evolution over time, especially in patients with chronic skin diseases, through telemedicine or telehealth management. This lack of objectivity poses a challenge for dermatologists striving to provide the best possible treatment for their patients.

Artificial Intelligence Algorithms for Guiding Acquisition: To address these challenges, the TARGET project will design and develop a web application supported by an artificial intelligence algorithm dedicated to skin image acquisition. These algorithms will provide detailed instructions to patients and dermatologists on how to properly position the acquisition device relative to the skin lesion or simply rescale the parameters to the first acquisition ones.

Security and Transmission of Images: A crucial aspect of the application is the security and privacy of patient data. Skin images uploaded by patients are encrypted and securely stored on dedicated servers. Access to these images is strictly controlled and limited to authorized medical personnel.

Contacts

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Section 2: PRODUCTS FROM OPEN CALLS

Name and acronym of the TT project with short presentation

UTOPIA - Urban TOol to Plan climate mitigation using satellite Imagery and Artificial intelligence.

UTOPIA, making the most of the technological skills and professional experience of the proposer Latitudo 40, aims at creating an innovative, of the huge heritage of Earth Observation data, to monitor and support decision-makers in the field of urban planning management, investments in improving the city's capacity to be resilient and sustainable, also in relation to the growing impact of climate change phenomena, and in the optimal management of urban green infrastructures. The new UTOPIA platform will make available a wide range of new geo-referenced information layers that can be integrated into existing information systems using the Data Spaces concept.

Company description and working group

Latitudo 40, an innovative startup, merges big company expertise with the agility of a lean organization focused on user-centered design. Garnering deep tech investor interest, it's backed by Techstars, CRIF S.p.A., and Expert Dojo. Specializing in ICT, AI, Remote Sensing, and Geospatial Analysis, Latitudo 40 offers cloud-based geoinformation solutions utilizing Earth observation satellite images and AI algorithms. The company operates in urban monitoring and precision agriculture, providing valuable insights for decision-making and environmental sustainability on a national and international scale.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Digital Transition

Description of the TT product

(technology/patent/prototype/service)

The project UTOPIA (Urban TOol to Plan climate mitigation using satellite Imagery and Artificial intelligence) aims to enhance the Urban Data Analytics Platform using satellite data and AI algorithms. This enables monitoring and supports decision-makers in urban planning by investing in cities' resilience and sustainability, considering the impact of climate change and urban green infrastructure management. UTOPIA provides a wide range of georeferenced and informative data to urban planners and involved organizations, allowing them to monitor, manage, and predict climate change impacts, identifying the best solutions to mitigate its effects.

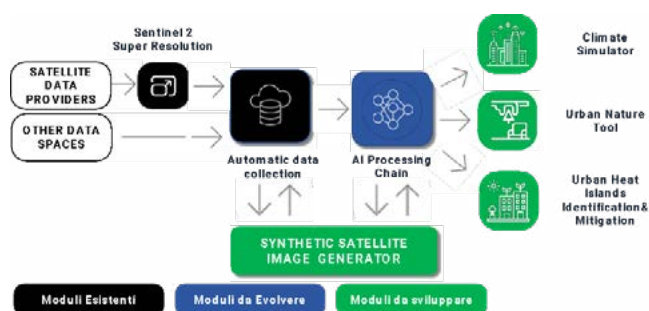


Figure 1 – UTOPIA ARCHITECTURE.

Themes of innovation and R&D

- Improving the Land Surface Temperature estimation model using Sentinel-2 and Land Cover maps using super-resolved (1m) Sentinel-2 images
- Enhancing the Tree Cover Density estimation model with Sentinel-1 products
- Developing and integrating a new module in the platform to enhance urban sustainability KPIs aligned with the 2030 Agenda and New Urban Agenda goals
- Incorporating a simulation system for Urban Nature Accountability to automatically identify Nature-Based Solutions for specific risks like Urban Heat Islands
- Developing and validating the new UTOPIA platform with market users, gathering feedback to improve service adoption and identifying the best go-to-market strategy for the new application solution.

Type of collaborations requested

Support in R&D activities – AI for cities and Nature Based Solutions –

Contacts

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Section 2: PRODUCTS FROM OPEN CALLS

Name and acronym of the TT project with short presentation

GENIUS powertrain diGitalE inNovativo per la mobilità Urbana soStenibile.

An innovative powertrain for light electric vehicles (L6e class) that integrates artificial intelligence (AI), 5G communication and data-driven approach to propose a complete and innovative solution for urban mobility.

Company description and working group

OPV Solutions SRL: *engineering of vehicles, development of innovative platforms, project coordinator, testing.*

F.C.E. S.r.l. Flati Costruzioni Elettromeccaniche: *precision manufacturing, digital testing, prototype implementation.*

S.C.I.R.E. Consorzio: *e-Axel monitoring and sensors implementation, AI model, platform testing.*

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic and topic

Digital Transition: GENIUS is focused on innovative and efficient and sensorized digital powertrain solution for electric vehicles. Field of relevance identified according to EU Regulation 2021/241 is related to intervention field 5 (Digitalization of Enterprises) and related to code 010 (Digitalization of SMEs).

Description of the TT product

The goal of the project is to implement hardware, software and methodologies oriented to digital predictive maintenance equipped with artificial intelligence with 5G communication and data-driven approach. The developed technologies will be used in an innovative integrated powertrain for high-efficiency electric vehicles developed in the project, combining safety, reliability and driving comfort with a digital MaaS-oriented product.

The final solution will integrate the powertrain (eAxle) and the 5G digital system, will be developed specifically for light four-wheeled vehicles, and will be demonstrated on a test platform that can be used for passenger and freight transport.



Themes of innovation and R&D

GENIUS project aims to enable the development and implementation of digital technology methodologies and tools to the proposing partners. The project will contribute to the development of a digital eAxle solution with high technological maturity, promoting the evolution of the object from the industrial research stage to an innovation closer to the market. The project results and activities carried out will be appropriately promoted. The developed digital technologies and the final demonstrator will ensure a competitive advantage in the project's strategic automotive reference sector, realizing a device that can actively contribute to the development of smart urban mobility, designed according to real user needs, according to statistics.

Type of collaborations requested

We evaluate collaborations with stakeholders in the automotive field, digital technologies, and car parts manufacturing.

Contacts

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opvsolutions.eu

Section 2: PRODUCTS FROM OPEN CALLS

Name and acronym of the TT project with short presentation

Digital Twin for Advanced Design in the Aerospace Industry – DigiPAD.

DigiPAD combines two proprietary technologies, JPAD and RBF Morph, with the aim of creating a tool that provides an innovative service within the aerospace design process capable of investigating in real-time the effect that geometric modifications have on the flow field and aircraft performance.

Company description and working group

DigiPAD is coordinated by RBF Morph, an ISV providing advanced CAE tools and services for parametric shape optimization. The partner, SmartUP, is an ISV that provides a vertical CAD tool for preliminary aircraft design. The soundness of DigiPAD is validated by stakeholder Piaggio Aerospace.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Digital Transition – Advanced CAE tools for aircraft design and operational optimization are based on interactive Digital Twins trained using Synthetic Big Data generated by automated high-fidelity CFD simulations.

Description of the TT product

(technology/patent/prototype/service)

JPAD is a tool for preliminary design, multidisciplinary analysis, and optimization of aircraft based on a geometric modeler. **RBF Morph** is a shape parametrization tool, based on mesh morphing techniques, capable of parametrizing geometries and numerical analysis domains. The coupling of the tools with **machine learning** methods and **numerical data compression** generated from high-fidelity analyses, will enable the creation of an efficient **Digital Twin** of the **aircraft** to support designers in finding the optimum solution. The final product will be a powerful preliminary design tool capable of estimating in real-time how the performance of the aircraft changes when altering the various parameters that characterize its configuration. The advantages are clear in terms of design times, quality of solutions, reduction of fuel consumption, and environmental impact. At the end of the project, the technological demonstrator **DigiPAD** will be available, and the aeronautical stakeholder **Piaggio Aerospace** will verify its usage and provide feedback to finalize it into an industrial product.

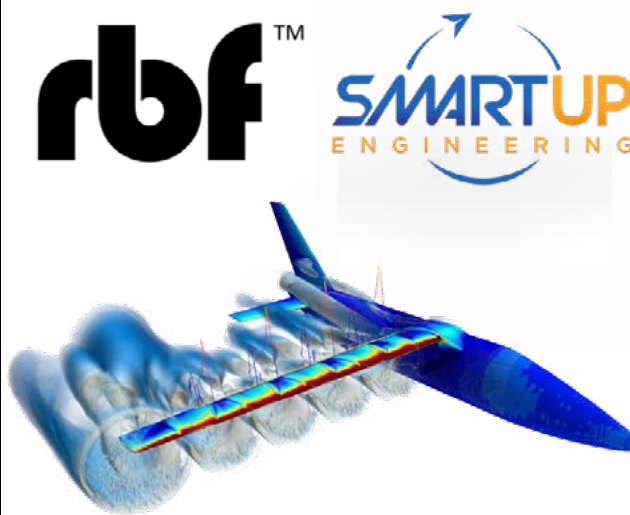


Figure 1: The DigiPAD project combines the technologies of RBF and SmartUp Engineering to create an efficient aircraft design tool based on Digital Twin to support designers in finding the optimum solution.

Themes of innovation and R&D

The project aims to develop a design methodology in the aeronautical field capable of reducing preliminary design times and facilitating the identification of more efficient aircraft configurations.

Reducing preliminary design times is crucial for the faster development and subsequent operational adoption of new aircraft models that aim to reduce the environmental impact of aviation, which is prospectively one of the highest in the transportation sector. The technology will support the development of more sustainable transportation with a positive contribution in terms of reducing environmental impact.

Type of collaborations requested

DigiPAD requires a new efficient numerical tool for Reduced Order Models (ROM) creation from synthetic Big Data. An algorithm suitable for the compression of large dataset by Proper Orthogonal Decomposition (POD) and its real-time interpolation via Machine Learning (ML) will be developed by the University of Rome Tor Vergata, and will be ready to be embedded into the existing API of RBF Morph software.

Contacts

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Section 2: PRODUCTS FROM OPEN CALLS

Name and acronym of the TT project with short presentation

A Robust Explainable Artificial Intelligence Approach for Measurement and Verification of Energy Efficient solutions. (MeterXAI).

The project develops a comprehensive AI-based approach for M&V in energy-efficient infrastructure. Our unique framework leverages all relevant data (pre and post-ECM) to create robust and explainable AI models for estimating energy savings. These models are integrated into the EnergyMONitor (EMON) framework, which already operates for ECM in commercial and residential buildings.

Company description and working group

The proposal is submitted by a single company, Tecno Energy, an engineering and energy services company, operating since 2009 throughout the Italian national territory. It is comprised of a dynamic team of industrial and civil designers, certified Energy Management Experts, specialists in energy monitoring, and data analysis. The main actors are: **Mevoli Giuseppe**, Electrical Engineer, Energy Management Expert, Certified Measurement and Verification Professional, Project Manager; **Colucci Donato**, Electrical Engineer, Energy Management Expert, Certified Measurement and Verification Professional, Senior Researcher; **Laghezza Vincenzo**, Civil Engineer, Energy Management Expert, Senior Researcher; **Romanazzi Domenico**, Industrial Technical Expert, Junior Researcher.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

MeterXAI belongs to Digital transition pillar, with the goal of create M&V plans created by explainable AI algorithms.

Description of the TT product

(technology/patent/prototype/service)

Tecno Energy proposes the MeterXAI project, which will be integrated into its current data and sensor management platform, EMON, already used with Tecno Energy's clients and can therefore already be positioned at TRL9. EMON is a software system designed for energy monitoring through data acquisition devices (power analyzers, PLCs, etc.) equipped with the Modbus communication protocol. Such existing infrastructure and the extensive data collection form a solid foundation on which to build intelligent models, as well as new visualizations and analytics. MeterXAI aims to increase accuracy, reduce savings definition times (by shortening the baseline period), and reduce the time required to create reports on energy savings for the clients. In this regard, MeterXAI aims to enable rapid growth of clientele and solutions adoptable by Tecno Energy.

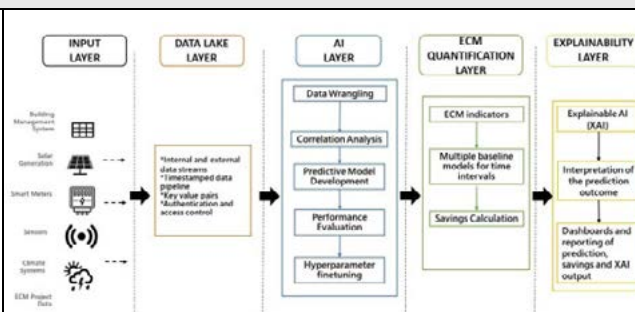


Figure 1 MeterXAI platform.



Themes of innovation and R&D

The artificial intelligence approach proposed in MeterXAI is illustrated in Figure 1. **The input level** receives data streams from installed sensors, smart meters, sensors, climate systems, and the ECM project management database. These data streams are extracted, transformed, and loaded into a **data lake**, forming the second vertical level. This data lake is accessible from the **artificial intelligence (AI) level**, which preprocesses and formulates relevant attributes to build the baseline consumption model and optimize its hyperparameters. Different artificial intelligence models, both supervised and unsupervised, will be used to build the predictive model, adding further robustness through their boosting and meta-learning properties. **The fourth ECM Quantification level** evaluates the model's performance, then calculates and quantifies the savings resulting from ECMs. Finally, **the fifth level** applies game theory approaches based on Shapley Additive exPlanations (SHAP) to explain and interpret the model and Monitoring and Verification (M&V) results and communicates data-based insights for ECM initiative M&V decision-making using interactive analysis dashboards.

Contacts

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Section 3: ENTERPRISES - NEW COLLABORATIONS**Name and acronym of the TT project with short presentation****AIR&HEALTH Project, A&H Project**

The Air&Health project is a purifier/sanitizer system, it controls the sanitization system constantly monitoring the quality of the treated air, guaranteeing total and continuous protection.

Company description and working group

Ugo Bazzotti, Vincenzo Cimmino, Alessandro D'Orsi, Roberto Torlai, Luca Valerio

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Health and welfare

Description of the TT product**(technology/patent/prototype/training project)**

The technology behind the Air&Health project is photocatalysis, a consolidated ecological method of air purification.

Photocatalytic oxidation (PCO) together with the germicidal action of UV-C is proposed as an ideal technology for air purification because it can degrade pollutants into non-toxic or less harmful forms using artificial light.

Air purifiers arise from the need to guarantee protection to those who work in environments with the possibility of biological risk.

Active 24 hours a day, 7 days a week, they guarantee aseptic and odorless environments and a clear reduction in infectious, chemical and biological risks.

But the Air&Health project is not just the purifier/sanitizer like other systems on the market, it is made up of the control part of the sanitization system which, through the use of sensors and a controller, constantly keeps the quality of the treated air monitored, guaranteeing total and continuous protection.

The system is patent pending and after first prototypes for testing electronic components, next steps will be tests in laboratory for verifying its sanitification capacity through a totally safe process.

After laboratory tests, it will start the design of product for presentation to the potential markets.

**Themes of innovation and R&D**

The innovation is the continuous monitoring of air quality during sanitification using sensors and controller.

Type of collaborations requested

Economic support for patent, laboratory tests, Rina Biosafe certification, analysis of global competition and marketing, product design studio, industrialization of the product, production starting, installation and after sale service.

Contacts

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Section 3: ENTERPRISES - NEW COLLABORATIONS

Name and acronym of the TT project with short presentation

The great experience in the water sector and the effective collaboration with the Tor Vergata University have driven to propose an innovative **Safe Water Treatment System (SWaT)** to detect Legionella in water samples. The system allows for in situ, automatized and low-cost monitoring of Legionella Bacteria.

Company description and working group

TECNOSENS Srl is founded in 2014 as spin-off with the aim to design and develop innovative solutions for the monitoring and management of water treatment plants exploiting nanomaterials and miniaturized electrodes. Thanks to high skilled team, it has developed and marketed electrochemical sensors to detect disinfectant compounds (i.e. free and total chlorine, bromine, and chlorine dioxide) and innovative materials were employed for the manufacturing of the products useful to meet the market needs.

The working group, consists of mechanical and electronics engineers and PhDs in chemistry, takes also advantages of collaboration with Tor Vergata University departments to develop innovative solutions and to ensure high quality standards of the developed products.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Sanification, water treatment

Description of the TT product (technology/patent/prototype/training project)

SWaT allows to:

- reduce the time from sampling to result and from result to sanitation of monitoring plant,
- automatize the procedure of analysis and of activation of sanification according to legislation,
- an on-line and real-time communication with the water manager for the remote plant control,
- reduce and modulate the use of chemical additives according to the contamination level,
- in-situ and on-line detection exploiting a spectrophotometric biosensor.

The results of measurement will be provided as a range of contamination/concentration, according to legislation, that can be identified with a colored and customizable display system.

SWaT includes an electronic management and implementation system able to: process and transmit data, activate the customer's external sterilization system and automate the disinfection/sterilization management.

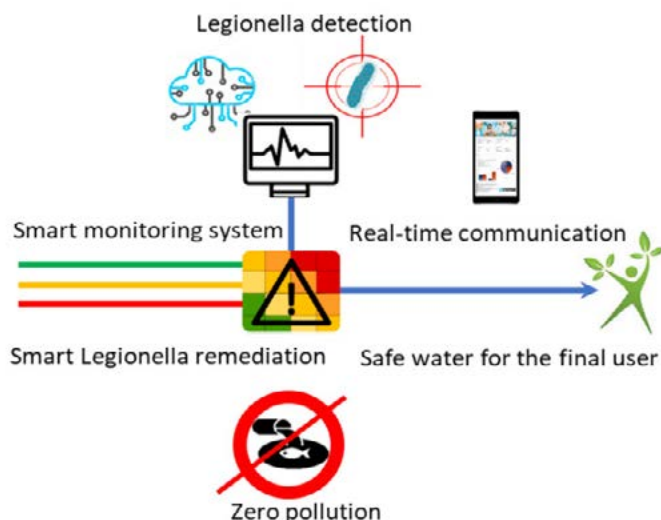


Figure 1 – SWaT system overview.

Themes of innovation and R&D

The R&D activities of Tecnosens aim to design and develop new control systems and products using innovative technologies to meet the needs of a constantly evolving market:

ease-of-use, no required qualified personnel, cost-effectiveness, size reduction, environmentally friendly, automation, remote management.

Type of collaborations requested

Tecnosens looks for collaborations to finance the research, development, and the industrialization of the system.

Contacts

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Section 3: ENTERPRISES - NEW COLLABORATIONS

Name and acronym of the TT project with short presentation

SIREN 2 - Development of an integrated platform for reporting and collecting data on accidents and near misses of operators in nuclear medicine. The SIREN 2 project aims to provide an integrated platform for collecting data useful for reconstructing the dynamics of accidents or near misses involving medical and paramedical personnel in nuclear medicine departments. The proposed solution will help safety experts to manage and analyze data, and workers to understand and share the causes of near misses. The tools proposed and developed by Deep Blue for SIREN 2 are: a. a voluntary reporting module for anomalies, near misses, and accidents in department environments, b. a module for detecting the presence of operators in various environments based on RFID sensors, c. a database containing data from all the modules.

Company description and working group

Deep Blue is based in Rome where it was founded by a group of researchers from Italian universities and research centers. Deep Blue expertise is interdisciplinary, ranging from cognitive sciences, psychology, and sociology, to mathematics, computer science, and aeronautical and aerospace engineering. Deep Blue is specialised in designing and implementing technological and organizational innovations that optimize the human-machine interaction to increase the overall system's security level. Deep Blue actively participates in national and international research projects, thus maintaining a leading position in innovation and cross-fertilization between different domains and applications. Many of Deep Blue's projects funded in recent years focus on the introduction of Artificial Intelligence (AI) and how AI, at various levels of responsibility, can support, facilitate, and assist human activities, particularly in critical operational environments such as healthcare.

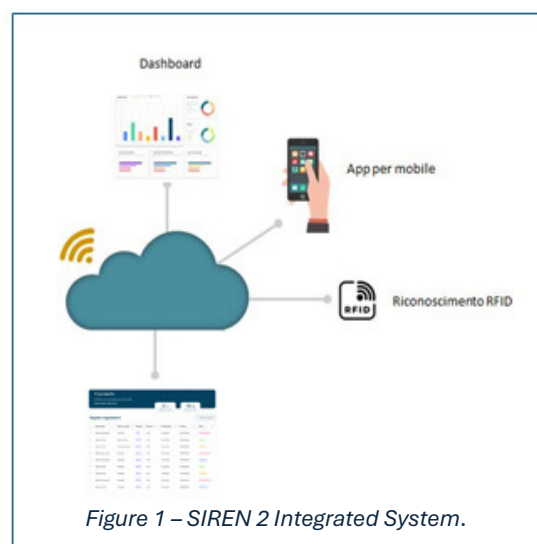
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Biopharma & health (specifically Sensors and devices for healthcare)
Digital transition (specifically Biopharma and healthcare applications)

Description of the TT product

(technology/patent/prototype/training project)

In this project, the SIREN system (developed in a previous project) will be further developed to increase its usability, context suitability, reliability, and accuracy. We plan to develop an integrated system with an intuitive user dashboard that brings together all collected information into a single view and enhances the accuracy of information regarding incident dynamics and operator radiation exposure in environments. Simultaneously, we aim to improve user-friendliness and speed of use. Areas for further development compared to the current model include enhanced usability of the reporting and information collection module for operators; an automatic recognition system for operator presence and identification in the environment; an informative system integrating various current web platforms. Additionally, we aim to facilitate easier data classification and analysis through the creation of a structured database and analysis tools utilizing state-of-the-art machine learning techniques to support risk quantification and identification of possible mitigation actions.



Themes of innovation and R&D

The SIREN 2 project, along with the methodologies and tools developed within it, brings a lot of innovation to nuclear medicine departments and the entire healthcare structure. In particular, it will allow for:

- An increase in safety regarding potential incidents due to the exposure of medical and auxiliary personnel to nuclear radiation, thanks to constant monitoring and improved incident prevention.
- Enhanced capability of the healthcare facility in managing incidents and identifying mitigation measures
- A change in operators' behaviour, with a more positive attitude towards reporting anomalous events and taking proactive actions for their resolution.
- Prevention and better management of incidents will ultimately lead to increased efficiency and economic savings, especially since the tools proposed here are economically sustainable for healthcare facilities.

Type of collaborations requested

The SIREN 2 system will have to be co-designed and validated with the staff of a nuclear medicine department.

Contacts

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Section 3: ENTERPRISES - NEW COLLABORATIONS**Name and acronym of the TT project with short presentation****Spot The Mistake (STM).**

TransTec Services and University of Rome Tor Vergata have embarked on a collaboration for the project “Spot The Mistake (STM)”, that aims to build software applications that can create a digital reference model, which will be stored and later used for comparison by an operator during his or her work activities, automatically highlighting errors and differences through machine learning algorithms or artificial intelligence.

Company description and working group

TransTec Services is a service and consulting company operating in the ICT sector since 2005. Since its foundation, TransTec Services has been able to offer its clients specific knowledge in the field of ICT and Technological Innovation, including at the international level. In 2014 the company created, well ahead of market times, a division called Brochesia vertically dedicated to the development of digital solutions in Augmented Reality to be used mainly with wearable devices (Smart Glasses), with a view to further expanding its innovative business offerings.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Digital Transition

Description of the TT product**(technology/patent/prototype/training project)**

The new technological solution including artificial intelligence, machine learning, augmented reality that will be developed has as its main purpose to revolutionize remote quality control and maintenance processes. It is in fact an application, studied and developed on real cases, dedicated to all businesses that need to carry out very accurate verifications during production processes and/or to highlight in Augmented Reality, by means of Smart Glasses, errors and/or shortcomings present downstream of some production cycles, during quality control, so as to avoid placing non-tolerant parts on the market. Alternatively, the same technology can be used by maintenance workers-independently-to be able to view changes in certain management systems (e.g., changing some wiring in a Data Center rack), be able to correct them easily and automatically as well as, by recording the intervention, maintain a history of what was done.



Figure 1 – TransTec Services logo.

Themes of innovation and R&D

The collaboration will focus on the digitization of processes to support in-service operations, to reduce time and costs of manufacturing and product management, particularly to improve quality control and maintenance processes.

By defining algorithms based on machine learning and artificial intelligence techniques and developing software applications that can exploit the patterns outlined by these algorithms, the collaboration aims to radically innovate the manufacturing industry by identifying defects in manufactured parts in an extremely accurate and intuitive way for operators.


Type of collaborations requested

Collaboration for research on the themes of innovation described.

Contacts

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Section 3: ENTERPRISES - NEW COLLABORATIONS
Name and acronym of the TT project with short presentation
Creation and valorization of innovative products, processes or services through additive manufacturing.
Company description and working group
Medilife S.p.A. is a company that has been operating in the healthcare sector for more than twenty years, providing healthcare services digital printing and creates software systems for data management and digital archiving for PA and private individuals. In recent years we have dedicated ourselves to the study of new software and hardware applications in 3D Printing sector.
Reference Pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic
Digital Transition - Development, creation and valorization of Additive Manufacturing products in the biomedical field
Description of the TT product (technology/patent/prototype/training project)
Creation and valorisation of innovative products, processes or services conceived and developed as part of research activity, applicable in various scientific and industrial sectors through additive manufacturing.
Themes of innovation and R&D
Research and development are focused on expanding and verifying the possibilities of use of available materials and Additive Manufacturing technologies in the biomedical sector, through the development of pilot projects of virtual models and 3D printed physical models.
Type of collaborations requested
Collaboration with the University of Rome "Tor Vergata", Department of Business Engineering "Mario Lucertini" for the creation and valorisation of innovative products, processes or services conceived and developed as part of research activity, applicable in various scientific and industrial sectors through additive manufacturing.
Contacts
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Section 3: ENTERPRISES - NEW COLLABORATIONS	
Name and acronym of the TT project with short presentation	
DIADeMA – Data-driven Intelligent Assistant to Destination MANagers	
Company description and working group	
We-Com s.r.l., a company specializing in the IT sector, was established in 2010 as a response to the rapid technological evolution and the progressive growth of the digital market which has imposed new communication and business strategies. In an era that runs rapidly on a double thread based on innovation and digital transformation, we stand as a guide to cope with the transition and changes in modern society, thanks to the skills of our own highly specialists and the digital ecosystem that over the years has been able to develop and propose comprehensive, rapid and effective solutions. We are currently a reference for Enterprises, Municipalities as well as Public National Administration to whom we offer advice on local finance and taxation and 360° assistance by proposing customized solutions, innovation and expertise fully available to our customers.	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic	
Digital Transition, Topic: Human Oriented AI	
Description of the TT product (technology/patent/prototype/training project)	
<p>The current adoption of AI services has a relatively low impact on Tourism platforms and software systems. First data assets about the touristic phenomena are usually tied to specific technologies and applications, their interoperability is very low and the level of reuse is still limited. On the contrary, Tourism Related Data (TRD) are often distributed on highly heterogeneous sources either of institutional nature (such as ISTAT, ENIT or MiBACT data sets) or open, i.e., accessible through Web portals as well as IoT sensors. The heterogeneity of TRD in support of the governance of territories and district in the national dimension (i.e., municipalities as well as regions) strictly requires the localization, gathering and integration of fine-grain information about geographical, industrial as well as cultural identities characterizing the touristic offer. Destination Managers are faced with a complex ecosystem of information, technologies, identities as well as Objectives characterizing the Web around different territories and touristic vocations. In this project the Destination Management platform known as Stendhal, currently adopted by ISNART for its services in the area of Tourism-related Consultancy will be used as source of information in the DM market and it will be enhanced through the automation of several consultancy tasks, such as:</p> <ul style="list-style-type: none"> - Autonomous Touristic Data Gathering - Destination Discovery and Documentation - Automatic Destination Assessment and Branding 	
Themes of innovation and R&D	
<p>Autonomous intelligent search and integration of distributed sources becomes an essential mechanism as a foundational support to high quality and timely business intelligence in the touristic market. The interpretation and querying data at the semantic level is a key factor for industrialization of services in support of the Destination Managers. Algorithms, Models and systems for Machine Learning will be designed and optimized for the target DM platforms that are already in use in National Agencies (such as the DM Stendhal portal actually in use at ISNART). We will deploy advanced ML methods in form of a TRL7 prototype able to automatize:</p> <ul style="list-style-type: none"> - Novelty detection for DM and tourists. Searching for information about a territory, not present in the DM platform, to make it easy for the DM and the potential tourist to understand the "identity" of a novel destination. - WHAT-IF analysis for touristic governance and branding. Detection of national areas with a tourism vocation similar to known destinations. - On site Dynamic Recommending through ML. Searching for the opportunities offered by a territory as a support for the analysis of its economic impact (e.g., costs) in strict relation with the interest of the user communities - Amplifying the Cultural Experience. Automatic Information Search about the touristic experience, targeted to the touristic, cultural and service dimensions (quality of hospitality services, environmental excellences, ...). <p>Such services are not just application functionalities of data and software Web infrastructures but are fundamentally tied to the data-driven intelligence needed for customizable services.</p>	
Type of collaborations requested	
The Technology Transfer is focused on the expertise on the research related to the application of Machine Learning and Artificial Intelligence methods to the structured and unstructured Web data.	
Contacts	
Marco Baffoni: m.baffoni@we-com.it	

Section 3: ENTERPRISES - NEW COLLABORATIONS**Name and acronym of the TT project with short presentation**

Innovative technologies for sustainable processes intended for the production and use of Compactor Vehicles – ITAC.

Company description and working group

Fratelli Mazzocchia S.p.A. with registered office in FR Via Enrico Fermi 39 – FROSINONE -Italy, among the Italian and European leaders in the construction of vehicles, equipment and systems for the collection and treatment of waste.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Energy Transition / Digital Transition

Description of the TT product (technology/patent/prototype/training project)

Technology Transfer products concern the production and use of vehicles and equipment for the collection of urban waste. The prototypes created or in progress relate to: system for dry cleaning of bins; wastewater treatment system polluted by wet waste and their reuse; innovative reversible movement system; electrification and energy storage; system for recovery and recycling of solvents/washing water in the painting plant; dry paint stripping system; prediction models for determining the level of wear of vehicles; remote monitoring of vehicles and AI prediction models of maintenance activities. Figure 1 shows the first prototype of the wastewater treatment system polluted by wet waste.



Figure 1 – ITP prototype of the wastewater treatment system.

Themes of innovation and R&D

The research project is part of the production and use of vehicles and equipment for the collection of urban waste. The innovation themes concern: innovative technologies for the bilateral collection process and for sustainable washing; technologies for the sustainable production process of vehicles.

Type of collaborations requested

The collaboration will focus on research activities in the field of sustainable processes for the production and use of compactor vehicles and on training activities in the field of TT aimed at company staff.

Contacts

Project Responsible: Dott.ssa Daniela Mazzocchia Te. 0775/8873, email: d.mazzocchia@mazzocchia.it

Section 3: ENTERPRISES - NEW COLLABORATIONS**Name and acronym of the TT project with short presentation**

ALIANTE (ALLuminio Innovativo per Automotive Nobilitato con coating di grafene per il Trasporto dell'Energia elettrica).

The scope of the project consists in the design and prototyping of aluminium conductors with a coating in graphene to be used as a core for electrical cables in automotive applications; such conductors will be realized through a specifically designed and constructed pilot plant. The Project is specifically aimed to overcome the disadvantages still related to the use of the aluminium in the electrical conduction and, therefore, to significantly contribute to the acceleration of the increasing trend of aluminium usage already in place in the automotive market from an eco-sustainable perspective.

Company description and working group

TEC.AL.CO. S.r.l., as leader of the ALIANTE partnership, is a company at high technological content specialized in the production of wire, multiwire, flexible and rigid ropes in aluminium and its alloys, to be used as electrical conductors in replacement of the traditional copper ones in both the "automotive" and "energy distribution" fields. The company mission is related to the promotion of innovative solutions for a more sustainable distribution of energy through the use of aluminium which results more ecological, lighter and more economic. ALIANTE will be carried out jointly with the DII of the UNIVERSITY OF ROME TOR VERGATA, that is known for the significant contribution provided to the world- wide Research in the different disciplinary sectors that distinguish it.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Energy Transition

Description of the TT product**(technology/patent/prototype/training project)**

The ALIANTE project is aimed to obtain both a process and a product innovation. In fact, as a part of the project, prototypes of highly-performing aluminium conductors with a coating in green graphene to be used as cores of electrical cables for Automotive applications will be realized; such conductors will be continuously deposited by electrophoresis through the pilot plant designed and developed for this purpose. The scope of the innovation is clearly disruptive considering that the graphene coating, according to the studies previously carried out by the Project Partners, will ensure that the innovative conductors simultaneously benefit from both the advantages of traditional copper conductors and from the alternative aluminium ones. Therefore, the project is potentially capable to revolutionize the automotive energy conduction market.



Figure 1: TEC.AL.CO. logo.

Themes of innovation and R&D

The use of graphene will significantly reduce the electrical resistance of aluminium conductors (reduction of more than 25%) and will solve the problems related to terminal connections and oxide-corrosive phenomena as well. Therefore, the innovative aluminium conductors deposited by electrophoresis with graphene will have a section almost similar to the traditional copper conductors (with an increase in diameter of less than 10%) and a weight almost similar to aluminium conductors (weight less than 60% than the equivalent in copper) and will not present significant problems relating to terminal connections and oxide-corrosive phenomena. The prototype conductors realized within the ALIANTE project will definitely allow to make a significant contribution to the replacement of the traditional copper cables with aluminium cables in the electrical conduction and to revolutionize the entire automotive wiring sector. A further element of strong innovation is represented by the type of graphene to be used within the project to enhance the pilot products: "green graphene" obtained from food and/or polymeric scraps.

Type of collaborations requested

The project Partners will take advice from the CIRTIBS and from companies specialized in the design and construction of process plants and technologies, in the automation, in the metallurgical, chemical and electrochemical industrial applications and in the environmental sustainability analyses.

Contacts

barbieri@tecalco.com

Section 4: SERVICES AND CALLS SUPPORTING TECHNOLOGY TRANSFER	
Name and acronym of the service/call with short presentation	
Innovation Management Assessment	
Working group (institutions/enterprises)	
University of Rome Tor Vergata, Dept. of Enterprise Engineering	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic	
Digital Transition / Energy Transition / BioPharma & Health	
Description of the service/call offered (patenting/prototyping/new start-ups and spin-offs promotion, enterprise acceleration)	
<p>Enterprise Europe Network (EEN) is the world's largest support network for SMEs. EEN offers various types of services to SMEs including innovation management assessment.</p> <p>This initiative is part of some activities carried out by the EEN Focal Point of University of Rome Tor Vergata and the Rome Technopole Foundation.</p> <p>The offered service can help establish how innovation oriented is a company. Therefore, it is designed to evaluate the company innovation process.</p> <p>The assessment looks at how the process operates from the outset, capturing customer needs (stated and unstated), idea generation, concept development, product/service development up to the commercial realisation stage and all steps in between.</p>	 <p>Figure 1 – Enterprise Europe Network logo.</p>
Objectives and target audience	
The aim of the service offered is to define and evaluate the methods of managing innovation within the company.	
Application procedure	
One or two meetings will be arranged with two or three company managers.	
Contacts	
<p>een@uniroma2.it</p> <p>Contact person: Giovanna Ferraro – giovanna.ferraro@uniroma2.it</p>	

Section 4: SERVICES AND CALLS SUPPORTING TECHNOLOGY TRANSFER**Name and acronym of the service/call with short presentation**

Téchne Accelerator - acceleration program for Startups and Spin-offs from the Lazio Region and Southern Italy Regions, with the purpose of supporting them in a tailor-made training and mentorship program, to increase their value in the market and prepare them for dedicated meeting events with Investors and Corporate.

Working group (institutions/enterprises)

Università degli Studi di Roma Tor Vergata, Università degli Studi di Roma La Sapienza, CNR – Consiglio Nazionale delle Ricerche, Università degli Studi di Roma Tre, Catalent, LUISS, ISS – Istituto Superiore di Sanità, LVenture, Università degli Studi della Tuscia, Università Campus Bio-Medico di Roma, ENEA, MBDA, Confindustria Dispositivi Medici.

Reference pillar (Digital Transition / Energy Transition / BioPharma &Health) and topic

Digital Transition
Energy Transition
BioPharma and Health

Description of the service/call offered**(patenting/prototyping/new start-ups and spin-offs promotion, enterprise acceleration)**

Téchne is a 3-month acceleration program, managed by LVenture Group, during which startups and spin-offs could benefit from specific training content and dedicated mentorship, functional to prepare them for the end-of-term fundraising and matching event with potential clients.

Startups and spin-offs selected between the application received, will benefit from

- ad hoc training on topics central to new entrepreneurship
- dedicated mentorship with technical acceleration experts (by LVenture Group) and vertical mentors (by the partners of the WG Business Acceleration and Venture Capital).

At the end of the acceleration pathway, the startups and spin-offs that have attended the program, will have the opportunity to present themselves to an audience of investors - for possible fundraising actions – and Corporate of the Rome Technopole Ecosystem and in the Network of all the partners of the WG.

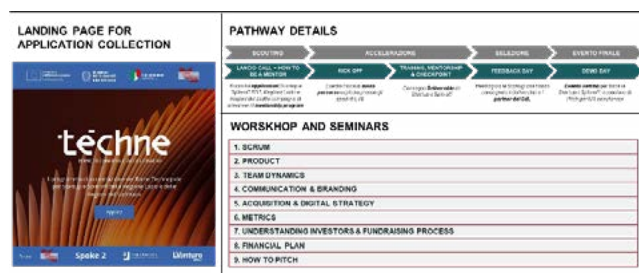


Figure 1 – Téchne Accelerator, Details.

Objectives and target audience


Téchne Accelerator aims to support the growth of startups and spin-offs from the Rome Technopole innovation ecosystem and Southern Italian regions, by supporting them in dedicated paths of acceleration, training and mentorship functional to matching with investors (for fundraising activities) and corporate (potential customers) through specific events organized at the end of the path.

Application procedure


Launch of the Call4Startup & Spin-off (February – March, 2024)
Applications Analysis and Selection of Startup and Spin-off in target with Téchne rules (April, 2024)
Téchne Accelerator (April - June 2024)
Feedback Day and Demo Day (June 2024)

Contacts

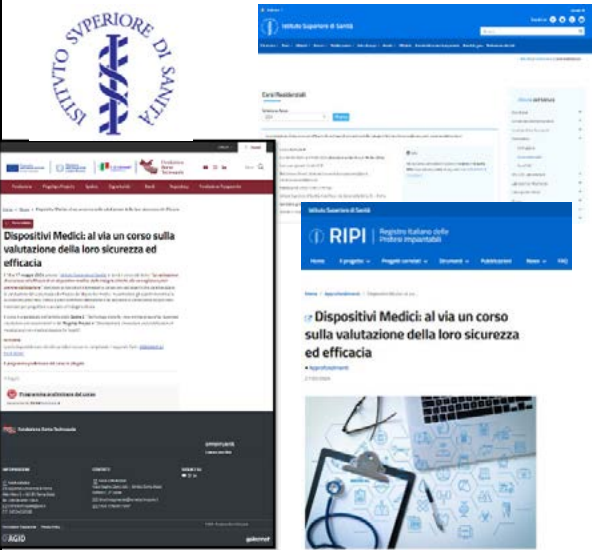
info@lventuregroup.com
rometechnopole.taskforce@uniroma2.it


Section 4: SERVICES AND CALLS SUPPORTING TECHNOLOGY TRANSFER	
Name and acronym of the service/call with short presentation	
Start Cup Lazio - Business Plan Competition for the promotion of new start-ups and spinoff/ Patenting & licensing.	
Working group (institutions/enterprises)	
University of Rome Tor Vergata, Roma Tre University, Sapienza University of Rome, University of Tuscia, Campus Bio-Medico University of Rome, Istituto Superiore di Sanità, National Research Council-CNR, Lazio Innova, Catalent Pharma Solutions Inc, Confindustria Dispositivi Medici, MBDA Italia Spa.	
Reference pillar (Digital Transition / Energy Transition / BioPharma &Health) and topic	
Reference pillars: Digital Transition / Energy Transition / BioPharma &Health Topic: Business incubation, promotion of new start-ups and spinoff / Patenting & licensing	
Description of the service/call offered (patenting/prototyping/new start-ups and spin-offs promotion, enterprise acceleration)	
<p>The Cross Cutting WG has identified new action lines aimed at enhancing business incubation, promotion of new start-ups and spin offs as well as patenting and licensing on the regional innovation ecosystem to be developed within the Start Cup Lazio-Regional Business Plan competition. Start Cup Lazio competition is a generative pathway of innovative entrepreneurship, with researchers of Universities and Research Organizations as its main protagonists. It supports and rewards at the regional level the best innovative business projects proposed by teams of researchers in the following main innovative sectors: Life Sciences-MED Tech, ICT, Cleantech & Energy, and Industrial, that are attributable to the aforesaid reference pillars. The competition is promoted by a network of 57 actors led by University of Rome Tor Vergata, including 11 Universities, 7 Research Organizations and 39 organizations (mostly enterprises) together with the Lazio Region-Lazio Innova. All the universities of the WG as well as the CNR belong to the Start Cup Lazio network. In particular, the competition involves a path lasting overall around eight months which starts with the publication of the call for applications and the scouting of eligible innovative business idea based on research, goes on with training and mentoring programs for the teams of researchers in competition, and ends with winners' selection and the award ceremony.</p>	
Objectives and target audience	
By collaborating and exchanging knowledge, universities, institutions and enterprises of the WG aim at: i) increasing the total number of innovative research-based business ideas submitted to the Start Cup Lazio competition; ii) the number of innovative research-based business ideas submitted by teams from individual Universities and Research Organizations located in the region, and iii) the number of research-based start-ups created annually in the fields of Life Sciences-MedTech, ICT, Cleantech & Energy, Industrial as well as the number of innovative research-based business plans with patents. Moreover, the WG aims at organizing an award-business plan competition to strengthen the collaboration between Universities, Research Organizations, firms and institutions within the Rome Technopole Innovation Ecosystem, with returns in terms of social impact of the entrepreneurial valorization of research.	
Application procedure	
Submission of the participation form to the segreteria@startcuplazio.it by May 6th, 2024.	
Contacts	
Scientific Responsible: Paola Maria Anna Paniccia, University of Rome Tor Vergata, paniccia@economia.uniroma2.it	


Section 4: SERVICES AND CALLS SUPPORTING TECHNOLOGY TRANSFER	
Name and acronym of the service/call with short presentation	
Research, Innovation and Creation Support Service (SARIC).	
Working group (institutions/enterprises)	
Prof. Dr. Fabiola Massa – Assistant professor of Commercial Law (Tor Vergata University) Dr. Matteo Di Fabio – Research Fellow (Tor Vergata University)	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic	
Digital Transition, in particular AI, AR/VR, Digital twins, IOT.	
Description of the service/call offered (patenting/prototyping/new start-ups and spin-offs promotion, enterprise acceleration)	
<p>Administration of a questionnaire to all spin-off and start-up companies set up so far by Technopole partners to understand what management problems they faced.</p> <p>Identification of possible solutions to the problems and critical issues that emerged from the questionnaire.</p> <p>In this way SARIC staff will ensure case-by-case intervention and the findings of the empirical investigation can be drawn on and taken into consideration to prevent that new spin-offs make the same mistakes.</p> <p>Writing of a best practice model company statute to be used by the new spin-off companies to be founded by the Technopole partners.</p> <p>SARIC staff will also contact potential companies interested in the technologies developed by Technopole's partners and offer them to register on the customised version of the Knowledge-Share platform. In this way, companies will be able to view the patents, spin-offs and skills they can find in the Technopole ecosystem and get in touch with their contact persons.</p>	
Objectives and target audience	
<p>SARIC's objectives are to support the spin-offs of Technopole's partners in order to overcome the critical issues that have plagued them so far. In addition, another objective is to support the staff of the various TTOs in disseminating the technologies retained by Technopole partners to potentially interested companies in order to increase the chances of their exploitation.</p> <p>The target audience of SARIC's services consists mainly of the spin-off companies of the Technopole partners, plus the owners of intellectual property rights to the patents filed by these partners.</p>	
Application procedure	
<p>Interview by means of the administration of a questionnaire and subsequent supplementary interview with one or more managers of the spin-off companies.</p> <p>Consultation of patent databases by SARIC staff in order to identify companies potentially interested in acquiring technologies developed by Technopole partners.</p> <p>Making contact with companies potentially interested in acquiring the technologies developed by Technopole's partners.</p>	
Contacts	
<p>Tel. : 06 72595831</p> <p>E.mail: fabiola.massa@uniroma2.it</p>	


Section 5: TRAINING ON TECHNOLOGY TRANSFER	
Name and acronym of the service/call with short presentation	
Digital Twin for Biomedicine and Biopharma DT_BB. The workshop covers Digital Twin for Biomedicine and Biopharma.	
Working group (institutions/enterprises)	
ENEA	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic	
BioPharma & Health	
Description of the service/call offered (training on TT)	
<p>DT applications in the biopharmaceutical field is very new and signify an innovative realm of study providing the capacity to forecast intricate occurrences across various levels, thus streamlining decision-making procedures and minimizing experiment duration. The integration of DT with artificial intelligence is expected to unveil fresh opportunities for the future of biotechnology.</p> <p>The workshop will be organized in different modules, as below described:</p> <ul style="list-style-type: none"> • Module 1 – Introduction to the Digital Twin in the Biomedical sector • Module 2 – Useful tools: Modeling, Numerical simulations • Module 3 – Digital Twin for the optimization, formulation and development of therapeutic molecules and medical devices 	 <p>Figure 1 – ENEA logo.</p>
Objectives and target audience	
<p>The objective of the course is to provide participants with the foundations on Digital Twin technologies in the biomedical field, highlighting how these can be exploited to develop highly personalized treatments and high-precision interventions for the medicine of the future.</p> <p>Innovative and effective strategies will be explored to digitally describe and analyze biological processes at various temporal and spatial scales, from the nanoscale (single molecule) to the macroscale (organism), with a particular focus on advanced tools such as modeling and simulation and high-performance computing.</p> <p>These tools, essential for the analysis, optimization of the formulation and development of drugs, molecules of therapeutic interest and new medical devices, will be explored in depth through the analysis of specific case studies. At the end of the course, the potential of using digital representations, to integrate direct experimental tests, for the biopharmaceutical sector will be shown.</p> <p>Target audience: Industrial partners internal and external.</p>	
Application procedure	
Carried out in the classroom.	
Contacts	
Caterina Arcangeli - ENEA Caterina Merla – ENEA	

Section 5: TRAINING ON TECHNOLOGY TRANSFER	
Name and acronym of the service/call with short presentation	
3D Printing for Industrial and Biomedical Applications - 3D PRI. The goal of this program is to train professionals in the field of rapid prototyping, and in particular in the use of various 3D printing techniques for industrial-type applications and in the biomedical sector. The occupational profile is a technical figure capable of creating sensors and devices through new 3D printing technologies	
Working group (institutions/enterprises)	
Università Campus Bio-Medico di Roma Medere Srl	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic	
BioPharma & Health	
Description of the service/call offered (training on TT)	
<p>The aim of this educational initiative is to cultivate a skilled workforce adept in the art of rapid prototyping, with a strong emphasis on mastering a wide array of 3D printing methodologies tailored for industrial and biomedical applications. The program is designed to endow participants with the necessary expertise to navigate and excel in this innovative and ever-evolving field. Attendees are expected to become proficient technicians who can ingeniously fabricate a variety of complex products, ranging from intricate components for industrial machinery to advanced sensors and cutting-edge medical devices, all utilizing the latest advancements in 3D printing technology. This comprehensive training seeks to empower individuals to not only operate but also innovate within the realm of additive manufacturing, thereby contributing to the growth and sophistication of the industry.</p>	
Objectives and target audience	
3D Printing: characteristics, applications, various technologies Potential applications in the industrial and biomedical fields (e.g., bioprinting, medical devices) Technology transfer: a corporate example of using 3D printing to create a device for biomedical application. Target Audience: <ul style="list-style-type: none"> • PhD students • Post-docs; • Researchers and Technologists. 	
Application procedure	
For information e registration: http://www.scuolaiad.it/component/zoo/item/technopole .	
Contacts	
Carlo Massaroni Università Campus Bio-Medico di Roma, Rome.	

Section 5: TRAINING ON TECHNOLOGY TRANSFER	
INTELLECTUAL PROPERTY AND TRADEMARK PROTECTION: FOCUS ON MEDICAL DEVICES AND BIOTECHNOLOGY	
<p>MD safety and effectiveness assessment: from clinical investigations to post-market surveillance.</p> <p>The course, “MD safety and effectiveness assessment: from clinical investigations to post-market surveillance” “organized by Spoke 2_ISS, will take place at ISS on 16-17 May 2024. The course aims to provide an overview of the various aspects involved in the evaluation of the safety and effectiveness of medical devices, particularly those aspects inherent in preclinical, clinical, and postmarket evaluation, and to provide researchers with an understanding of the processes involved in designing and initiating a clinical investigation.</p>	
<p>Working group (institutions/enterprises)</p> <p>Giovanni Calcagnini, Francesca Capone, Luciano Castiello, Federica Censi, Paola Fattibene, Paola Laricchiuta, Roberta Marcoaldi, Veronica Mari, Carlo Petrini, Luciana Riva, Marina Torre (<i>Istituto Superiore di Sanità</i>); Adele Misticoni Consorti, Marina Urpis (<i>Ministero della Salute, ex Direzione Generale dispositivi medici e servizio farmaceutico</i>); Fabrizio Guerra (<i>Sapienza Università di Roma</i>); Massimo Ciccozzi, Laura Santangelo (<i>Università Campus Biomedico</i>); Gianluca Sferazza (<i>Consiglio Nazionale delle Ricerche</i>); Valeria Glorioso, Giulia Magri (<i>Confindustria-DM</i>).</p>	
<p>Reference pillar (Digital Transition / Energy Transition / BioPharma &Health) and topic</p> <p>BioPharma & Health</p>	
<p>Description of the service/call offered (training on TT)</p> <p>The course is organized in 4 sessions: 1) Clinical Investigations and the role of the Competent Authority and Ethics Committees, 2) Practical test on setting up the preparation of documentation for submitting an application to an Ethics Committee, 3) Post-marketing Surveillance, 4) Researchers tell their stories: comparing experiences. Session 1 aims at giving a general overview on clinical investigations and provides participants with some tips and advices about the preparation of a proposal to be submitted to an Ethical Committee. In Session 2, participants are organized in groups and requested to prepare a proposal. All the proposals are presented to the audience and discussed with the teaching panel of experts. Session 3 provides information about post-market surveillance, from the point of view of Industry, Registries and Notified Bodies. In Session 4, researchers share with the participants their direct experience and provide an overview on intellectual property, Open Innovation and Technology Transfer.</p>	
 <p>Figure 1 - Course announcements.</p>	
<p>Objectives and target audience</p> <p>The course is intended for researchers from health care and research organizations and institutions, industry professionals, and Rome Technopole Project partners interested in learning more about preclinical, clinical, and postmarket evaluation and gaining knowledge regarding the processes required to design and initiate a clinical investigation and technology transfer.</p>	
<p>Application procedure</p> <p>The Course, open to a maximum of 30 participants, has been announced on the following websites: 1) Istituto Superiore di Sanità (https://www.iss.it/corsi-residenziali), 2) Registro italiano delle protesi impiantabili (https://ripi.iss.it/ripi/it/news/approfondimenti/al-via-un-corso-sulla-valutazione-della-sicurezza-e-dellefficacia-dei-dispositivi-medici/), 3) Rome Technopole (https://www.rometechnopole.it/news/dispositivi-medici-al-via-un-corso-sulla-valutazione-della-loro-sicurezza-ed-efficacia/). Moreover, the news of the course appeared in the Rome Technopole Newsletter of 28th March 2024 and circulated via LinkedIn.</p>	
<p>Contacts</p> <p>Francesca Capone (francesca.capone@iss.it), Veronica Mari (veronica.mari@iss.it), Marina Torre (marina.torre@iss.it); Alessia Biondi (alessia.biondi@iss.it), Stefania Ceccarelli (stefania.ceccarelli@iss.it), Paola Fattibene (paola.fattibene@iss.it).</p>	

Section 5: TRAINING ON TECHNOLOGY TRANSFER	
Name and acronym of the service/call with short presentation	
Digital Twin aim and solutions: an Introduction – DT_ASI. The workshop is an introduction to digital twin	
Working group (institutions/enterprises)	
ENEA Industrial Partners	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic	
Digital Transition	
Description of the service/call offered (training on TT)	
<p>The workshop aims to introduce the use of the digital twin in different sectors.</p> <p>The event will be divided into two sections:</p> <ol style="list-style-type: none"> 1) An introduction to the concept of Digital Twin: potential and revolutionary role, applicability, advantages, cost reduction, etc. - Applications in the Energy, Healthcare and BioPharma, Digitalization sectors. 2) Commercial digital twin: Industrial partners will demonstrate different Digital Twin solutions in the three sectors analyzed in the first section. 	 <p>Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile</p> <p>Figure 1 – ENEA logo.</p>
Objectives and target audience	
<p>The objective of the workshop is to provide participants with the fundamentals of Digital Twin technologies, and their utility in the different sectors. This workshop aims to introduce the Digital Twin in its digital form. It will showcase the state of the art of the Digital Twin, with a focus on Design DT and Service DT, meaning the Digital Twin used both in the virtual design phase and in production for predictive analysis.</p> <p>The workshop will consist of two main modules, totaling 2 hours of training. Module 1 – Introduction to the Digital Twin solutions Module 2 – Industrial Experiences</p> <p>Target audience: Industrial partners internal and external.</p>	
Application procedure	
Webinar online	
Contacts	
Valeria Palladino – ENEA valeria.palladino@enea.it Maria Valenti – ENEA maria.valenti@enea.it	

Section 5: TRAINING ON TECHNOLOGY TRANSFER	
Name and acronym of the service/call with short presentation	
Digital Twin for HPC monitoring with Data Science Techniques - DT_HPC. The workshop covers Digital Twins for HPC monitoring with Data Science Techniques.	
Working group (institutions/enterprises)	
ENEA	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic	
Digital Transition	
Description of the service/call offered (training on TT)	
<p>Digital Twins are becoming increasingly important because they allow simulation and prediction of the behavior of an object or, in this case, a high-performance computing infrastructure, enabling the reduction of energy consumption, optimization of computing processes, and identification of potential anomalies. Creating a Digital Twin requires several skills: infrastructure skills to design the data collection architecture from IoT sensors; computer skills to manage and process the data with the help of supercomputing; mathematical skills to model real processes with data and create control/prediction algorithms, and HPC skills as the amount of collected data requires scalable algorithm management.</p> <p>The workshop will consist of three modules, totaling 3 hours of training.</p> <p>Module 1 – Introduction: DT and HPC-Infrastructure. Module 2 – Useful Tools: Parallelization procedures, data science techniques for predictive analysis. Module 3 – DT for monitoring HPC infrastructure.</p>	 <p>Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile</p> <p>Figure 1 – ENEA logo.</p>
Objectives and target audience	
<p>This workshop intends to provide an introduction to DT and its digital decline. It will show the state of the art of DT, with a focus on Design DT and Service DT, i.e., the Digital Twin used both in the virtual design phase and in the production phase for predictive analysis. It will highlight the need for advanced simulation through the use of massively parallel high-performance computers (HPC, High-Performance Computing). The Digital Twin Data Center use case will be demonstrated in collaboration with the industry.</p> <p>The workshop “Digital Twin for HPC Monitoring with Data Science Techniques” aims to provide participants with the basic information and skills needed to create and manage a digital twin in the HPC context:</p> <ul style="list-style-type: none"> - Infrastructure skills to create the data collection architecture from sensors. - Computer skills to manage the volume of data and process it with the help of supercomputing. - Mathematical skills to model real processes with data science techniques for control/prediction. <p>Target audience: Industrial partners internal and external.</p>	
Application procedure	
Carried out in the classroom/ online	
Contacts	
Marta Chinnici – ENEA marta.chinnici@enea.it Davide De Chiara – ENEA	

Section 5: TRAINING ON TECHNOLOGY TRANSFER	
Name and acronym of the service/call with short presentation	
Effective Team Management – ETM. The success of innovation management depends upon the effectiveness of the teams that manage the innovation. Nevertheless, effective team management requires the adaptation of multifaceted soft skills. Digital innovation makes no exception and the success of start ups and spin offs may be hindered by neglecting the importance of teams and team management. This workshop lays the foundation for the awareness of the importance of teams and the tools that help managing them in innovative digital environments.	
Working group (institutions/enterprises)	
Lucia Marchegiani; Federico Ceschel; Roberta Guglielmetti Mugion: Roma Tre University, Department of Business Studies Loris Antonelli, expert team consultant	
Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic	
Digital Transition: the workshop fosters the development of soft skills in digital innovation environments	
Description of the service/call offered (training on TT)	
Half-day seminar followed by one full day outdoor training, to experience: <ul style="list-style-type: none"> • Leadership • Excellent management • Group dynamics • Feedback • Coaching • Conflict management • Negotiation 	 <p>Figure 1 – Outdoor team building.</p>
Objectives and target audience	
The objective of the workshop is to explore the peculiar characteristics of teams in start-up and spin-off cases, starting from the typical issues of managing successful teams. The path explores the processes behind the creation, functioning and maintenance of a team and provides techniques for transforming your work group into a close-knit and high-performing team. Since this is a path for technological transfer, particular attention is paid to the composition of the team, which can be based on the skills of the components necessary to implement the business model or alternatively born with the founders who are generally the creators of the product developed starting from the skills of the members. The course integrates classroom training with an experiential outdoor team management proposal, with a focus on effective communication and conflict resolution. Level base. PhD and Post-doc who want to launch their own start-up or spin-off.	
Application procedure	
Pitch of the business idea and team composition of the proposed start-up/spin-off.	
Contacts	
lucia.marchegiani@uniroma3.it federico.ceschel@uniroma3.it	

Section 5: TRAINING ON TECHNOLOGY TRANSFER

Name and acronym of the service/call with short presentation

Digital Twin, integration of GIS and BIM systems for the digital transition - DT_GIS_BIM.

The aim of the workshop is to provide the state of the art of the technologies available today for the construction of Digital Twin through the knowledge of tools for the survey, analysis and management of the territory and architecture.

The goal is also to provide the framework of skills useful for the integration of processes between the different disciplines that contribute to the construction of the Digital Twin model. The course responds to a market need to create new professional figures capable of combining different skills, through the synergistic integration of BIM and IOT GIS systems for the Digital Twin according to the paradigms of the Smart City.

The course will address real-world methodologies and applications and use cases regarding technologies such as GNSS GIS, UAV, BIM, and LIDAR and IoT.

Working group (institutions/enterprises)

Roma Tre: L. Farroni - G. Giordano - P. Marrone - A. Cecili - M.F. Mancini

Riferimenti Esterni: E. Consiglio (Overit) M. Ieradi (Esri) P. Centanni (Stonex) P. Gilardi (3DTarget), dott. A. Bonamico PRA (Parco Regionale dell'Appia Antica), G. Petrucci (Autodesk-Deskor).

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Digital Transition _ The course pays particular attention to the methodologies useful for the integration of information, in their widest geographical and built, according to processes and models that make the digital transition in the territorial and architecture environment effective and sustainable.

Description of the service/call offered (training on TT)

The workshop will aim to provide theoretical and applicative knowledge, through lectures and seminars on theoretical aspects and application case studies, related to the following modules: introduction on the disciplines concerned; relevant tools, platforms of data use, data management methods and system integration that will close the training path. The practice in outdoor is placed in the middle of the week in order to summarize what communicated and proceed to new communications.



Figure 1 - Scheme of knowledge transfer proposed in the workshop.

Objectives and target audience

The figure that will emerge will be able to guess, manage and design training plans and systems at different scales of territorial representation by dialoguing interoperability concepts necessary for the realization of a holistic approach unavoidable in the processes of managing living spaces. Level Base and Intermediate.

Application procedure

Official procedure of the technopole. For the registration procedures: <http://www.scuolaiaad.it/component/zoo/item/technopole>

Contacts

Laura Farroni Associate Professor Icar 17, Dipartimento Architettura, Università degli Studi Roma Tre mail: laura.farroni@uniroma3.it

Section 5: TRAINING ON TECHNOLOGY TRANSFER

Name and acronym of the service/call with short presentation

Advanced Product Design and Optimization using - FEM APD_FEM.

The "Advanced Product Design and Optimization using FEM (APD_FEM)" course offers a comprehensive training program aimed at mastering advanced Finite Element Method (FEM) techniques. Delivered over 30 hours through seven lessons, participants will gain expertise in various aspects of FEM, including theoretical foundations, commercial software applications, linear and nonlinear analysis, dynamic behavior of structures, thermo-structural analysis and optimization methods. Targeted at professionals, undergraduate, and graduate students with technical backgrounds, the course integrates real-world projects and collaboration opportunities with industry stakeholders. Led by Prof. Marco Evangelos Biancolini, applicants with relevant qualifications are invited to apply for the program, contributing to the advancement of digital prototyping and product optimization in the context of the Digital Transition paradigm.

Working group (institutions/enterprises)

The network of stakeholders that already follow master's theses and students of the Advanced Structural Design course will be involved. Among them: INAF-IAPS, EuroFUSION, F4E, Ansys, RBF Morph, RINA, and the MeDiTATE consortium.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Digital Transition – State of the Art Virtual Prototyping to conceive better and greener products

Description of the service/call offered (training on TT)

A complete path to master advanced Finite Element Method is offered. 30 hours of training in seven lessons according to the following breakdown:

1. Introduction to the world of FEM: theoretical background and addressable issues
2. Platforms and commercial software. Key features
3. Linear static analysis: from geometry to results
4. Nonlinearities in finite element analysis
5. Dynamic behavior of structures: beyond modal analysis
6. Thermo-structural analysis and instability: case studies and examples
7. Optimization in structural engineering, from zero-order methods to evolutionary methods.

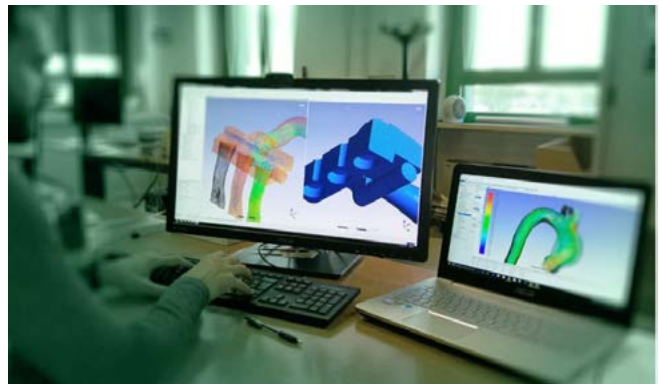


Figure 1 - Virtual prototyping in action.

Objectives and target audience

The objective of the course is to provide the most advanced knowledge related to CAE tools (multi-physics simulation of structural behavior). In the basic course, state-of-the-art commercial software for structural analysis will be introduced; it will be possible to carry out projects in the company and extend the course according to specific needs. The course aims to bring together professionals from companies, undergraduate students, recent graduates with master's degrees, and research PhD students specializing in particularly innovative topics, on which a project work will be developed.

Application procedure

Participants must apply by emailing the coordinator of the course, Prof. Marco Evangelos Biancolini (biancolini@ing.uniroma2.it), and attaching a curriculum vitae. Applicants must possess a master's degree in scientific or technical disciplines (mathematics, physics, engineering) or be employed with technical qualifications in companies requiring advanced product design and optimization. Applications will be considered valid if received at least 15 days before the first lesson of the course.

Contacts

Information about the course, its contents and the schedule can be requested to the coordinator, Prof. Marco Evangelos Biancolini biancolini@ing.uniroma2.it

Section 5: TRAINING ON TECHNOLOGY TRANSFER**Name and acronym of the service/call with short presentation****Engineering and Management of Industrial Companies – EMIC.**

The objective is to build a managerial profile capable of dealing with the rapidity of changes affecting skills, organisational structures, the competitive environment and strategic resources, providing effective answers and solutions. The aim of the course is also to develop not only managerial skills, but also creativity, leadership qualities and the ability to embrace the entire horizon of economic and organisational events in order to be able to deal with a wide range of management problems.

Working group (institutions/enterprises)

Elisa Battistoni (Tor Vergata), Roberta Costa (Tor Vergata), Massimiliano M. Schiraldi (Tor Vergata), Roberta De Lisi (MBDA).

Tor Vergata University of Rome, Italy.

Collaboration with MBDA in project work. Possibility to carry out in-depth projects with Rome Technopole partner companies and external companies.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

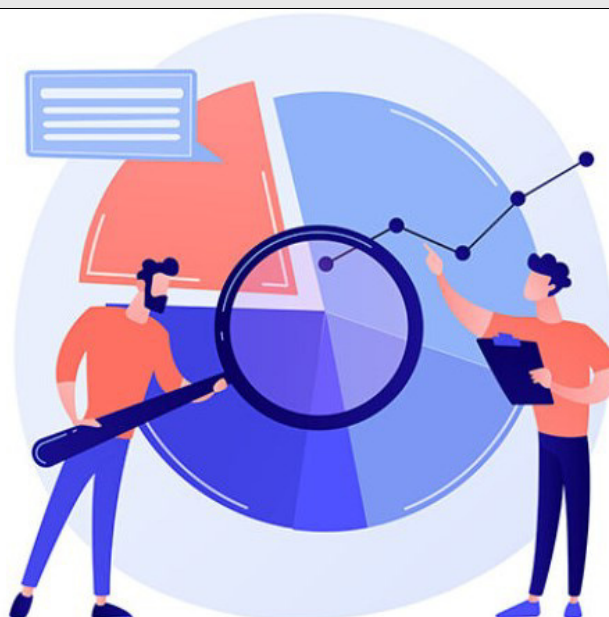
Digital Transition

Description of the service/call offered (training on TT)

The course includes the following training modules:

1. Design, analysis and mapping of organisational processes: Business Process Management and BPMN2.0 notation
2. Notes on decision-making under conditions of uncertainty and application of the AHP methodology
3. Corporate culture, organisational climate and change management
4. Project management for research and development projects

Collaboration with MBDA on Project Work.
Opportunity to carry out in-depth projects with the partner companies of the Rome Technopole and external ones.

**Objectives and target audience**

The course aims to provide learners with the basics on:

- 1) Modelling and representation of organisational processes with a view to their subsequent translation into digital workflows;
- 2) Analytic Hierarchy Process (AHP) methodology as decision support in contexts with unclear or multiple objectives and multiple decision-makers;
- 3) Corporate culture, organisational climate and change management;
- 4) Tools and principles for evaluating project ideas before launch, for setting and verifying the achievement of project objectives during project execution, and for evaluating project benefits and return on investment afterwards.

Application procedure

For the registration procedures: <http://www.scuolaiaed.it/component/zoo/item/technopole>

Contacts

Roberta Costa roberta.costa@uniroma2.it
Elisa Battistoni elisa.battistoni@uniroma2.it
Massimiliano M. Schiraldi schiraldi@uniroma2.it

Section 5: TRAINING ON TECHNOLOGY TRANSFER

Name and acronym of the service/call with short presentation

Smart Maintenance – SM.

Welcome to the course on Smart Manufacturing, where we navigate the forefront of industrial innovation and digital transformation within the Rome Technopole Innovation Ecosystem. In today's rapidly evolving landscape, the manufacturing sector is undergoing a profound shift driven by the integration of digital technologies, collectively known as Industry 4.0. The course aims to bridge the divide between academic expertise and practical industry applications. By distilling advanced methodologies developed in academic settings and translating them into actionable insights, we empower professionals to harness the full potential of the emerging smart manufacturing methodologies within their organizations. Participants will join on this transformative journey, being equipped with the skills, knowledge, and practical tools necessary to drive digital transformation initiatives and propel the manufacturing sector towards unparalleled levels of efficiency and competitiveness.

Working group (institutions/enterprises)

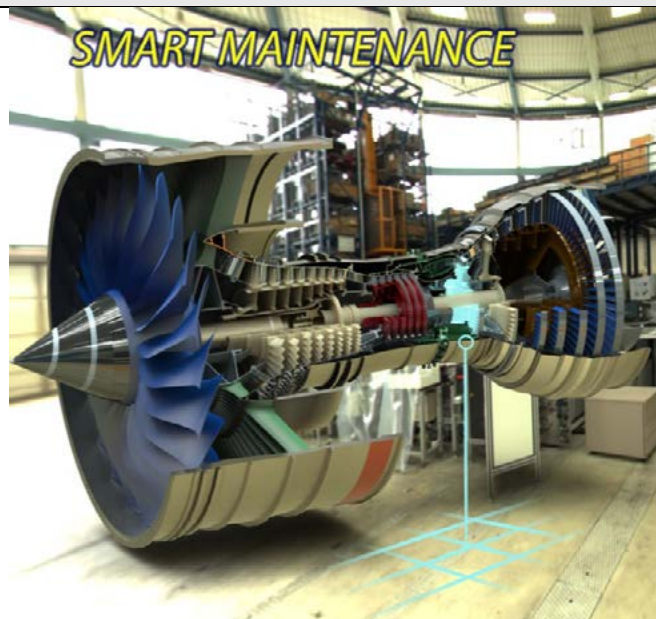
The course will be held at University of Rome Tor Vergata. Project Works will be in cooperation with other Rome Technopole Partners as Thales Alenia Space, BV Tech and Almagora, with the support of Joint Laboratories established in the Rome Technopole Innovation Ecosystem.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Digital Transition – Use of Key Enabling Technologies for supporting maintenance operations.

Description of the service/call offered (training on TT)

- The effects of the development of digitalization on maintenance: the 4.0 paradigm applied to maintenance. How to assess company's readiness for transition.
- From new ways of applying old maintenance policies to new maintenance policies.
- The reorganization of a maintenance plan from an Industry 4.0 perspective through a review of the Reliability Centered Maintenance techniques.
- Applications of reverse engineering and 3D printing for the manufacturing of spare parts
- Virtual reality and augmented reality to support the maintenance and the development of new systems
- Reverse Engineering & Virtual Reality Laboratory Experience
- Development of Digital Twins based and integration techniques with IIoT systems
- Final project work on practical cases and/or implementations.



Objectives and target audience

The aim of the course is to provide the most advanced knowledge related to maintenance management models that integrate the enabling technologies of industry 4.0. At the end of the course, the participant will be able to assess the readiness of a production system for the introduction of maintenance 4.0 and propose a plan for the introduction of smart maintenance within the organization.

Career opportunities are about specialist within the maintenance/engineering unit of an industrial company or within maintenance service companies.

Application procedure

Participants must apply by emailing to the coordinator of the course, Prof. Pier Paolo Valentini (valentini@ing.uniroma2.it) and attaching a curriculum vitae. Applicants must possess a master's degree in scientific or technical disciplines (math, physics, engineering) or be employed with technical qualification in companies related to Industry 4.0. Applications will be considered valid if received by 15 days before the first lesson of the course.

Contacts

Information about the course, its contents and the schedule can be requested to the coordinator of the course, Prof. Pier Paolo Valentini (valentini@ing.uniroma2.it).

Section 5: TRAINING ON TECHNOLOGY TRANSFER**Name and acronym of the service/call with short presentation****Innovative Process Technologies – IPT.**

The workshop Innovative Process Technologies focuses on Industry 4.0 technologies, in particular additive manufacturing and laser technology, in different application contexts, from biomedical to industrial sector.

The course will cover basic principles, modelling, simulation and process optimization through the analysis of practical case studies within the Rome Technopole Innovation Ecosystem.

At the end of the training course, participants will gain expertise useful to drive the digital transformation of manufacturing sector, known as Industry 4.0, in terms of technologies efficiency and competitiveness.

Working group (institutions/enterprises)

The course will be held by the Research Group on Technologies and Manufacturing Systems at the University of Rome Tor Vergata, delivered in hybrid mode.

Project Works will be in cooperation with other Rome Technopole Partners and Stakeholders.

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Digital Transition – Industry 4.0 technologies

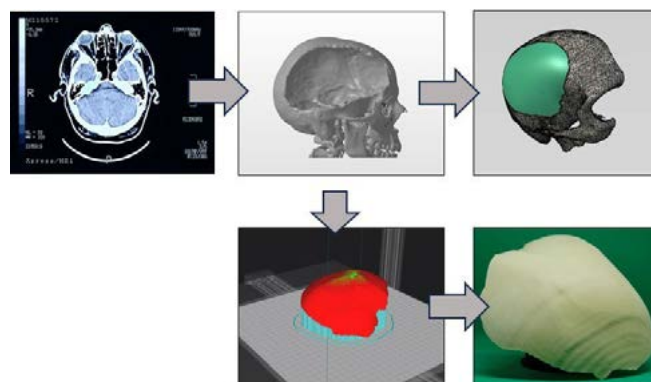
Description of the service/call offered (training on TT)

30 hours of training will be held on the following topics:

- The effects of digitalization on production, the industry 4.0 paradigm applied to manufacturing processes;
- Additive manufacturing technologies;
- Modeling and simulation of additive processes;
- LASER technology;
- Expert systems to support production;

Finally, project works on practical cases will be performed and discussed.

The analysis of case studies will show how advanced methodologies developed in academic context will be translated to companies and organizations.

**Objectives and target audience**

The aim of the course is to provide advanced knowledge related to Industry 4.0 technologies.

Additive manufacturing and LASER technologies will be approached in different sectors; expert systems will be considered to support production processes.

The workshop targeted at professionals, undergraduate, and graduate students with technical backgrounds.

Application procedure

For the registration procedures: <http://www.scuolaiaad.it/component/zoo/item/technopole>

Contacts

Information about the contents and the schedule can be requested to Prof. Federica Trovalusci
federica.trovalusci@uniroma2.it

Section 5: TRAINING ON TECHNOLOGY TRANSFER**Name and acronym of the service/call with short presentation****Use of Wood and Extension of Useful Life through Low Environmental Impact Methodologies – WEU.**

The workshop trains the evaluation of the use of wood as a renewable, sustainable and green material, specifically in the outdoor environment.

Working group (institutions/enterprises)

Angela Lo Monaco (UniTUS DAFNE) Claudia Pelosi (UniTUS DEIM) Gianluca Rubino (UniTUS DEIM).

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Energy transition

Description of the service/call offered (training on TT)

The course aims to train a transversal figure capable of evaluating the use of wood as a renewable, sustainable and green material, specifically in the outdoor environment.

The course will take place in the third week of June, (two or three days from 17 to 21 June, including the practical application part)

The professional profile is a technical figure capable of carrying out quality checks on wood and coatings.

The topics covered are

- Wood: characteristics, applications, limits of use
- Morphological, aesthetic and mechanical characterization methodologies
- Coatings techniques
- Heat treatment: benefits and critical issues of thermal modification.
- Technology transfer: innovative methodologies aimed at improving and maintaining the characteristics of wood for prolonged periods of use.

**Objectives and target audience**

The professional profile is a technical figure capable of carrying out quality checks on wood and coatings. The level is basic.

At the time of enrolment, candidates must possess one of the following qualifications:

- Bachelor's degree in STEM disciplines
- alternatively, be hired with a technical qualification in companies relevant to the course topics.

Application procedure

There are 15 positions; candidates are selected based on qualifications and the order in which the applications are received by email.

Contacts

Angela Lo Monaco lomonaco@unitus.it
 Claudia Pelosi pelosi@unitus.it
 Gianluca Rubino gianluca.rubino@unitus.it

Section 5: TRAINING ON TECHNOLOGY TRANSFER

Name and acronym of the service/call with short presentation

Digital Twin for Energy and Production Management - DT_EPM.

The aim of the workshop is to provide participants with a robust understanding of Digital Twin technologies, highlighting how they can be exploited to optimize energy and production management in the industrial domain, through the definition of a strategic and efficient approach. Effective strategies to facilitate the digital transition and digital energy management will be explored, with a particular focus on advanced tools such as simulation and machine learning. These tools, essential for the analysis and optimization of processes, will be deepened through analysis of real case studies.

At the end of the course, participants will be able to operate within digital transition implementation projects and contribute to the development of Digital Twin projects in an industrial environment.

Working group (institutions/enterprises)

The workshop is held at University of Rome Tor Vergata. The lecturers are Vito Introna (UniRoma2) and Annalisa Santolamazza (Uniroma2).

Reference pillar (Digital Transition / Energy Transition / BioPharma & Health) and topic

Energy Transition and Digital Transition - Digital Twin applications for Energy e Production Management.

Description of the service/call offered (training on TT)

The workshop is structured across four distinct modules:

- Module 1 – Introduction to Digital Twin**
 The course begins with a foundational overview of Digital Twins. It delineates their function and utility in bridging the physical and digital realms.
- Module 2 – Essential Tools: Machine Learning and Simulation**
 Key tools and technologies that drive Digital Twins are explored in this module. A focus on machine learning and simulation provides knowledge and practical examples.
- Module 3 – Digital Twin for Energy Management**
 This module delves into the potential of Digital Twins in energy management, offering insights into optimizing energy use, cost reduction through real-time data analytics and predictive modeling.
- Module 4 – Digital Twin for Production Management**
 The course concludes with a focus on the application of Digital Twins in the production sector, highlighting strategies to enhance production efficiency, product quality, and maintenance management.



Objectives and target audience

The aim of the course is to provide advanced knowledge related to Digital Twin applications related to energy and production management, highlighting the characteristics of different implementations. Upon completion, attendees will be proficient in evaluating a system's suitability for the integration of a Digital Twin solution and will be capable of formulating a comprehensive strategy for its implementation within an organizational context. The curriculum is beneficial for both engineering students and practitioners seeking to become pivotal contributors within the digital transformation and energy management projects.

Application procedure

The workshop is already underway, it started on March 21.

Find the information on <http://www.scuolaiaed.it/component/zoo/item/technopole>

Contacts

Information about the course can be requested to Ing. Annalisa Santolamazza (annalisa.santolamazza@uniroma2.it) or Prof. Vito Introna (vito.introna@uniroma2.it)

Spoke 2

Technology transfer, new entrepreneurship,
business incubation and acceleration



Leader: Università degli Studi Tor Vergata

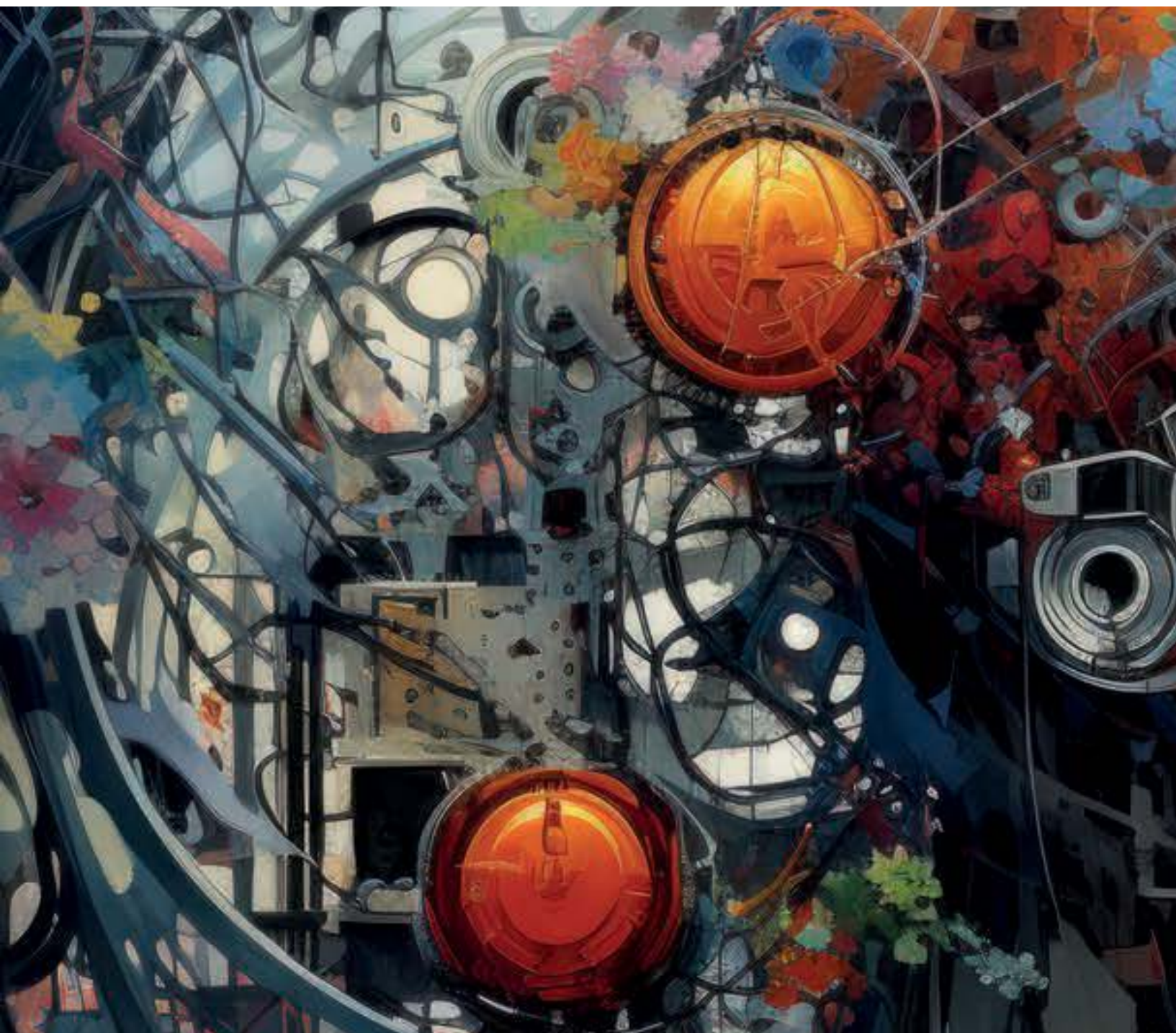
Affiliates: Università degli Studi di Roma Sapienza, Università degli Studi Roma Tre, Università degli Studi della Tuscia, Università di Cassino e del Lazio Meridionale, Università Campus Bio-Medico di Roma, Istituto Superiore di Sanità, LUISS, CNR – Consiglio Nazionale delle Ricerche, ENEA, Confindustria Dispositivi Medici, Al maviva S.p.A., Catalent Anagni S.r.l., LVenture Group S.p.A.

TASKS
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 off
2.4 Business acceleration and venture capital
2.5 Training in technology transfer
2.6 Patenting & licensing



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TOR VERGATA
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