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BEST4.0

BEST 4.0

I4.0 Service Catalogue for SMEs of BE Sector

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SUMMARY

BEST 4.0 - D.2.2.1
Action Plan for testing I4.0 Service Catalogue for SMEs of BE Sector

1. Introduction (by PP3)

Objective

The objective of this Action Plan is to provide a structured framework for the testing of the Industry 4.0 Service Catalogue developed within the BEST 4.0 project. The plan has been prepared by PP3 (CETMA) on the basis of the inputs collected from project partners during the 2nd Exchange Visit in Italy.

The document consolidates the list of I4.0 services jointly agreed by partners and Associated Organisations (AOs), clustered into three main typologies:

- Business Improvement Services
- Industry 4.0 Application Services
- Capacity Building Services

These services will be concretely tested within Work Package 3 (WP3), involving a total of 80 SMEs across the Programme area.

Scope of the Report

The scope of this deliverable is to:

- Present the structure of the I4.0 Service Catalogue, including the services to be tested and the methodology for their validation.
- Describe the **company profiles of project partners**, the **facilities and laboratories available**, and the **services offered**, categorized into the three macro areas.
- Provide the operational basis for the testing activities to be implemented with SMEs in WP3, ensuring comparability, transparency, and transferability of results across the Programme area.

2. Overview of the I4.0 Service Catalogue for SMEs of BE

This section provides a comprehensive overview of the Industry 4.0 Service Catalogue jointly designed by the BEST 4.0 partners. The catalogue represents a consolidated framework of services aimed at supporting the digital transformation of SMEs operating in the Blue Economy sector.
Based on the contributions collected during the project's exchange visits and partner consultations, the catalogue has been structured into **three main typologies**:

- **Business Improvement Services**
- **Industry 4.0 Application Services**
- **Capacity Building Services**

For each project area/partner, the following information is presented:

- **Company profile** of the partner, outlining its role, competencies, and organizational capacity, along with **related laboratories and infrastructures available for testing and demonstration (2.1)**;
- **Catalogue of services** offered, clustered according to the three macro areas **(2.2)**.

This structure ensures comparability and coherence across the partnership, while also reflecting the specific expertise and facilities of each partner. The services described here will serve as the operational basis for testing activities under WP3, where a total of 80 SMEs will be involved across the Programme area.

Project Partners and Areas
Project partners of BEST 4.0 are:

- CNA Ferrara Association (Lead Partner),
- CNA Territorial Association of Ancona (Partner 2),
- CETMA - European Research Center for Technologies Design and Materials (Partner 3),
- Area Science Park (Partner 4),
- Croatian Chamber of Economy (Partner 5),
- Istrian development agency - IDA Ltd. (Partner 6),
- Association DIH AgriFood Croatia (Partner 7) and
- University of Rijeka, Faculty of Maritime Studies (Partner 8).

Below is the map with the territorial indication showing where the partners are located.

8 Project Partners and Areas:

1 – CNA Ferrara
2 – CNA Ancona
3 – CETMA
4 – AREA Science Park
5 – HGK Croatian Chamber of Economy
6 – IDA Istrian development agency
7 – Association DIH AgriFood Croatia
8 – PFRI University of Rijeka, Faculty of Maritime Studies

160 Companies assessed (20 per Partner)

CNA Ferrara – Lead Partner

2.1 - Company profile and related laboratories and infrastructures

CNA (National Confederation of Crafts and Small and Medium Enterprises) is an association of businesses, entrepreneurs, and freelancers, politically and culturally autonomous, and economically independent. Its purpose is to represent, protect, and promote businesses, as well as to provide services for the management and development of their activities. Its structure consists of 19 regional offices (CNA Regionali), 96 territorial offices (CNA Territoriali), about 9.000 people work in 1.100 Confederation offices.

The CNA system provides to its associated businesses a wide range of services, such as, for example: assistance in administration, tax accounting, payrolls, income-tax returns, fiscal matters, labor legislation, environmental legislation, assistance in the establishments of new enterprises, fiscal services, financial counselling for small businesses, training, promotion, internationalization, innovation services, assistance and consultancy in the fields of health and pensions CNA Ferrara encompasses around 4,800 businesses, comprising artisans, those in commerce, small and medium-sized enterprises (SMEs), and professionals.

CNA Ferrara is a local association that is part of the CNA Emilia Romagna network and is one of the DIHs in the CNA HUB 4.0 network. CNA Hub 4.0, the Digital Innovation Hub of CNA Emilia-Romagna aims to create and maintain a strong connection among key players (research laboratories, businesses, institutions, Innovation Centers, Clust-ER, etc.) to promote digital transition, knowledge generation, and technological and organizational

innovation, while capitalizing on skills and relationships. CNA HUB 4.0 coordinates a network of 10 Digital Innovation Hubs (DIHs), real local access points to tools, services, and relationships useful for the development of SMEs, with the aim to guide companies in understanding their digital maturity and sustainability approach, while identifying key areas for intervention and available incentives at all levels, from local to European.
CNA FERRARA / CNA HUB 4.0 is featured on Atlante 4.0, the first portal promoted by Unioncamere and the Ministry of Economic Development, aimed at showcasing national structures that support companies in technology transfer and digital transformation processes. Since 2022, the regional CNA HUB 4.0 and local HUBs have been accredited within the Digital Transition Network of the Emilia-Romagna Region. CNA's innovative services are also included in the it-ER Service Guide by ARTER, as an organization providing direct or indirect support to international talents in Emilia-Romagna.
CNA HUB 4.0 serves as a key access point to services and tools supporting the growth of Small and Medium Enterprises (SMEs) in the digitalization era.
Aligned with the National Industry 4.0 Plan and the Smart Specialization Strategy of Emilia-Romagna, its mission is to contribute to building a region that is increasingly dynamic, competitive, and capable of generating employment growth by enhancing the efficiency of its structures and knowledge systems.
CNA HUB 4.0 fosters and maintains strong connections with key stakeholders-including research laboratories, companies, the Emilia-Romagna Region, innovation centers, and Clust-ER networks-to stimulate knowledge generation, technological and organizational innovation, and to capitalize on skills and partnerships.
Although it does not own laboratories or technological facilities, CNA HUB 4.0 guides companies through their technological and digital transition by offering assessment, design, financing, and verification services, leveraging well-established partnerships within the regional innovation ecosystem.

2.2 - I4.0 Services Provided

To assist companies in their growth and transformation processes, CNA HUB 4.0 offers a service catalog which, starting from a bottom-up approach, provides tailored and precise responses to expressed needs:

- Innovation and Research
- Financial Consulting and Credit
- Training and Skills
- Internationalization
- Sustainability

1. "To improve business" macro area

1. Organizational Innovation
   Business networks
   Lean manufacturing
   Creation of international partnerships

2. Digitalization
   Purchase and installation of hardware
   Choice of management software
   Implementation of websites and business networks

3. Management Consultancy
   Survey of the innovation potential
   Implementation of development plans

4. Patents and Certifications
   Protection of industrial property rights

5. Support to Funding Application

2. "Services for I4.0 applications" macro area

Management Consultancy
Process and product analyses from the perspective of Industry 4.0

Technology Transfer
Agreed conditions
Support to companies
Training paths and seminars

3. "Services for I4.0 Capacity Building" macro area

Matching the Business World with High-Level Skills
Training internships
Research apprenticeship
Training and Skills

Development of training courses together with companies
Training paths managed by experts

Financing for training
Integration of highly qualified profiles

Support to Funding Application

CNA ANCONA – Project Partner 2

2.1 - Company profile and related laboratories and infrastructures

CNA (National Confederation of Crafts and Small and Medium Enterprises) Ancona has been supporting SMEs for almost 80 years now, being one of the first BSO in Italy. Through this long period it built up strong competences in many different areas of expertise from tax to legal, from counselling to financial advice, just to name a few. At the same time, it specialized in many different sectors, among which shipbuilding, since it represents a strong part of local economy. In order to represent local SMEs of the shipbuilding sector and to meet their specific needs, CAN Ancona developed a number of thematic meetings, focus groups and matchmaking events, where entrepreneurs can meet local stakeholders, possible partners, clients and suppliers and can learn about trends in their sector.

In the past 5 years, it has met hundreds of SMEs working in the shipbuilding sector or interested in working with it and organized 5 large events held each year, in order to introduce figures of future trends and organize B2B meetings among shipyards and possible suppliers. It also has strong relations with specific stakeholders such as marinas of touristic ports of the Marche Region and the Port Authority of the Central Adriatic Sea.

As far as Innovation and Technology transfer are regarded, CNA Ancona has had its own Innovation Hub called “Innovation Box” since 2014, which became a regional Digital Innovation Hub when the national plan for Industry 4.0 was emanated in 2016.

In 2020 it turned into “Marche Innovation Hub - MIH” an Ltd. Company with other partners and was financed by the regional law for innovation. In 2022 MIH entered the regional consortium of EDIH4Marche which was financed by the EU and started its activities as an EDIH in 2023 and since then it acts as a strategic facilitator for SMEs seeking to embrace digital transformation. In line with both the National Industry 4.0 Plan and the Marche Region's Smart Specialization Strategy, MIH works to strengthen connections among

regional actors such as research institutes, businesses, public authorities, innovation centers and clusters. While it does not operate its own technological facilities, MIH supports companies throughout their digitalization journey by offering a range of services, such as diagnostics, planning, access to funding and result evaluation.

Moreover, as part of the EDIH4Marche platform, MIH plays a key role in guiding SMEs toward the most suitable partners within the network, facilitating access to the expertise, technologies and services offered by the other EDIH4Marche partners.

2.2 - I4.0 Services Provided

To assist SMEs in their transformation processes, CNA Ancona and its DIH, called MIH, offers a service catalogue able to provide services according to their needs in terms of innovation, financial consulting, internationalization and training skills.

1. "Services to improve business" macro area

In order to support SMEs in improving their business, it provides assistance in:

- building and managing business networks
- establishing international relations and opening to new markets
- developing digital transformation processes
- setting up digital networking strategies and tools
- planning financial investments
- evaluating their innovation capacity and readiness
- making intellectual property procedures (trademarks and patents)
- Support to Funding Application related to the above

2. "Services for I4.0 applications" macro area

In order to support SMEs in applying I4.0 services, it provides consultancy for:

- process and product innovation aligned with I4.0 principles
- In-depth analysis of business operations through a 4.0 lens
- Analytsis of internalization potential
- facilitating technology adoption and knowledge transfer
- Support to Funding Application related to the above

3. "Services for I4.0 Capacity Building" macro area

In order to support SMEs in building their capacity on I4.0 theme, it provides consultancy for:

- bridging the gap between companies and advanced skills
- facilitating training internships and research-based apprenticeships
- planning professional training paths
- training programs and professional seminars
- accessing financial tools for training activities

CETMA – Project Partner 3

2.1 - Company profile and related laboratories and infrastructures

CETMA is an RTO - Research and Technology organization dedicated to both generating new knowledge (Research) and applying this knowledge in practical ways (Technology) for companies and institutions.
Founded in 1994 through a special agreement between ENEA (National Agency for New Technologies, Energy and Sustainable Economic Development) and the MURST (Ministry of University, Scientific and Technological Research), CETMA aims to promote business innovation, particularly in Southern Italy.

As a non-profit entity, CETMA reinvests all profits into research, training, and dissemination activities. It has developed expertise in materials engineering, computer engineering, and industrial design. By integrating these skills, CETMA operates as a multidisciplinary entity that fosters the innovation of products, processes, and services. This integrated approach supports the growth and development of the national production system and effectively addresses technological development activities. CETMA provides research and innovation services to all types of companies and institutions without distinction.
The multidisciplinary nature of CETMA, combined with the diverse expertise of its members, has enabled the development of applications across various sectors including industrial products and components, transportation, mobility, production systems, human health and medical engineering, environment and recycling, cultural heritage, energy, and infrastructure and civil engineering.

In Materials Engineering, CETMA specializes in composite and polymeric materials, focusing on material design and optimization, simulation of materials, components and processes, testing, structural health monitoring, process development, and prototyping.
A particular strength lies in the numerical modeling of advanced materials and their manufacturing processes, as well as in material recovery through innovative recycling and reusing processes and applications of recovered materials.
CETMA's expertise in Computer Engineering includes the development of software for industrial and engineering applications, advanced visual systems using Augmented Reality (AR) and Virtual Reality (VR) technologies, robotic and automation applications, and medical and rehabilitation applications.
In the field of Industrial Design, CETMA's competencies cover all phases of Product Development: from conceptual ideation, design, and prototyping, to manufacturing, including ergonomic and market analysis.
With over 65 highly specialized employees, CETMA is one of the largest private research centers in Italy not directly linked to large companies.
According to a recent survey based on CERVED data, the 40 largest private research entities in Italy primarily serve large multinational companies (generally their parent companies) and pharmaceutical companies. In proportion to its size, CETMA stands out as one of the leading research and technology centers in Italy, offering research and innovation services mainly to SMEs.
CETMA is in the “Cittadella della Ricerca” in Brindisi and it has a technical structure of about 3,500 square meters equipped with advanced instrumentation and specialized software, offices, training rooms, libraries and multimedia stations and 15 technological laboratories

- Non-Destructive Testing Lab: The lab specializes in non-destructive diagnostics, assessing structural preservation, degradation, anomalies, crack patterns, hidden structures, elasto-dynamic properties (e.g., concrete, masonry), FRP reinforcement quality, and building envelope energy efficiency (pre/post intervention);
- Building Lab: The lab performs chemical, physical, and mechanical tests on construction materials, including cement-based materials (mortars, plasters, lightweight, fiber-reinforced concretes), FRP, wood (tensile, flexural, compressive strength), and stony materials, along with out-of-standard tests;
- Technologies and processes Lab: The lab includes equipment for characterizing and processing polymeric materials. For example:

- dynamometers for tensile, flexural and compressive strength
  thermal analysis like DSC, TGA lab and pilot press for compression molding process

- 3D Printing, Rapid Prototyping and Ergonomics Labs: The 3D Printing, Rapid Prototyping and Ergonomics Laboratory is a center capable of supporting ergonomic design and analysis activities. It offers solid modeling services and optimization of externally generated models for Rapid Prototyping activities, with identification of the techniques and materials that satisfy the initial design requirements.
  The 3D Printing Lab is equipped with an Objet30 Prime 3D printer, one of the few desktop 3D printers that works with 12 materials, characterized by specific properties such as flexibility and biocompatibility. The Objet30 Prime uses Polyjet technology and expands CETMA's service portfolio with the ability to print the following materials:
  - Rigid and opaque materials in various colors, including white, gray, blue and black;
  - Transparent materials, for the prototyping of transparent and colored products with great dimensional stability and surface uniformity;
  - High temperature material for advanced functional testing, hot air and water flows and static applications;
  - Strong, durable simulated polypropylene materials for creating smooth-surfaced prototypes with moving hinges, flexible latches, and snap-fit parts;
  - Rubber-like materials suitable for a range of applications requiring non-slip or soft surfaces;
  - Biocompatible material suitable for medical device prototyping.
- Electronics Lab: Laboratory consists of a 50 sqm room, located on the ground floor and includes a range of instruments and equipment for the design, prototyping, and testing of systems for automation and process control.
  Research activities in the Laboratory include:
  - design, development, and supervision of high-tech mechatronic systems for the civil, social, industrial, military, and biomedical sectors;
  - design and implementation of embedded and industrial systems, tracking systems with RFID wireless technologies, automation and control systems, and systems for process simulation and optimization;
  - creation of physical and virtual prototypes.

- Exhibit Design Lab: The Exhibit & Design laboratory, located on the second floor of CETMA, covers an area of approximately 50 square meters and serves as a multifunctional space dedicated to a variety of activities. Specifically, the operations carried out in this space range from the assembly, testing, and ergonomic analysis of product design prototypes to the assembly of prototypes derived from rapid prototyping processes, as well as the creation of multimedia and experiential setups;

- Robotics Lab: Our robotics laboratory is equipped with a KUKA Ready2_educate training cell, specifically designed for educational and research purposes. At the core of the system is the KUKA KR4 R600, a compact and versatile 6-axis industrial robot ideal for demonstrating automation processes in a safe and accessible environment. The cell provides a complete setup for hands-on learning in robot programming, pick-and-place operations, and basic automation tasks, making it a valuable tool for both students and engineers exploring Industry 4.0 applications;

- Visual Technologies (VR/AR, Holography, image processing) Lab: The lab is currently focused on experimenting with subjects such as virtual reality, augmented reality and holography. It allows VR and AR testing activities, exhibit design prototyping and video analysis;

- Virtual Reality Center (one of the largest in Europe): It is one of the largest in EU. 144 m^2 infrastructure for immersive, collaborative, and interactive visualisation of 3D scenarios. It allows VR and AR visualisation of digitally reconstructed environments, numerical simulations, mechanical design, and styling.

CETMA-DIHSME is the EDIH promoted and managed by CETMA. In order to strengthen assistance to SMEs with skills, expertise and tools according to a 'one stop shop' logic, CETMA involved 13 other partners in the Hub's service offering.
Based on the experience of CETMA and analysis of innovation experts, CETMA-DIHSME starts from the consideration that to foster innovation in small businesses, in addition to "problem solving" services (technology consulting, research, engineering, etc.), it is necessary to support SMEs with "problem setting" services (strategic analysis, business planning, fundraising, supply chain relations, etc.).
For this reason, the EDIH CETMA-DIHSME provides an integrated offering of business and strategy-setting services and technological services.

It offers services for:

- awareness building;
- assistance for strategic setting;
- testing and development,
- such as feasibility studies, simulations,
- development of artificial intelligence applications,
- testing and optimization of prototypes;
- testing and development in operating environments;
- fundraising support;
- customised training.

2.2 – I4.0 Services Provided

1. "Services to improve business" macro area

- Intellectual Property and Design Protection: We provide companies with guidance on intellectual property strategy, supporting patent applications, trademark registrations, and design protection. Through our expertise and partnership with national and European networks, we help evaluate patentability, assess the legal status of existing patents, and conduct competitor and market analysis to guide innovation;
- Funding and Project Development Support: We assist organizations in identifying suitable funding opportunities and provide hands-on support in preparing and submitting project proposals. Our team has experience in national and EU-funded programmes, and we help structure project ideas, build partnerships, and manage proposal writing—from concept to submission;
- Strategic Design Services: We support companies in aligning design processes with business goals through strategic design activities. This includes product and service innovation, brand identity development, and user-centered design strategies. Our approach combines creativity with market insights to enhance competitiveness and value creation.

2. "Services for I4.0 applications" macro area

CETMA offers a wide range of technical demonstrations and hands-on experiences designed to help companies, especially SMEs, explore the potential of Industry 4.0 technologies through a *test before invest* approach. These services allow organizations

to assess the added value of digital tools by applying them to real or customized use cases, simulating their integration into existing workflows. By reducing uncertainty and clarifying return on investment, these demos support informed decision-making prior to the adoption of advanced technologies:

- VR demos: We use VR headsets to simulate and visualize products in immersive 3D environments. This allows companies to explore design concepts and virtual prototypes in real time. Ideal for product development, training, and marketing scenarios
- AR demos: Through devices like HoloLens or mobile apps, we demonstrate augmented reality for predictive maintenance. Users can visualize components, access data overlays, and interact with digital twins. Applicable to industrial, service, and consumer-facing contexts.
- APP demos: We showcase interactive apps such as product configurators, e-commerce platforms, or cost estimators. These solutions enhance user engagement, support business operations, and promote cultural heritage. Customizable for web and mobile environments.
- CFD and FEM demos: We demonstrate simulation tools for fluid dynamics and structural analysis using real or sample products. These tools support performance optimization, design validation, and cost reduction. Ideal for companies exploring virtual testing before prototyping.
- Demo Additive Manufacturing: We offer training sessions and live 3D printing of scale models or functional components. These demos highlight rapid prototyping, customization, and design freedom. Useful for product development, education, and innovation projects.
- AI demos: We present AI applications such as chatbots, defect detection via machine vision, or environmental monitoring. Examples include coastal erosion analysis, tide prediction, and automated inspections. These demos reveal AI's potential across diverse sectors.
- Robotic demos: We simulate industrial processes at scale using our KUKA Ready2_educate robotic cell. We also provide hands-on training in robot programming and automation workflows. A practical introduction to robotics for SMEs and students.

3. *"Services for I4.0 Capacity Building" macro area*

- Training and Upskilling in Industry 4.0 Technologies: We offer specialized training courses and workshops tailored to Industry 4.0 technologies, including robotics, additive manufacturing, artificial intelligence, AR/VR, and digital simulation tools. Our programs are designed to upskill company personnel, technicians, and students, combining theoretical knowledge with hands-on experience to foster innovation and digital transformation within organizations.
- Seminars, Conferences and Thematic Events: CETMA organizes and participates in national and international seminars, conferences, and thematic events aimed at promoting a culture of innovation and digital transformation. These initiatives serve as platforms for dialogue between researchers, companies, institutions, and policy makers, fostering the exchange of ideas, the dissemination of research outcomes, and the creation of collaborative opportunities. Topics range from emerging technologies and sustainable manufacturing to design, digital skills, and funding opportunities. (3)
- Expert Networking and Knowledge Exchange: As a multidisciplinary Research and Technology Organization (RTO), CETMA actively connects companies with a broad network of experts, research centers, universities, and industrial partners. This includes its consortium members such as ENEA, Università del Salento, RINA Consulting, Lattanzio KIBS, Digimat, Sysman, Axist, GMT, ASA, and others. By promoting collaboration and sharing of best practices, CETMA accelerates the adoption of innovative technologies and facilitates access to new knowledge and expertise.
- Strategic Innovation Planning: CETMA supports organizations in defining digital transformation paths and long-term innovation strategies. Thanks to its multidisciplinary skills in material engineering, software engineering, and industrial design, CETMA offers sector-specific diagnostics and roadmaps for product, process, and service innovation. This integrated approach helps companies remain competitive and resilient in a rapidly evolving market.
- Promotion of Digital Leadership and Awareness: Through conferences, demonstration events, and communication campaigns, CETMA promotes the value of digital innovation and sustainable development. These initiatives aim to raise awareness of Industry 4.0 opportunities among SMEs and stimulate investments in

research, development, and advanced manufacturing.

- Access to Resources and European Networks: CETMA is an active partner of the Enterprise Europe Network (EEN) and the DIHSME project, through which it offers support in accessing European funding, identifying international partners, and implementing digital solutions tailored to SMEs. It also provides access to methodologies, tools, and platforms supporting digital innovation, compliance, and sustainability.
- Enterprise Europe Network (EEN): As a partner of the Enterprise Europe Network (EEN), the largest support network for SMEs in Europe, we offer services for internationalization, innovation, and access to new markets. This includes support for finding international partners, navigating EU regulations, and identifying funding or investment opportunities to scale innovations globally.
- DIH-SME Support Activities: Within the DIHSME initiative, CETMA provides guidance and technical assistance to small and medium enterprises (SMEs) on their digital transformation journey. We offer tailored support in digital assessment, technology adoption, and innovation roadmap development, fostering growth and competitiveness in the digital economy.

AREA SCIENCE PARK – Project Partner 4

2.1 - Company profile and related laboratories and infrastructures

Area Science Park (Welcome to Area Science Park | A world in progress) is a **national research body** headquartered in Trieste and supervised by the Italian Ministry of University and Research. It was established in 1978 to develop and support scientific and technological research in the region. Over the years, Area Science Park has accrued specific skills in conceiving, developing and implementing technology transfer initiatives, integrated systems and innovative services.
Area Science Park's geographic position, close to the borders with Central Europe and the Western Balkans has fostered the development of a wide network of international relations and participation in several cross-border and transnational programs funded by the European Union. Thanks to its expertise in research and innovation, technology transfer and development of shared policies, Area Science Park designs and participates in a wide range of INTERREG cooperation projects with the countries of Eastern and Southern Europe.
Area Science Park also develops and participates in Horizon Europe research and innovation projects.

In its two campuses on the outskirts of the city of Trieste on the Karst plateau, Area Science Park hosts R&I labs, research centres, companies, startups and university spin-offs. The campuses are places for contamination between science and business. The S&T park hosts research infrastructures and international centers of excellence, such as ELETTRA synchrotron light source, FERMI free electron laser and ICGEB, the International Center for Genetic Engineering and Biotechnology.
Area Science Park has put together laboratories, equipment and advanced skills present in the park to deliver two Scientific and Technological Platforms, available to research and business in an open access mode. In line with Area Science Park's research, the platforms are dedicated to applications in the life sciences sector and to the study of new materials.
Today, Area Science Park's main focuses include: highly specialized research, innovation models to support industry, management and development of the science park. All initiatives and activities are devised to support the digital and ecological transition.

The main sectors of expertise are:

- Research**:** Area Science Park carries out research and develops connected services in the fields of omics sciences, new materials and data science. Researchers at Area Science Park have specific skills in Big Data processing, from artificial intelligence techniques to the production of FAIR-by-design data. Area Science Park has three laboratories on its premises. All facilities operate with cutting edge technology equipment:
    1. The Genomics and Epigenomics Laboratory (LAGE) is dedicated to DNA and RNA sequencing analysis and genotyping for the study of viruses and pathogens of human, animal or vegetable origin.
    2. The Electron Microscopy Laboratory (LAME) is dedicated to the analysis of the nano-structural, electronic and chemical-compositional properties of materials with applications in electronics, sensors and in the energy sector.
    3. The Data Engineering Laboratory (LADE) provides advanced calculation and data analysis services and carries out R&D activities to extract knowledge from data in the field of Artificial Intelligence.

The laboratories, which can be accessed in an open access mode by researchers from academia and business alike, belong to networks of scientific collaboration and international research infrastructures.

- Innovation support for Enterprises: Area Science Park has thirty years' experience in developing innovation projects, based on knowledge and skills gained matching the needs of research and business in several different sectors, from ICT to environmental sustainability, and in supporting and promoting the creation and scale-up of technologically focused and deep-tech start-ups. In recent years Area Science

Park has initiated and supported the development of the digital innovation hub of Friuli Venezia Giulia region, IP4FVG, which supports companies' digital transformation through advanced training, public-private partnership initiatives and technology demonstrators and is currently developing its international dimension as a recognized European Digital Innovation Hub (IP4FVG-EDIH).

Area Science Park manages and offers within an open access framework Research and Technological Infrastructures. With specific regards to the digital innovation support domain, Area Science Park operates three distinct Digital Living Labs, each designed to showcase and facilitate the adoption of advanced digital technologies within specific industrial domains:

1. Data Analytics & Artificial Intelligence Living Lab: this lab focuses on the applications of data collection, analysis, and artificial intelligence for production monitoring and quality control. It highlights technologies such as machine vision, deep learning algorithms, and real-time production analysis. The lab provides businesses with the ability to test systems that improve quality control and allow for zero defect production. Demo use cases available in this Living Lab include:
    - Advanced machine vision systems for automated quality inspection
    - Deep learning algorithms for predictive maintenance and process optimization
    - Real-time production monitoring and analysis tools
    - AI-powered defect detection and classification systems
2. Data Optimization & Simulation Living Lab: this Living Lab explores the use of simulation and augmented reality technologies for industrial purposes. It facilitates the virtual reproduction of environments, products, and processes, enabling optimization and analysis. Companies can test simulations for product design, logistical processes, and building energy optimization. The lab offers various demo solutions, including:
    - Product simulation using finite element analysis (FEM)
    - Integration of FEM simulation and optimization for designing mechanical components
    - Simulation of metal hot stamping processes
    - Pedestrian movement simulation for building evacuation planning
    - Logistics hub management process simulation
    - Road vehicle fleet route optimization
    - Building energy behavior optimization
    - Augmented reality solutions for maintenance management
3. Internet of Things (IoT) Living Lab: this Lab showcases the implementation of IoT solutions for transforming traditional factories into smart enterprises. Its use cases

include integrated sensor systems, communication networks, and data exchange between machines and operators. The lab facilitates the testing of predictive maintenance models, remote monitoring systems, and smart factory applications. Among the demo solutions available at the IoT Living Lab companies can find:

- Integrated sensor networks for real-time data collection
- Industrial communication protocols and standards
- Edge computing solutions for local data processing
- Cloud-based IoT platforms for data storage and analysis
- Predictive maintenance algorithms and models
- Remote monitoring and control systems for industrial equipment
- Smart factory applications for improved efficiency and productivity

These Living Labs provide a unique opportunity for businesses, especially SMEs, to experience and evaluate cutting-edge technologies before making significant investments. By offering hands-on demonstrations and expert guidance, Area Science Park supports accelerating the adoption of digital and green technologies in the manufacturing sector. By leveraging these Living Labs and associated services, companies can reduce design time and costs, improve product and process performance, conduct stress tests safely and cost-effectively, perform what-if analyses, enhance decision-making activities, and train employees in safe, simulated environments. Through this initiative, Area Science Park is playing a crucial role in fostering digital innovation and supporting the competitiveness of businesses in the Friuli Venezia Giulia region and beyond, contributing to the broader European effort to accelerate digital transformation across industries.

Data center - ORFEO (Open Research Facility for Epigenomics and Other)

ORFEO is a cutting-edge data center located in Area Science Park, Trieste. It is housed within a container and serves as a hub for advanced computing and data analysis, particularly in genomics, epigenomics, and other scientific domains. The facility is designed to deliver millions of computing hours annually, showcasing high flexibility and reconfigurability. It combines traditional computing servers with an infrastructure capable of cloud delivery for HPC (High-Performance Computing) and AI services.
ORFEO is equipped with state-of-the-art hardware, including high-memory nodes with up to 1.5TB of RAM per server and processors featuring up to 128 cores.
Some servers integrate GPUs, such as dual V100 cards with 32GB RAM or DGX systems with A100 GPUs, enabling robust parallel processing capabilities.
The data center provides over 5PB of raw storage capacity. This includes high-speed partitions based on NVMe and SSD technology, standard HDD partitions, and long-term tape-based storage exceeding 3PB. A CEPH parallel file system ensures efficient data access and management.

ORFEO is connected via redundant 10 Gbit fiber to Area Science Park's network and Lighnet, ensuring fast connectivity to regional and national research networks. Internal communication between nodes uses a 100 Gbit/s Infiniband link for RDMA.
ORFEO supports diverse research areas:

- Genomics and epigenomics data analysis
- Machine learning and AI applications
- Material science simulations

2.2 - I4.0 Services Provided

Area Science Park provides a comprehensive array of services designed to enhance business capabilities and foster innovation. Here is a detailed overview of the services offered:

1. "Services to improve business" macro area

Specialized Business Consulting:

- Guidance on Intellectual Property (IP)
- Advisory support to help companies understand the basics of intellectual property protection. The service includes an initial evaluation of the protectability of innovations and basic guidance on how to define an IP strategy aligned with business goals.

Consulting for New Business Development

- Strategic support for the creation and development of new business opportunities. This includes basic market and competitor analysis and the validation of innovative ideas to foster growth and value creation.

Support for Internationalization Strategy

- Guidance in designing and implementing strategies for entering international markets. The service helps identify suitable target markets, understand regulatory frameworks, and define basic operational approaches to support international expansion.

2. "Services for I4.0 applications" macro area

Digital Demonstration & Testing

- This service aims to introduce companies operating in the Blue Economy to innovative Industry 4.0 solutions through practical demonstrations and guided testing. The goal

  is to raise awareness of digital technologies and support their potential adoption. The service includes both theoretical and practical demonstration sessions led by international experts in the Blue Economy sector, along with tailored reporting for the SMEs participating in the workshop.

3. "Services for I4.0 Capacity Building" macro area

Consulting for Access to Research and Innovation Funding

- This service supports companies in identifying and accessing public funding opportunities at regional, national, and European levels. The goal is to help SMEs understand the most suitable programmes for their needs and increase their chances of success in applying for grants. The service includes guidance on available calls, eligibility criteria, and how to structure a project idea for funding.

THE CROATIAN CHAMBER OF ECONOMY (CCE) – Project Partner 5

2.1 - Company profile and related laboratories and infrastructures

The Croatian Chamber of Economy (CCE) is the largest business network in Croatia which connects key sectors of the national economy through a network of county chambers, communities, associations, international representative offices, and memberships in international chambers. It also promotes the interests of its members before government bodies. CCE focuses on several crucial areas of operation, such as lobbying and representation of members' interests, internationalisation, education and conferences, information sharing, EU projects, and economic development.

Sustainable development, the digital and green transition, the future of work and human resource development, export potential and competitiveness, security of supply and food quality are CCE's key strategic topics.

The CCE operates through 20 county chambers, ensuring strong local presence and operational support across the entire country. It also comprises more than 40 sector-specific

associations and business communities, which provide specialized insights, enable strategic industry development, and foster networking among companies within related fields.
Beyond its sectoral and regional activities, CCE offers a wide range of services—from legal advisory and market intelligence to education, economic analysis, and export assistance through business delegations, trade missions, and matchmaking events. The Chamber collaborates with numerous domestic and international partners and is actively engaged in implementing EU-funded projects and initiatives that support economic development.
As a trusted partner to government bodies, the business community, and international organizations, CCE is a key stakeholder in the policymaking process and contributes to shaping the legislative framework that affects business in Croatia. Its role is increasingly vital in the context of EU integration, the twin transition toward digital and green economies, and the growing need for businesses to adapt to global challenges and trends.
CCE is also a member of the International Chamber of Commerce and Eurochambres, further strengthening its role in the international economic environment.
The Croatian Chamber of Economy does not operate its own laboratories, but through its Digital Chamber platform, it ensures streamlined access to a wide range of services and infrastructure relevant to businesses, particularly small and medium-sized enterprises.
Digital Chamber is a modern digital ecosystem developed by CCE to simplify and enhance the interaction between businesses, institutions, and support services. It integrates various tools and resources, including access to economic data, financing opportunities, educational content, digital certification requests, and connections to relevant innovation and testing ecosystems. Through this centralized platform, companies can manage their business profiles, monitor relevant regulations, and connect with accredited laboratories, certification bodies, and research institutions.
Within the BEST project, CCE will leverage Digital Chamber to map and promote available national infrastructure, facilitate the exchange of resources between partners, and support SMEs in identifying and accessing suitable facilities for testing, validation, and demonstration activities that contribute to the project's goals.

2.2 - I4.0 Services Provided

1. "Services to improve business" macro area

The Croatian Chamber of Economy provides a range of services that support companies in their digital transformation journey and the adoption of Industry 4.0 principles, with a particular focus on micro, small, and medium-sized enterprises (SMEs). Through its ongoing activities and participation in projects such as BEST4.0, CCE acts as a bridge between businesses, research institutions, and technology providers, enabling access to key knowledge, tools, and partnerships.

The I4.0-related services offered by CCE include:

- Organizing trainings and workshops on digital transformation, automation, smart technologies, artificial intelligence, cyber security, ESG and data analytics;
- Providing advisory services and information on available funding opportunities and national/EU support programs for digitalization and innovation;
- Solvency and Financial Condition Report of Croatian Companies (SFCR) Description: Provides an analytical overview of the financial stability and creditworthiness of Croatian companies, including key performance indicators, solvency ratios, and risk assessment to support informed business and investment decisions.

Through these activities, CCE actively contributes to strengthening the capacity of businesses to implement I4.0 solutions and fosters the development of a digitally resilient and innovative Croatian economy.

2. "Services for I4.0 applications" macro area

The Croatian Chamber of Economy provides targeted services to support companies in the development and implementation of Industry 4.0 (I4.0) applications. By acting as a national facilitator of innovation and digital transformation, CCE helps businesses adopt advanced technologies and integrate them into their operations and production systems.

Key services for I4.0 applications include:

- Business diagnostics and digital readiness assessments – through tools available on the Digital Chamber platform, CCE supports companies in evaluating their digital maturity and identifying areas for improvement;
- Partner search and ecosystem facilitation – CCE connects companies with technology providers, research institutions, digital innovation hubs, and consultancy experts that specialize in I4.0 solutions;
- Project development support – including guidance in preparing I4.0-related project proposals for EU and national funding schemes, and assistance in identifying suitable financial instruments;
- Showcasing and matchmaking – CCE supports participation in B2B events, innovation expos, and international platforms where companies can present their I4.0 applications, find strategic partners, and explore new markets.

By combining strategic advisory services with practical tools and strong stakeholder networks, CCE empowers Croatian companies to successfully develop, apply, and scale I4.0 solutions in both domestic and international contexts.

3. "Services for I4.0 Capacity Building" macro area

The Croatian Chamber of Economy actively contributes to strengthening the capacity of businesses to adopt and implement Industry 4.0 (I4.0) principles through a range of services focused on knowledge building, skills development, and integration into the innovation ecosystem.

CCE's I4.0 capacity-building services include:

- Education and training programs – CCE regularly organizes workshops, professional seminars, and targeted training sessions to help companies develop in-house knowledge in areas such as digital transformation, process automation, data analytics, and smart manufacturing technologies.

Through these activities, CCE plays a key role in building the foundational knowledge, organizational readiness, and strategic vision needed for Croatian companies to transition toward advanced, data-driven, and sustainable industrial models.

ISTRIA DEVELOPMENT AGENCY (IDA) – Project Partner 6

2.1 - Company profile and related laboratories and infrastructures

IDA Ltd. is the regional development agency of Istria County, Croatia, established in 1999 with the mission to foster sustainable economic growth, innovation, and international competitiveness across the region. Acting as a key link between the public, private, and academic sectors, IDA implements a wide range of initiatives that promote entrepreneurship, technology transfer, and strategic investments. Over the years, IDA has successfully positioned itself as a central institution for regional development by managing numerous EU-funded projects, facilitating access to financial instruments, and providing tailored support services to local businesses. Through its dynamic approach, IDA not only

strengthens the local innovation ecosystem but also enhances the global visibility of Istria as a forward-thinking region committed to embracing digital transformation and Industry 4.0 (I4.0) concepts.

In addition to its core mandate of spurring economic development, IDA has cultivated an extensive network of partnerships with national and international stakeholders. These collaborations enable the agency to exchange best practices, leverage specialized expertise, and foster cross-border cooperation in priority areas such as ICT, advanced manufacturing, and green technologies. By working closely with SMEs, startups, public institutions, and research centers, IDA offers comprehensive support services—from conceptualizing new business ideas and securing financing, to providing mentorship programs and facilitating market entry strategies. This integrated approach reflects IDA's focus on creating a resilient, knowledge-based economy where innovation and entrepreneurship thrive. Through continuous efforts to align its programs with evolving market demands, IDA remains at the forefront of regional development, contributing significantly to the modernization and competitiveness of the Istrian economy.

While IDA itself does not operate conventional research laboratories, it manages and supports a variety of infrastructure resources that serve as innovation hubs and collaborative environments for entrepreneurs, startups, and established businesses. A prime example is Coworking Pula, a shared workspace initiative that encourages creativity, networking, and knowledge exchange among professionals from diverse fields. The facility is equipped with high-speed internet, meeting rooms, and event spaces designed for workshops, seminars, and mentoring sessions. By providing a flexible and modern environment, Coworking Pula fosters synergy among entrepreneurs, freelancers, and digital nomads, aligning with IDA's broader mission of stimulating regional economic growth and attracting talent to the Istrian region.

Beyond coworking facilities, IDA also plays a key role in the development and management of business incubators and business zones throughout Istria. These incubators offer offices, technical support, and tailored mentorship programs that guide startups through their early stages of development, enabling them to refine their products, services, and business models. In parallel, IDA's collaboration with local municipalities has led to the establishment of strategically located business zones that provide essential infrastructure - such as utilities, logistics, and proximity to key transportation routes - necessary for industrial growth. Through these initiatives, IDA ensures that companies at various stages of maturity have access to the physical and organizational support required to scale up operations and remain competitive. This integrated network of coworking spaces, incubators, and business zones exemplifies IDA's commitment to creating a vibrant, innovation-driven ecosystem,

underpinned by strong partnerships with research institutions, technology providers, and public-sector stakeholders.

2.2 - I4.0 Services Provided

1. "Services to improve business" macro area

1. Funding opportunities: guidance and support in identifying and securing suitable financing options, including EU funds and national grants;
2. Digital marketing solutions: tailored strategies to enhance online visibility and market reach for SMEs and startups;
3. Development of business ideas (models & concepts): in collaboration with research institutions, IDA supports the creation of innovative business models aligned with I4.0 principles.

2. "Services for I4.0 applications" macro area

1. Business networking events and B2B matchmaking: facilitation of collaboration among entrepreneurs, SMEs, and investors, fostering partnerships and joint ventures.
2. Digital Readiness Check
3. Individual Funding Consultation

3. "Services for I4.0 Capacity Building" macro area

1. Basic and advanced training for entrepreneurs, SMEs, and the public sector: courses and seminars on digital transformation, innovation management, and emerging technologies.
2. Organisation of study visits and knowledge exchange programs: facilitating on-site visits and collaboration with leading I4.0 hubs, research centers, and industry leaders to accelerate learning and technology transfer.
3. Workshops on financing and EU project applications: practical sessions that help organisations understand and apply for relevant EU funding calls.
4. Mentorship and residency programmes in business incubators: focused support for early-stage ventures, helping them integrate advanced technologies and I4.0 methodologies.
5. Organisation of competitions and hackathons: creative programs (e.g., design sprints, design thinking workshops) aimed at accelerating innovation, prototyping, and problem-solving in an I4.0 context.
6. Group Workshop: Access to EU Funding.

ASSOCATION DIH AGRIFOOD CROATIA (DIH AGRIFOOD CROATIA) – Project Partner 7

2.1 - Company profile and related laboratories and infrastructures

DIH AgriFood Croatia is an innovation hub established in 2020 in Šibenik, Croatia, with the vision to become a key driver of digital transformation in the blue economy and agrifood sectors. As part of the European network of Digital Innovation Hubs, DIH AgriFood Croatia acts as a link between research institutions, the business sector and public bodies, fostering innovation and development through the application of digital technologies.

The mission of DIH AFC is to provide support to small and medium-sized enterprises (SMEs) in their digitalization process, offering them access to expertise, technological infrastructure, and financial resources.

Through the organization of workshops, seminars, demonstration projects, and individual consultations, DIH AFC helps SMEs identify their digital needs, test new technologies and implement innovative solutions that will improve their competitiveness and sustainability.

In addition to its role as a facilitator of digital transformation, DIH AFC places a strong emphasis on fostering cross-border collaboration and knowledge exchange. DIH AgriFood Croatia actively works to establish strategic partnerships with local, national, and international stakeholders, including universities, research centers, technology companies and investors. Through participation in European projects and initiatives, DIH AFC ensures that SMEs have access to the latest trends and best practices in the field of digital transformation.

The hub's unique focus on aquaculture, exemplified by the Blue Living Lab, highlights its strategic commitment to addressing industry-specific challenges while promoting eco-conscious innovation. DIH AFC continues to play a key role in shaping a resilient and technology-driven future for Croatia's blue economy and agrifood sectors.

DIH Agrifood Croatia operates the Blue Living Lab, a unique research and innovation space located at the shellfish farm. This lab serves as a focal point for developing and testing advanced digital solutions specific to aquaculture and sustainable food production. Through its unique capabilities, the Blue Living Lab bridges the gap between research and industrial application, driving forward sustainable advancements in aquaculture and beyond.

Key Features of the Blue Living Lab:

- Real-World Testing Environment: The Blue Living Lab offers a dynamic, real-world setting that enables the application and assessment of innovative technologies under authentic aquaculture conditions;
- Advanced Monitoring and Data Systems: Equipped with IoT sensors, data collection platforms, and analytical tools, the lab provides insights into water quality, shellfish health, and overall ecosystem management;
- Collaborative Development Space: The lab fosters synergy among researchers, industry stakeholders, and SMEs, encouraging the co-creation of solutions that align with I4.0 principles;
- Sustainability Focus: The lab prioritizes eco-friendly and resource-efficient practices, supporting DIH AFC's mission to integrate sustainability into every aspect of digital innovation.

Through the Blue Living Lab, DIH AFC bridges the gap between research and real-world application, offering an unparalleled platform for innovation in blue sectors.

2.2 - I4.0 Services Provided

1. "Services to improve business" macro area

- ➢ Assessment (Digital Readiness Assessment)
  - Digital check-up for SMEs to evaluate their level of digitalization and potential improvements
  - Identification of key technological needs using the Technology Maturity Level (TML) index
- ➢ TML – Technology Maturity Level (Developing Technological Strategies)
  - Application of TML methodology to assess SME technological readiness
  - Development of individual technological roadmaps
- ➢ Search for Needs (Identifying SME Needs)
  - SME needs analysis through interviews and workshops
  - Connecting SMEs with relevant technological partners
  - Support for blockchain-based traceability solutions for SMEs

2. "Services for I4.0 applications" macro area

- ➢ Test Before Invest (Technology Testing Before Investment) – Blue Living Lab
  - AI and Machine Learning for SMEs – testing AI-powered water quality monitoring sensors in aquaculture

- Smart logistics & supply chain management – optimizing distribution processes in fisheries and the Blue Economy

➢ Demo (Technology Demonstration Sessions) - Blue Living Lab
- Physical and online demonstrations of Industry 4.0 solutions
- Pilot testing of automation and environmental monitoring solutions

3. "Services for I4.0 Capacity Building" macro area

➢ Events (Networking and Knowledge Sharing Events
- Organization of international conferences and roundtables on digital transformation in the Blue Economy
- Connecting SMEs with investors and technology hubs

➢ Workshops (Practical Training & Hands-on Learning)
- Workshops on AI and IoT applications in the Blue Economy
- Training sessions on blockchain use for product traceability

➢ Seminars (Industry 4.0 Trends & Insights)
- Digitalization of SMEs and available funding opportunities
- Regulatory frameworks for introducing new technologies in the Blue Economy

➢ Company Visits (Learning from Innovation Leaders)
- Study visits to leading DIHs and research centers
- Best practices in implementing Industry 4.0 in the Blue Economy

UNIVERSITY OF RIJEKA, FACULTY OF MARITIME STUDIES – Project Partner 8

2.1 - Company profile and related laboratories and infrastructures

Faculty of Maritime Studies, University of Rijeka is the oldest Maritime Education and Training institution of higher education in the Adriatic area, offering academic degree courses in Transport Technology, Logistics and Management, Nautical Science and Maritime Safety, Marine Engineering, Marine Electronics and Communications. Academic staff offers scientific expertise and experience in: transport logistics, transport technology, port operations, transport economics, shipping and port economics, maritime safety, navigation, electronics, marine engineering, marine power plants, maritime law, law of the sea, verbal maritime communications, etc. FMS has accumulated experience from more than 500 scientific and professional projects in Croatia and abroad.
In addition, FMS has completed numerous feasibility studies in the area of maritime safety, marine environment protection, concession feasibility studies etc. Over the past years, the focus has been on innovative technologies, digital and smart solutions for traffic monitoring

with special focus on cross-border and regional passenger maritime transport, coastal surveillance, and ecologically friendly sea-mobility projects.
Faculty of Maritime Studies, University of Rijeka has several educational and research centres and laboratories:
Center for Marine Technologies - is an educational and research center which is focused on the development and application of marine technologies as well as education. Marine technologies include all technological processes and systems related to research, exploitation and protection of the sea, marine environment and seabed (including: renewable sea energy sources; exploration and exploitation of resources from seabed, seawater and marine organisms; ship design, shipbuilding and hydrodynamics; underwater technology and engineering; marine environment protection from pollution; safety).
The Center's activities in the field of marine technologies include:

- application and implementation of scientific and professional projects on international, national and University level;
- cooperation with the economy and implementation of research projects, studies and expertise for both the public and industry sector;
- providing scientific research equipment and services to other scientific and industry entities based on scientific excellence or commercial grounds;
- teaching activities in cooperation with the constituent units of the University of Rijeka, in parts of programs dedicated to marine technologies;
- organization of scientific and professional workshops and lectures;
- promoting international scientific cooperation;
- popularization activities aimed at raising public awareness of the need for the development of novel marine technologies, especially new technological solutions for advanced marine research, the use of sea renewable energy and the protection of the sea and the marine environment.

Laboratory for Traffic and Transportation Modeling (Traffic Lab) - is a part of the Department of Transport and Transportation Technologies. The laboratory's planned activities are primarily focused on the field of technical sciences, specifically in the area of traffic and transportation technology. However, in line with the development of traffic sciences, it is necessary to include interdisciplinary research from other scientific areas and applied sciences in the domain of spatial planning, economics and ecology, psychology, and similar fields.
The primary research activities will include:

- Design, testing, adaptation of conventional traffic models, and their application at both micro and macro levels with an emphasis on the dynamic properties of the models and their control through API (Application Programming Interface) architecture.

- Development of models based on specific mobility patterns, user demands, and sharing logistics: ABM (Activity-Based Modeling), TBDM (Tour Based Demand Modeling), MaaS (Mobility as a Service), DRT (Demand Responsive Transport), and similar.
- Research of models that include connected and autonomous vehicles, and investigation of various methods to achieve system and user equilibrium in mixed traffic flow.

The laboratory implements:

- Simulation methods for simulating traffic in static and dynamic environments
- Programming algorithms and tools
- Numerical methods for achieving optimal targeted traffic conditions
- Video analytics methods based on pattern recognition using AI technology
- Traffic measurement methods, using UAVs (Unmanned Aerial Vehicles) and FCD (Floating Car Data) methods

Marine Propulsion Engines and Systems Laboratory (MARPRO Lab) - is part of the Department of Marine Engineering and Energy. The research activities of the laboratory belong to the field of technical sciences, mechanical engineering and traffic and transport technology. The main objective of the Marine Propulsion Engines and Systems Laboratory is to research ways of improving the reliability, energy efficiency and environmental compatibility of marine propulsion engines and systems.

MARPRO Lab researches:

- various process optimization options,
- application of alternative fuels,
- application of hybrid drives,
- systems for monitoring the condition of drives and advanced diagnostics, with the aim of increasing reliability, energy efficiency and reducing emissions of harmful substances.

MARPRO Lab uses:

- computer programs for simulating the operation of ship propulsion machines and plants,
- analytical and numerical methods for solving problems in applied thermodynamics and mechanics,
- experimental methods for collecting relevant data on the operation of machines and systems.

MARPRO Lab participates in the following activities:

- application and implementation of research projects,
- cooperation with other research institutions and business institutions,
- teaching at undergraduate, graduate and doctoral level,
- popularization of science.

Laboratory for Information Processing (iPRO Lab) - operates organizationally within the Department of Electrical Engineering, Automation and Computing. The laboratory's work and research activities take place in the area of technical sciences, relying on a unique combination of interdisciplinary knowledge in the fields of electrical engineering, computer science, and traffic technology and transport. The primary
focus of the laboratory is directed towards the development of information processing methods and the implementation of corresponding computer solutions.
The planned research activities of the laboratory include:

- Development of methods and computer algorithms based on advanced digital signal processing techniques (analysis and processing of non-stationary signals, time-frequency signal analysis, noise suppression in signals, signal feature extraction, digital image and video processing, algorithm optimization);
- Development of methods and computer algorithms based on principles of artificial intelligence (AI) and machine and deep learning (signal feature detection, pattern recognition, datasegmentation, detection and classification, computer vision and convolutional neural networks, processing data from modern sensor systems with applications in maritime and traffic domains);
- Development, optimization, and implementation of computer solutions based on advanced digital signal processing and machine learning techniques (applications for estimating and predicting sea state parameters based on ship motion measurements, applications in other areas involving analysis and processing of non-stationary signals);
- Applications of advanced digital solutions in maritime communication and electronic navigation systems (data compression in maritime communication channels, hybrid computer platforms in maritime communication systems for exploiting navigation data, application of machine learning methods for utilizing maritime data (AIS).

The activities of the Laboratory encompass:

- Application and implementation of research projects,
- Dissemination of research results,
- Collaboration with other national and foreign research institutions,
- Teaching activities,
- Support in the preparation of doctoral dissertations and student master's and bachelor's theses,
- Science popularization activities.

Materials and Mechanics Laboratory (MASTER Lab) - is a part of the Marine Engineering Department.
MASTER Lab focuses on the research of:

- material properties in the different environmental conditions (marine environment, elevated temperature, etc.),

- structural behaviour at the limit stress state (high stress, fatigue and fracture).

MASTER Lab deals with:
- traditional materials (metals, polymers),
- modern materials (composites; additively manufactured (3D-printed) materials).

MASTER Lab uses:
- analytical method to solve problems in engineering mechanics,
- experimental methods for material characterization,
- numerical method for stress and strain structural analysis.

MASTER Lab works on:
- application and implementation of research projects,
- cooperation with other research and business institutions,
- teaching at BSC, MSc and PhD level,
- popularization of science.

Laboratory for Language, Cognition and Neuroscience - was established as part of the Chair of Foreign Languages. The work of the Laboratory is conceived primarily within the framework of interdisciplinary sciences (cognitive science), including all related scientific disciplines. The primary activity is focused on psycholinguistic and neurolinguistic research, i.e., cognitive processing of different aspects of language. In addition, the development of psycholinguistic and computational-linguistic tools and resources necessary for conducting experimental research is also planned.

The laboratory's research activities include:
- Development of computational-linguistic tools and resources for the Croatian language;
- Development of psycholinguistic databases for the Croatian language;

- Research on the processing of English loanwords in Croatian;
- Research on the processing of Croatian negations;
- Research of conceptual metaphors;
- Research on semantic processing in Croatian;
- Research on bilingual language processing

The Laboratory also works on:
- Application and implementation of research and professional projects;
- Cooperation with other research and business institutions;
- Popularization of science.

2.2 - I4.0 Services Provided

Faculty of Maritime Studies, University of Rijeka services include various specialized education and training, collaborative research, consulting for digital transformation, executive programs, and the creation of innovative learning frameworks that align academic expertise with industrial needs and technological advances.

1. "Services to improve business" macro area

- Consulting and digital transformation support: Consulting services that help companies adopt Industry 4.0 technologies gradually, including automation, IoT, AI, and data analytics. Providing expertise to reshape processes, improve decision-making, and boost factory performance.
- Executive education and customized programs: Providing tailored executive education and research opportunities to help business leaders understand and implement Industry 4.0 strategies, leveraging big data analytics and smart factory concepts.

2. "Services for I4.0 applications" macro area

- Consultancy and knowledge transfer: Providing consultancy services to help companies adopt digital transformation strategies, implement smart factory solutions, and leverage big data analytics for productivity and cost improvements. Knowledge transfer programs connect academic research with industry needs, accelerating innovation and adoption of Industry 4.0 technologies.
- Networking and partnerships: Fostering partnerships between academia, industry, and international experts, creating a collaborative ecosystem for technological advancement andworkforce upskilling to help companies transition to Industry 4.0, optimize operations, and stay competitive in the digital era.

3. "Services for I4.0 Capacity Building" macro area

➢ Education and training programs: A capacity building program, workshops, professional seminars, and on demand training sessions aimed at SMEs to assess, diagnose, and plan digital transformation to become agile, adaptive Industry 4.0 companies.

➢ Enhancing teaching staff competencies: Enhancing competencies in Industry 4.0 through innovative training modules, teaching skill development, and establishing a sustainable teaching and learning center for the smart and digital maritime and

transport sector to educate and develop highly skilled manpower and conduct industry-relevant R&D.

- ➢ Consulting and strategic services: Consultancy to assess digital maturity and readiness and to develop customized Industry 4.0 vision, strategy, and roadmaps.
- ➢ R&D and innovation support: Budgets and policy support for R&D, focusing on collaborative projects between industry and academia, technology transfer programs and innovation hubs.
- ➢ Immersive training and demonstration labs: Interactive labs for hands-on experience with Industry 4.0 technologies and simulation environments for experimenting with new production setups and digital solutions.
- ➢ Training and education: Specialized programs and courses train students and professionals in core Industry 4.0 technologies such as IoT, AI, robotics, big data, and digital manufacturing on both theoretical and hands-on learning, including live lectures, recorded sessions, and project-based modules with industry case studies.
- ➢ Research and development collaboration: Collaboration with companies on R&D projects, offering access to research labs, expertise, and joint innovation initiatives to test, prototype, and optimize smart and digital solutions using real industrial and research equipment and software.

3. Conclusions

The development of the I4.0 Service Catalogue and its related Action Plan marks a key milestone in the implementation of BEST4.0. The catalogue brings together a diverse and complementary set of services designed to support the digital transformation of SMEs operating in the Blue Economy across the cross-border Italy–Croatia area.
By grouping services into three main categories the project ensures a balanced offer that combines strategic guidance, technology access, and skill development. The structured mapping of each partner's expertise and infrastructure enables targeted support for different SME needs. Here following a recap table of all services.

Partner	Category	Service	Priority*
CNA Ferrara (PP1)	Business Improvement	Organizational Innovation Consultancy	4
		Digitalization Consultancy	1
		Management consultancy	4
		IP and certification support	4
		Support to Funding Application	5
	I4.0 Applications	Management Consultancy (Process/product analysis I4.0)	2
		Support to Funding Application	5
		Technology Transfer Consultancy	2

	Capacity Building	Training internships/ Research apprenticeships	3
		Support to Funding Application (Training courses & financing)	5
CNA Ancona (PP2)	Business Improvement	Analysis of internationalization potential	4
		Analytical company check-up (organizational and financial)	1
		Company valuation	2
		Support to Funding Application related to the above	5
	I4.0 Applications	Analysis of digitalization and innovation maturity level	1
		Support to Funding Application related to the above	5
	Capacity Building	Industry 4.0 Capacity Building Guidance	3
		Training paths & funding	5
CETMA (PP3)	Business Improvement	IP and design protection	4
		Funding & proposal support	5
		Strategic design	2
	I4.0 Applications	Demos: VR, AR, APPs, CFD/FEM, AM, AI, robotics	6
	Capacity Building	Training on I4.0 tech	3
		Conferences & networking	3
		Innovation planning & awareness	3
		Access to EU networks	3
Area Science Park (PP4)	Business Improvement	IP strategy support	4
		Business development	4
		Internationalization strategy	8
	I4.0 Applications	Digital demo & testing	6
	Capacity Building	Funding access consulting	5
Croatian Chamber of Economy (PP5)	Business Improvement	Workshops on I4.0 topics	3
		Providing advisory services and information	5
		Solvency and Financial COndition Report of Croatian companies (SFCR)	1
	I4.0 Applications	EU Funds Individual Consultations	5
		Professional Consultations	4
		Energy Saving Exchange	8
	Capacity Building	Education and Training Programs	3
Digital IDA Ltd. (PP6)	Business Improvement	Tailored Digital Marketing Strategy	7
		Business Model Development	4
	I4.0 Applications	B2B Networking	8
		Digital Readliness Check	1
		Individual Funding Consultation	5
	Capacity Building	Coworking access	
		Hackathons & Mentorship Program	3
		Group Workshop: Access to EU Funding	5
DIH Agrifood Croatia (PP7)	Business Improvement	Digital readiness & needs analysis	1
		Tech maturity assessment	1
	I4.0 Applications	Testing in Blue Living Lab	6

		Demos: AI, logistics, automation	6
	Capacity Building	Industry 4.0 Trends & Insights Seminars (price for single participant)	8
University of Rijeka (PP8)	Business Improvement	Consulting and Digital transformation support	1
		Executive education and customased programs	3
	I4.0 Applications	Custom Simulation Development	2
		Evaluation of Immersive Tools	2
	Capacity Building	Immersive training labs	3
		Education & academic support	3

*The priorities marked with a number from 1 to 8 correspond to the types of services listed in section 7 "SELECTION RULES AND CRITERIA", under rule 3.

Priority	Type of Services
1	Assessment and Digital Readiness Check
2	Feasibility Studies and Technical Validation
3	Customized Training and Capacity Building
4	Business Development and IP Strategy
5	Support to Funding Applications and EU Project Design
6	Test Before Invest (TBI e Demo)
7	Tailored Digital Marketing and Communication
8	Ecosystem Positioning and Policy Engagement

This document not only defines the range of services available, but also sets the operational framework for the upcoming testing phase under WP3. The allocation logic, SME engagement strategies, and regional coordination mechanisms described here aim to guarantee an effective and equitable implementation.

The Action Plan reinforces the project's ambition to demonstrate real-world applications of I4.0 technologies in the Blue Economy and to leave a legacy of tools, practices, and partnerships that can endure beyond the project's lifetime.