



I-MECH PROJECT OVERVIEW

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I-MECH project parameters



ECSEL
Joint Undertaking
Electronic Components and Systems
for European Leadership

www.I-MECH.eu

- ✓ 36 months (6/2017-5/2020)
- ✓ 10 national clusters
- ✓ 31 partners (10 LE, 9 SMEs, 12 RTD/Uni)
- ✓ 18.8 mEur total project cost, 10.4 mEur funding
- ✓ 2209 person-months total project staff effort



... the team





Motivation and driving forces

Wide range of industrial apps requiring precise motion control

- ✓ *App domains*: Robotic manipulators, CNC machine tools (big machining, high-speed machining), micro-positioning systems, paper machines, automotive industry, etc.
- ✓ Increasing performance requirements coming from top management layers - **higher bandwidth** of the control loops and improved **motion precision, adaptability, robustness, security** – all covered by novel **smart functions**
- ✓ There is a **gap** between scientific research and industrial practice



Scientific/Technological, integration and exploitation objectives

code	Obective description
ST 1	To develop techniques for employment of advanced model-based methods for the design, real-time control and self-diagnosis of cyber-physical systems
ST 2	To develop a smart Instrumentation layer gathering visual and/or sensor information from supplementary instrumentation installed on the moving parts of the controlled system to enhance the achievable performance of the system
ST 3	To develop modular unified, Hardware and Software motion control building blocks implementing a service-oriented architecture paradigm, i.e. smart Control Layer
SI 1	To integrate the developed building blocks into a conceptual open platform for intelligent control of industrial mechatronic systems
SE 1	To prove the platform deployability on commercial control systems produced by consortium partners
SE 2	To prove the platform deployability onto commercial industrial robots (fixed, modular)
SE 3	To pre-validate I-MECH platform in industrial-relevant environments (clean, harsh)
SE 4	To establish I-MECH center which shall ensure sustainable cooperation between partners after the project termination.



I-MECH at a glance

BB1: Platform for Smart Sensors with Advanced Data Processing

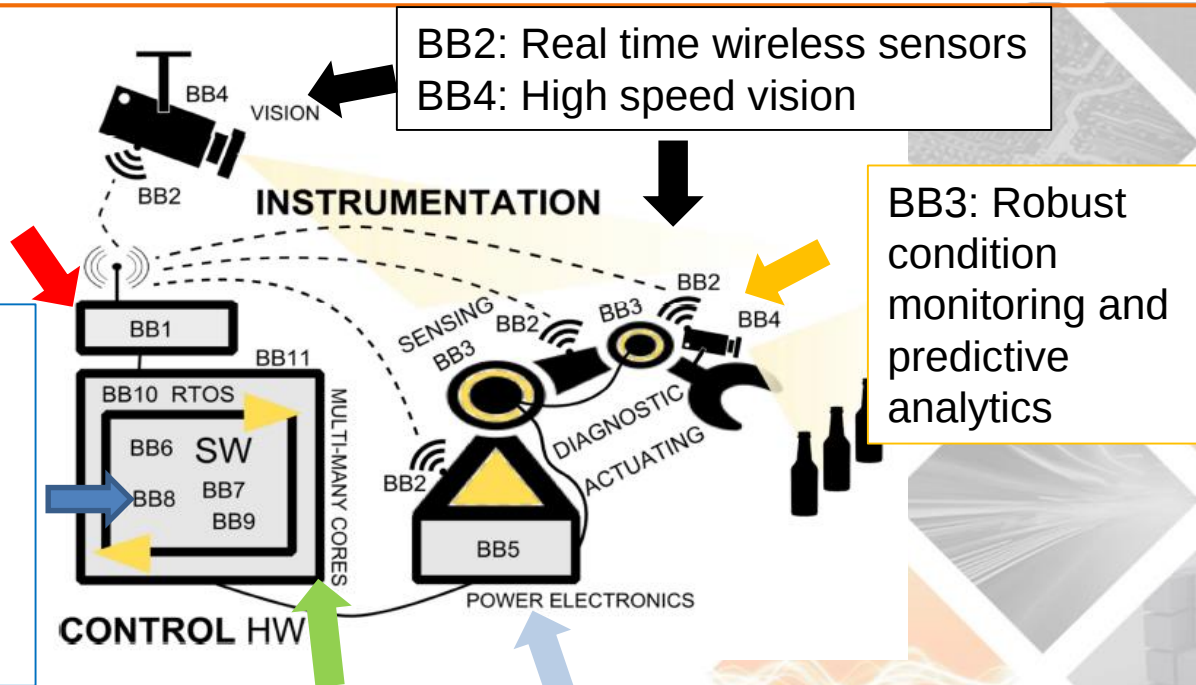
BB6: Self-commissioning velocity and position control loops
BB7: Vibration control module
BB8: Robust model-based multivariable control
BB9: Iterative and repetitive control module

BB9: Control specific multi-many core Platform
BB10: RTSO for multi-many core Platform

BB2: Real time wireless sensors
BB4: High speed vision

BB3: Robust condition monitoring and predictive analytics

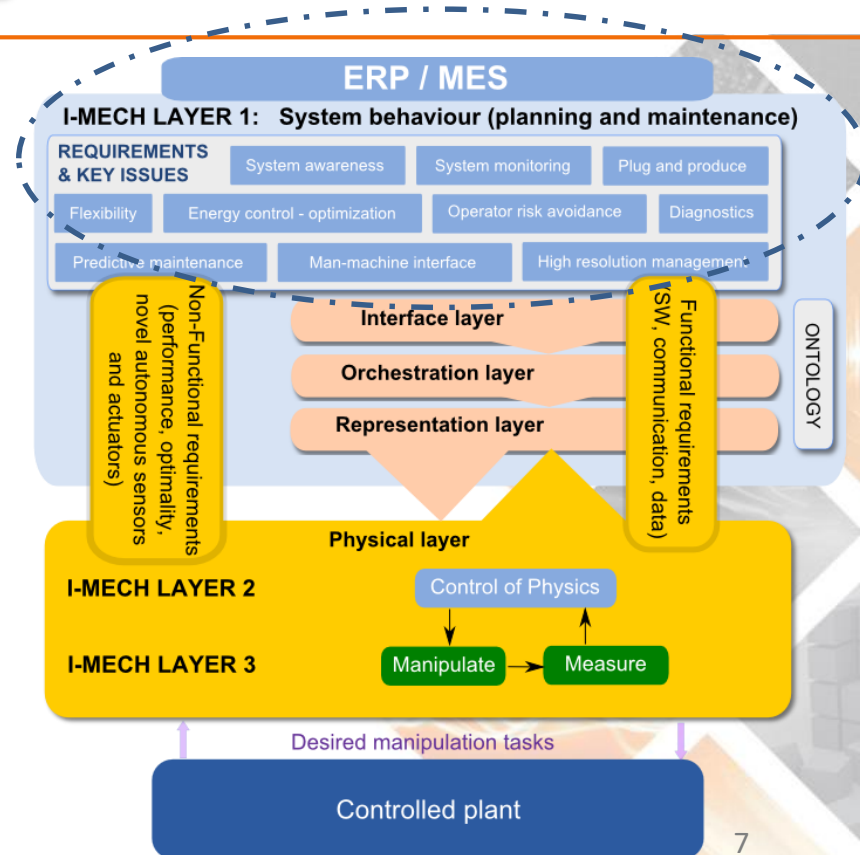
BB5: High performance servo amplifier





I-MECH platform layers

- ✓ **I-MECH** main research focus is in „Layer 2” and “Layer 3”
- ✓ **I-MECH** platform strives for following „Layer 1” features:
 - **SOA** > support of globally accepted standards (e.g. OPC UA)
 - **Industry 4.0** > connectivity to ERP/MES layers, adopting IoT principles
 - **S-o-S** > connectivity / cooperation between machines
 - **Predictive maintenance** > building block with diagnostic and performance monitoring features





I-MECH means of validation

- 1) Pilots -> driven by companies producing machines which should be on market
- 2) Use cases -> driven by companies producing control equipment (HW and SW), the innovated equipment should be on market
- 3) Demonstrators -> test of I-MECH BBs at the production line level (both clean and harsh environment)

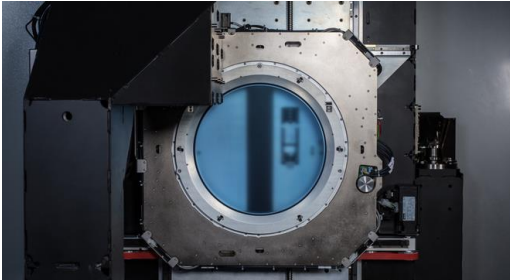


I-MECH pilots

Generic substrate carrier (SCC)



12-inch wafer stage (NXP)

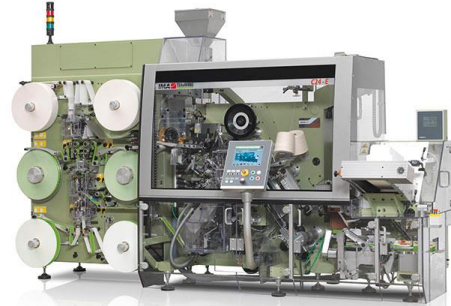


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Big CNC machine (Correa)



Packaging machine (IMA)



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Medical manipulator (Philips)





I-MECH use cases and demonstrators

Drive for industrial Apps
(Gefran)



Compact control for
CNC machines (Fagor)



PAC base HW (Teco)



Modular robotic arm
(UWB)



Validation of space GNC
systems (GMV)



Contact lenses transport
System (J&J)

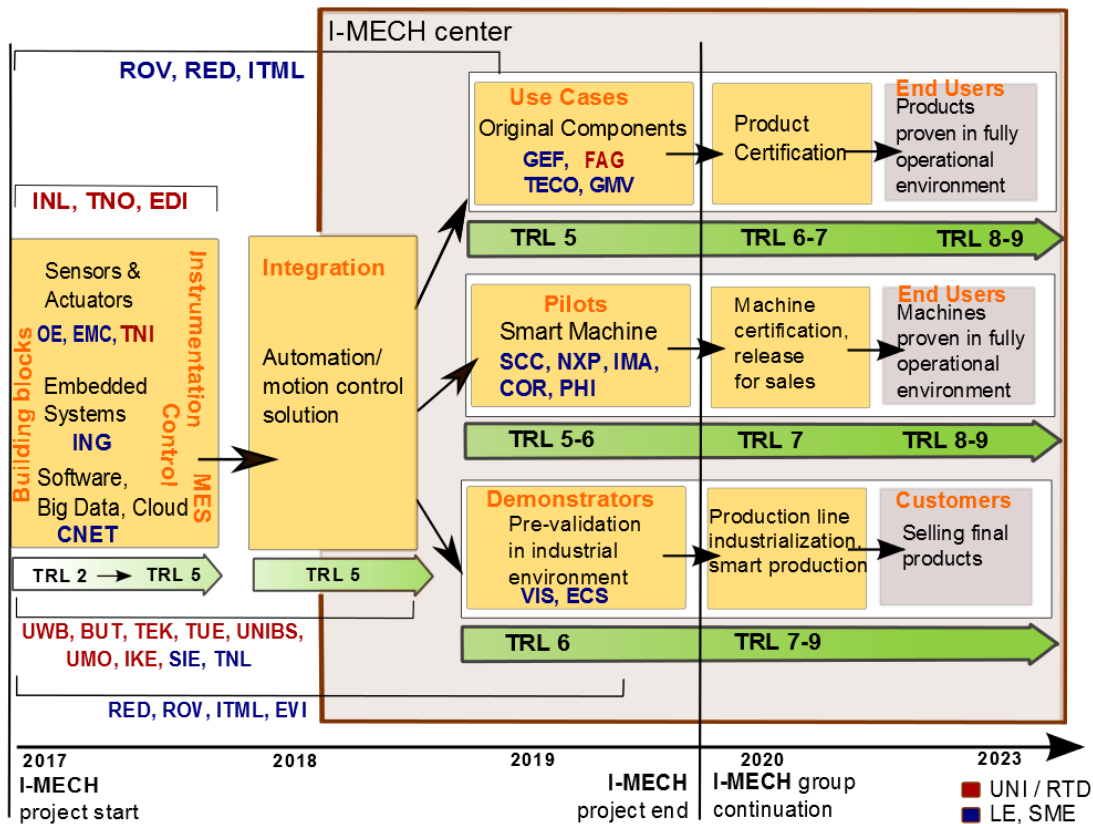


Injection mold industry



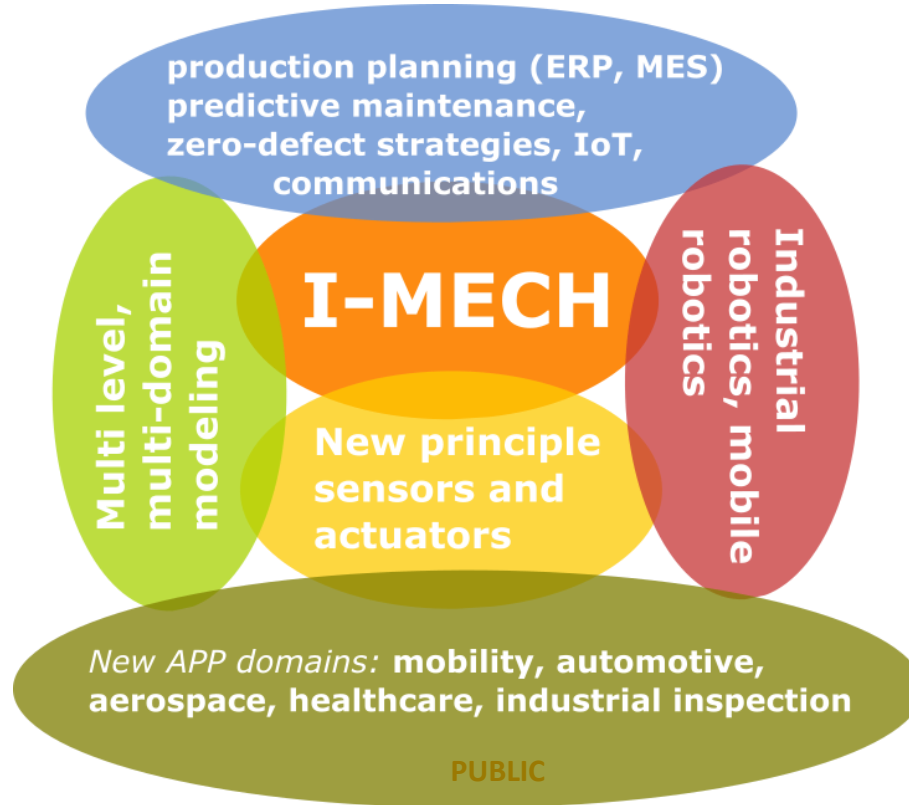


I-MECH center and business models





Potential lighthouse synergies





Potential lighthouse synergies

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