



AI - TEF for the manufacturing sector in Slovenia – TEF centers at the University of Ljubljana and Jožef Stefan Institute

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The PPT presentation available at: <https://web.fs.uni-lj.si/lasim/index.php?page=tef>

Excellence

Our team provides unique expertise in manufacturing and production sector that addresses the challenges of Artificial Intelligence, Factories of the Future, Robotics, Digital twins and Agents etc. across all the TRLs, from basic research to real-life applications and is composed of two leading R&D institutions in Slovenia:

- University of Ljubljana (Faculty of Mechanical Engineering) – UL FME
- Jožef Stefan Institute – JSI

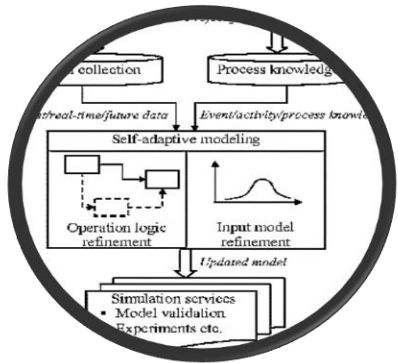
I. University of Ljubljana (Faculty of Mechanical Engineering)

- The capacity of the team in this field is more than **80 experts**, including PhD students, post-docs, and senior researchers, with numerous scientific articles and citations.
- We participated in more than **35 international and national R&D projects and in hundreds of industrial projects.**
- We provide **more than 5 million EUR of dedicated state-of-the art equipment** that facilitates both R&D and practical challenges, also test-before-invest to help companies (transfer of knowledge).

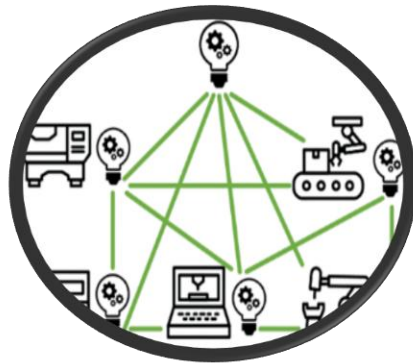
II. Jožef Stefan Institute

- Leading research institute in Slovenia with more than 1000 workers with a revenue of cca. 57,4 million EUR, own activities 15,2 million EUR, from own activities 51% direct industrial projects and 6 ERC projects.
- **Robotics** department has more than **40 experts**, with excellent international scientific results, large and state-of-the-art laboratory facilities and equipment.
- Currently we provide **6 EU projects (2 project coordination)**, additionally also industrial projects on this field with numerous scientific articles and citations.
- ...

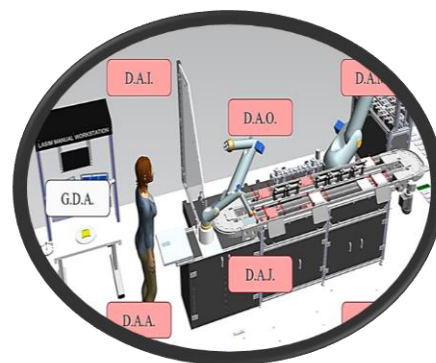
What we use, provide and transfer to manufacturing sector



Artificial Intelligence and Smart Algorithms



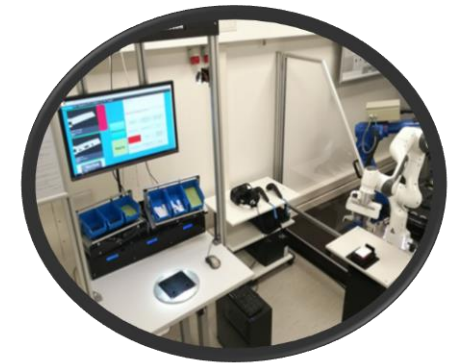
Distributed Systems and Edge Computing



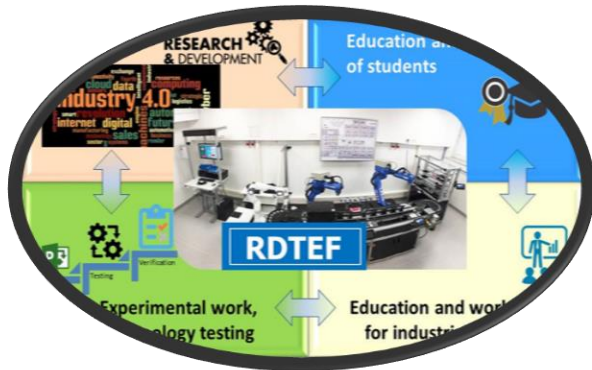
AI based Digital Twins and Agents for autonomous decision making



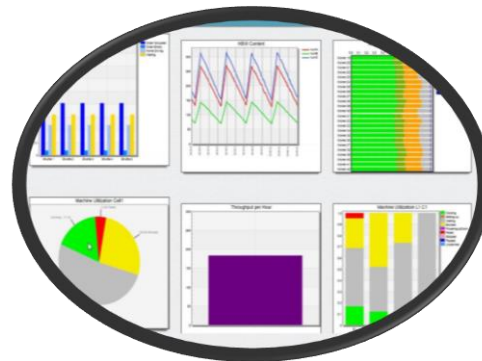
Flexible, Agile, Reconfigurable Robotic and Cobotic Cells



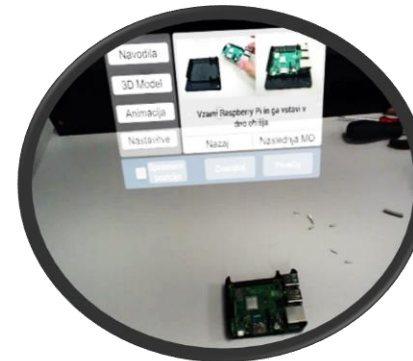
Smart Production, Manufacturing (ERP-MES-Digital twin interconnectivity)



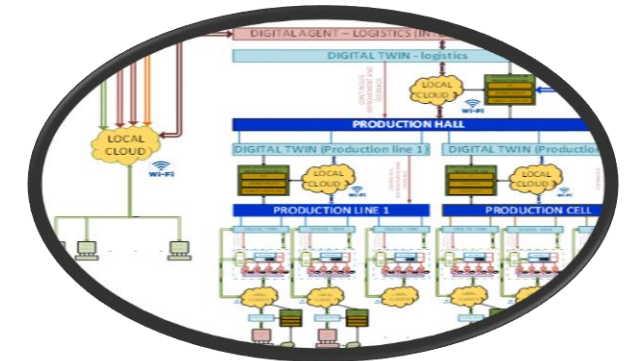
Experimental and Testing and facilities



Modelling, Simulation, Data Analytics

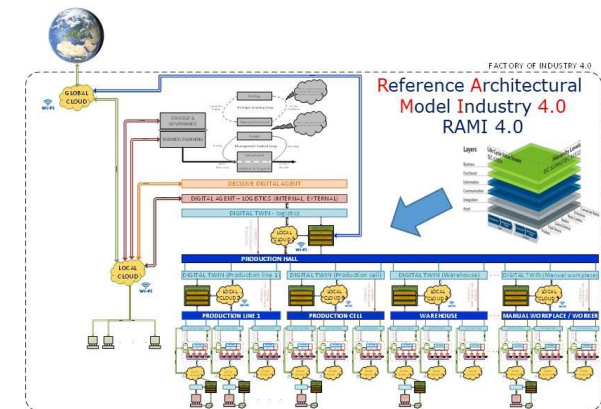
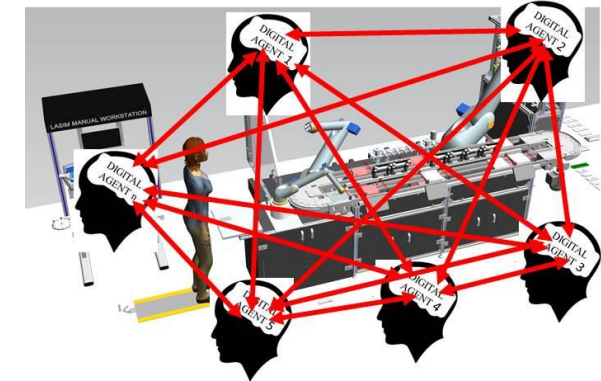
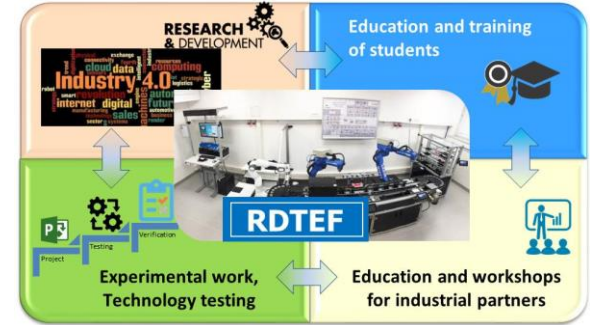
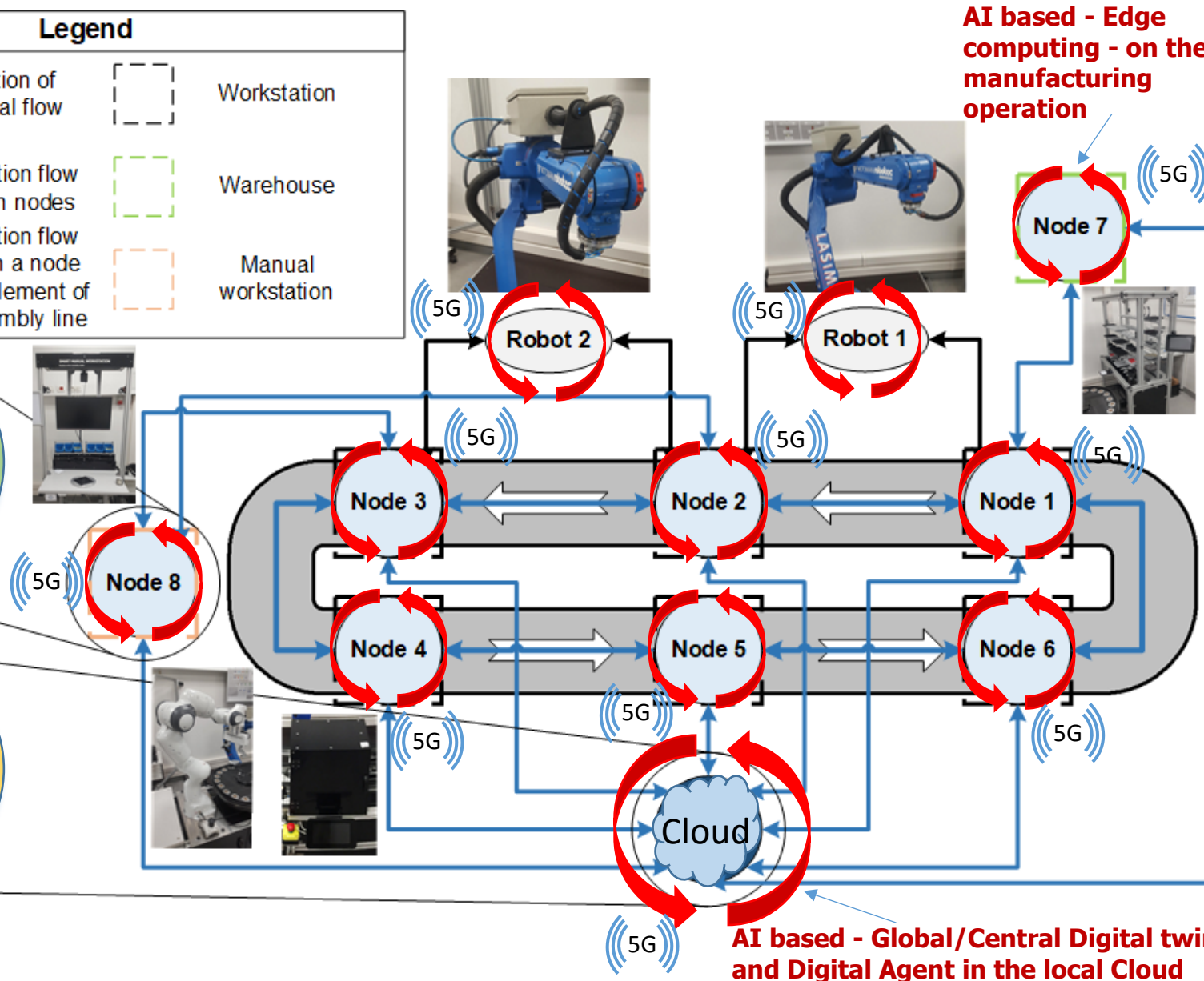
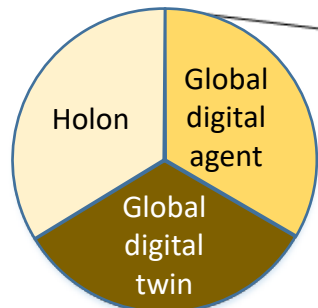
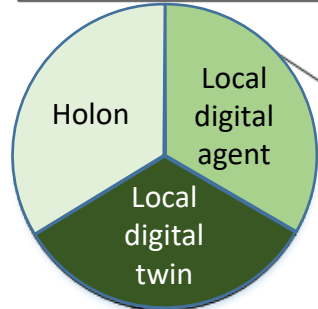
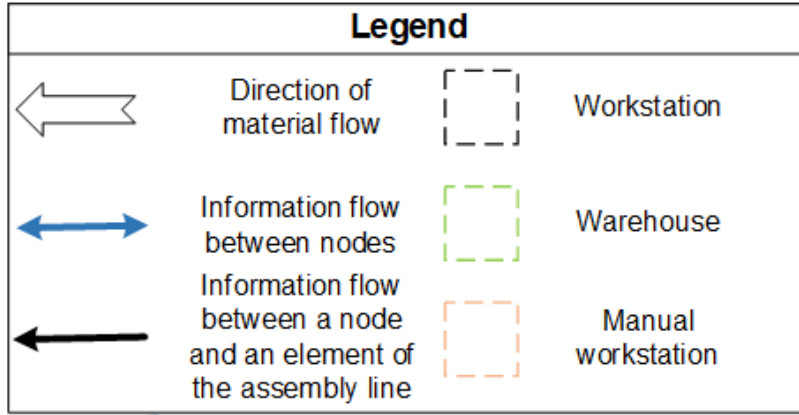


AR and VR



Architectural Models, Smart Factories, Communication Protocols and 5G

AI-based Edge Computing Concept in the R&D, Experimental, Testing and Demonstration Facility (RDTEF) at the University of Ljubljana, Faculty of Mechanical Engineering (UL FME)



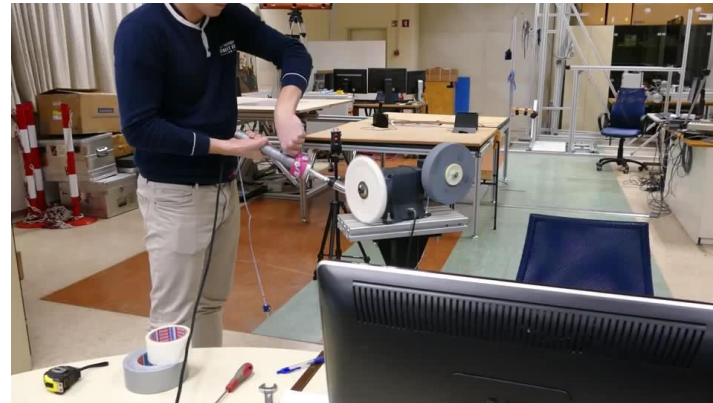
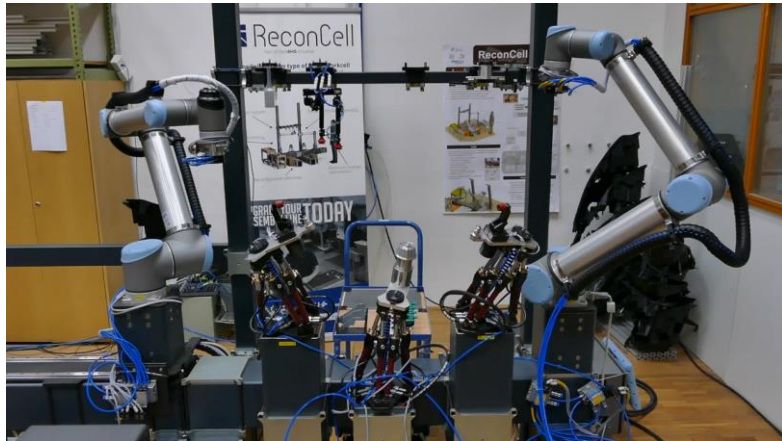
Robotics at Jožef Stefan Institute

Main research topics: Robot learning and cognitive robotics, Human-robot collaboration, Humanoid robotics, Dual-arm manipulation, Industrial robotics and automation supported by AI

A **Reconfigurable** robot work**Cell** for fast set-up of assembly processes in SMEs

Advanced Robotics for Agile Production in Future Manufacturing Ecosystems

Self-reconfiguration of a robotic workcell for the recycling of electronic waste



- Design a new kind of an **autonomous robot workcell**.
- Attractive not only for large production lines but also for **few-of-a-kind production**, which often takes place in SMEs.
- Passive reconfigurable hardware design, programming by demonstration, force control, simulation, and visual monitoring for **fast set-up** of robotic workcells.
- Coordinated by Jožef Stefan Institute



- Robot aided reconfiguration
- Intelligent modularisation
- Coordinated by Jožef Stefan Institute

Impact: Activities in Knowledge & Technology transfer to industry

- We have provided education and hand-on training of experts from industry for more than 50 companies from Slovenia, Croatia, Austria, Italy and Check Republic.
- We transferred knowledge to more then 100 companies through industrial projects in Slovenia, Germany and neighboring countries.
- We have access to more than 100 companies through our networks in Slovenia (SRIP FoF cluster, DIH JSI, CTT at JSI).
- We have access to more than 100 companies through our networks in the EU (EU DIH Trinity, RIA, EFFRA).
- We have a contract with Slovenian Chamber of commerce (GZS) and with Strategic Research and Innovation Partnership Factories of the Future (SRIP FoF).
- We are members of Technological Network of Companies for Control Technologies with significant membership.
- We have established Digital Innovation Hub (DIH-DITMAPS) for digital twins of logistics systems and manufacturing processes and systems.
- We are members of Slovenian Innovation Hub (DIH Slovenia).
- JSI is a regular member of EIT Manufacturing, EFFRA, RIA, WMF
- ...



Thank you for your attention!

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Laboratory LASIM, Faculty of
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<https://web.fs.uni-lj.si/lasim/>

<https://dih-ditmaps.si/>

Laboratory LASIM – R&D fields

