



MIDIH

**MANUFACTURING · INDUSTRY**  
DIGITAL · INNOVATION · HUBS



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MIDIH Didactic Factories

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Information for the applicants

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# Didactic Factory Milan

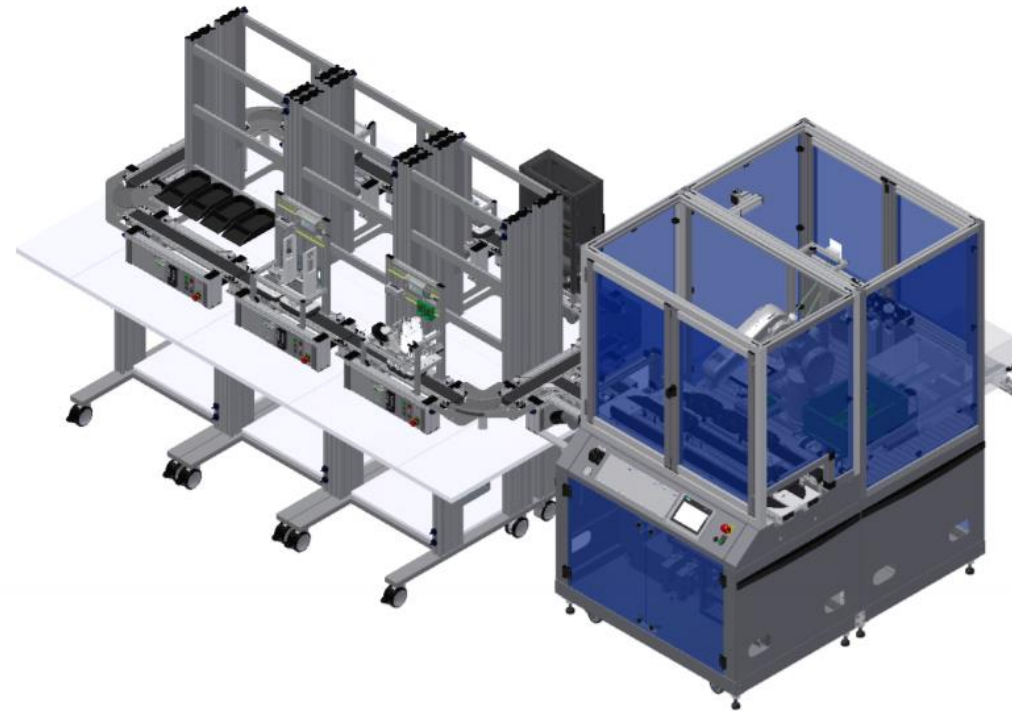


# I4.0Lab - Introduction

I4.0LAB @ DIG

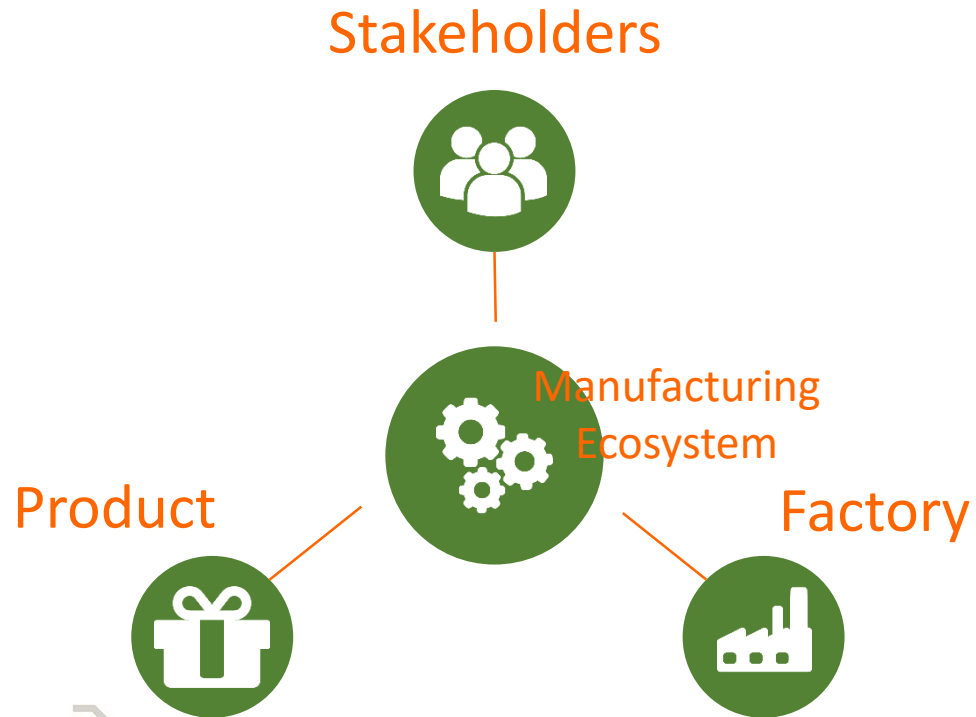
The **didactic factory lab** for the new manufacturing. Is promoted and developed by Manufacturing Group in School of Management of Politecnico di Milano

It is implementing a **tangible physical entity** where the research activity in the innovative manufacturing management and planning approaches can be carried out in conjunction with a **practical implementation in a “real-like” environment**



# I4.0Lab - Vision

The Manufacturing EcoSystem where **I4.0Lab @ DIG** is positioned includes 3 major dimensions to consider: the **human factor**, the **product**, the **process/plant**



The product and the factory are two main pillars to consider both in term of **management**, **control** and **monitoring**, but also in terms of **complete Life Cycle** to centralize the human factor within the Manufacturing EcoSystem



# I4.0Lab Milan DF - Mission

- For the exploitation perspective I4.0Lab @ DIG addresses **3 main purposes**:



**Education & Training**



**Communication and Consulting**



**Research Projects related activities**



# I4.0Lab - Structure: Key features



- Embedded sensors and monitoring systems (RFID, QR CODE and Power consumption)
- OPC-UA interface
- SW suite for modeling, simulation and control application set
- Seamless interfaces of single hardware module to enable transparent plug&play of new modules or reconfiguration of the production system
- Open architecture for integrating 3rd parties software and devices (e.g. robots or machineries)



# 14.0Lab – Structure: Software features



- 3D real-time simulation and modelling
- Import filters for STEP, IGES, STL, VRML
- Export filters for DXF, STEP, IGES, STL, ...
- Plug-in for Autodesk Inventor and Autodesk
- Robot programming in the programming languages:
  - Industrial Robot Language (IRL)
  - Mitsubishi Movemaster Command Language (MRL) - Mitsubishi MELFA BASIC III, IV and V - Kuka Robot Language (KRL) - ABB Rapid - V+ (for Adept and Stäubli)
- Communication via OPC client/server
- Virtual human with 30 independent degrees of freedom
- Online connection to Mitsubishi robot control systems for upload and download of robot programs and position lists

It is the program version for the trainer who creates new models, tests the virtual learning environments and releases programs for the connected robots and transfers them to the robot control system



# I4.0Lab – Structure: Main processes implemented



- Flow control (bar-code, RFId, Visual) of individual products and assembled
- Processing operations emulation or real
- Final product assembly using robot
- Quality control using optical camera
- Intelligent handling system





# 14.0Lab – Structure: Main components



- Warehouse management input raw products (input materials) / outgoing finished products
- Finished / assembled (product output) or flow control of individual products as the assembled or operations processing of the raw products, which is executed by real CNC machine or operation of assembly and final finishing of the product via anthropomorphic robot
- Quality control with optical method by camera
- Control flows of individual products and monitoring via RFID and barcode
- Intelligent handling of parts made by motorized conveyors and pallets
- Possibility to measure the energy consumption of the various constituent parts of the system



# I4.0Lab – Main activities



- **Flexible robotics.** Implementation of applications oriented to flexible robotics and monitoring of energy efficiency in the scope of the production harmonized reconfiguration of flexible robots and machinery
- **Energy efficiency.** Monitoring of energy efficiency at components and plant level, data analysis and simulation
- **Simulation of the operations.** Associated with the manufacturing process: multi-disciplinary integrated simulation and forecasting tools, empowered by digital continuity and continuous real-world synchronization, towards reduced time to production and optimization
- **CPS paradigms.** Paradigms and tools related to CPS (Cyber Physical Systems) to support the complete life cycle of the product



# I4.0Lab – Main activities



- **Human to machine interaction.** Environment for the validation of the human operator interaction in a robotic context and automated
- **Optimization of production and logistics flows.** Environment for the study of applications for the optimization of production and logistics flows of a robotic automated production environment
- **Training.** Support to the training of engineers with expertise on design, respectively, modeling, simulation and implementation of automated and robotic flexible production environments



# Didactic Factory Bilbao



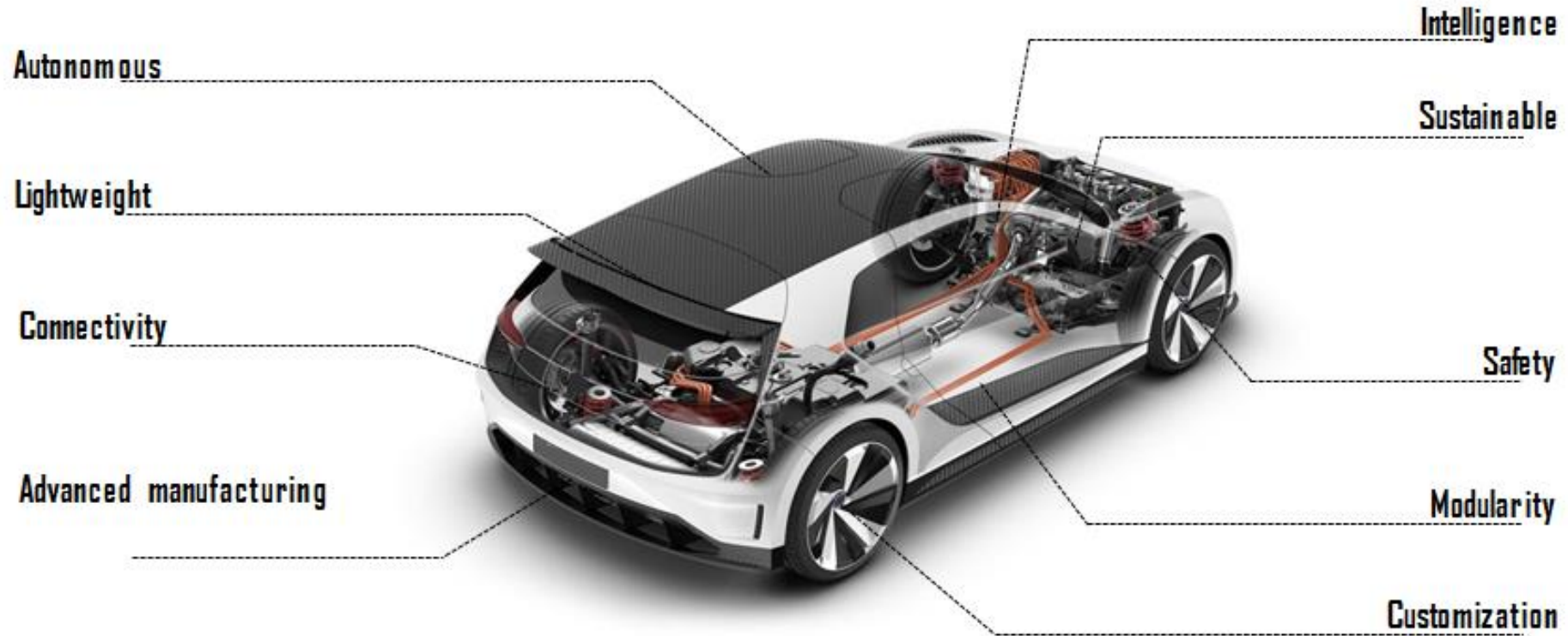


# Location: Automotive Intelligence Centre Borja (Vizcaya) Spain





# Digital transformation in the automotive sector



# Bilbao DF – Activities

The DF Bilbao is located in the Automotive Intelligence Centre (AIC) in Boroa, a network of international partners in the automotive Sector.

The DF activities are focused on :

- **R&D&i activities on industrial application of CPPS/IIoT technology and digital manufacturing process design**
- **Development of Industrial partnerships**
- **Strong market orientation and**
- **Digital business models development technology**



# Bilbao DF – Activities



## TECHNOLOGICAL SUPPORT

Access to technology  
& know-how;  
Availability of research  
infrastructure;  
Technology-oriented trainings;  
Tailored technical support;  
Technological tools &  
experimentation facilities;



## BUSINESS SERVICES

Tailored Competence Brokerage;  
Business plan development  
support;  
Online investor readiness  
webinars;  
Intellectual Property (IP) trainings;  
Mentoring and coaching services;



## ACCESS TO CAPITAL

Investment readiness programs  
(IRP);  
Networking with VCs, Business  
angels, accelerators etc.;  
Capacity building in novel funding  
mechanisms e.g. equity  
crowdfunding;  
Support and participation in  
relevant venture events;





# Bilbao DF – Services

- **Digitalization solutions for zero defect manufacturing.** These CPPS solutions integrated in the manufacturing process enable the exploitation of data and knowledge generated in other manufacturing phases through dedicated decision support tools, automated dynamic process adaptation or user friendly interfaces to improve machine communication and management, analysis and visualisation of (Big) data.
- **Business Innovation.** Design and management of the product innovation lifecycle (ideation, strategy design, financing, development), technology surveillance, business intelligence and digital (intra)entrepreneurship coaching and mentoring.
- **Training and workforce digital (up)skilling.** Customised digital manufacturing training courses both theoretical and through "teaching factory" practical modules. Regular digital knowledge pills on dimensional metrology basics, seminars on CPPS technologies and ZDM technologies.

