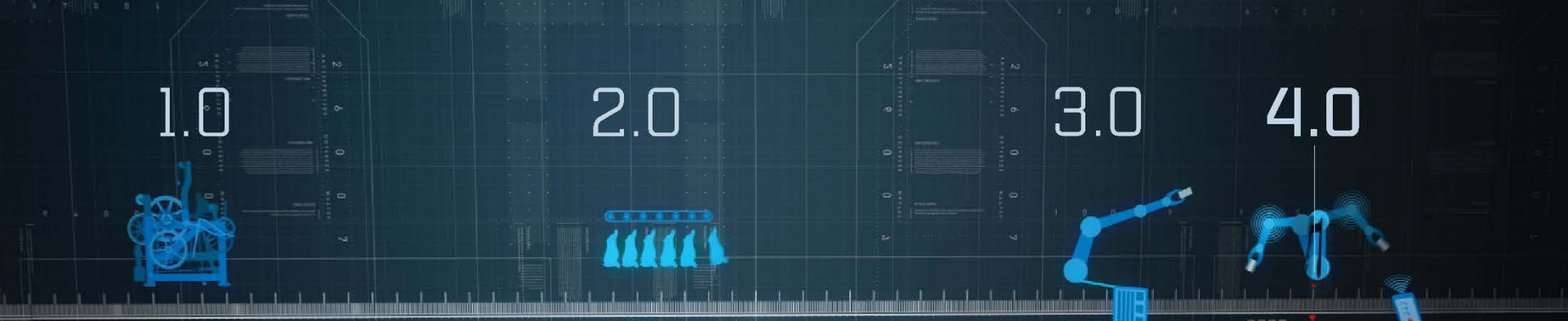

SME 4.0

SME 4.0 > Industry 4.0 for SMEs

Smart Manufacturing and Logistics for SMEs in an X-to-order and Mass Customization Environment

Project key facts

3 Research fields 

8 Partners 

783.000€ of H2020 funding 

6 Countries 

212 Person Months 

44+ Researchers 

78 Secondments 

This project has received funding from the European Union's Horizon 2020 R&I programme under the Marie Skłodowska-Curie grant agreement No 734713

Introduction to Industry 4.0 for SMEs

Industry 4.0 refers to the fourth industrial revolution and technological evolution from embedded systems to cyber-physical systems (CPS) in production. The main objectives of Industry 4.0 can be summarized as:

- the introduction of **intelligent systems in production and logistics**;
- the **development of highly adaptable and modular manufacturing and logistics systems**;
- the **integration of sustainable and advanced manufacturing technologies**;
- the promotion of **automation technology and human-machine interaction**.

In the context of industry 4.0, new ICT and web technologies act as booster or enabler of smart, autonomous and self-learning factories facing the challenges of even more individualized and customized product portfolios.

A great challenge for the future lies in transferring expertise and technologies of Industry 4.0 to small and medium-sized enterprises (SMEs). SMEs represent the backbone of the economy and have an enormous importance in the development programs of the European Union for strengthening the competitiveness of European enterprises.

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Research objectives

Despite the high potential of Industry 4.0 in SMEs, the main limitation lies in a lack of concrete models for its implementation and application in small and medium-sized enterprises.

Thus the research project aims at closing and overcoming this gap **through the creation of an international and interdisciplinary research network**.

The three main objectives of the research network are:

1. Identifying the need and enablers for a smart and intelligent SME Factory;
2. Creating adapted concepts and design solutions for production and logistics system in SMEs;
3. Developing sustainable organization and business models.

The applicability of results is ensured through a close collaboration with a European small and medium size enterprise (non-academic partner) from mass customization industry.

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Research questions

A) **Identification of requirements for Industry 4.0 applications and implementation in SME Manufacturing and Logistics:**

- What are actual known concepts and technologies of Industry 4.0?
- What are the main opportunities/risks for the use of these concepts in SMEs?
- How suitable are the different concepts for application in SMEs (assessment of SME suitability)?
- What are SME-specific functional requirements for the adaptation of the most promising concepts and technologies?

B) **Development of SME-specific concepts and strategies for smart and intelligent SME Manufacturing and Logistics:**

- What are possible forms or migration levels for realizing smart and intelligent Manufacturing Systems for X-to-order and Mass Customization Production?
- How can Automation, Advanced Manufacturing Technologies, ICT and CPS improve productivity in SME Manufacturing and Logistics?
- What are suitable models for smart and lean supply chains in SME Logistics?

C) **Development of specific organization and management models for smart SMEs:**

- What are innovative and promising new business models for smart SMEs?
- What are optimal implementation strategies for the introduction of Industry 4.0 in SMEs?
- What are ideal organizational models for smart SMEs or SME networks?

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Research consortium

Free University of Bolzano
Bolzano, Italy
Prof. Dominik Matt
Leader "Smart Manufacturing"

Montanuniversität Leoben, Austria
Prof. Helmut Zsifkovits
Leader "Smart Logistics"

Technical University of Košice Košice, Slovakia
Prof. Vladimír Modrák
Leader "Organisation and Management models"

European beneficiaries network

ELCOM sro
Prešov, Slovakia
Ing. Miloslav Karaffa
Industrial partner

International partner organizations

University Chiang Mai
Chiang Mai, Thailand
Prof. Korrakot Y. Tippayawong
Logistics Engineering and Supply Chain Management

Worcester Polytechnic Institute, Worcester (MA)
Prof. Christopher Brown
Manufacturing Systems and Processes

Massachusetts Institute of Technology, Boston (MA)
Prof. Sang-Gook Kim
Complex Systems

SACS MAVMM
Tamil Nadu, India
Prof. Sudhakara Pandian
Cellular Manufacturing and Logistics/Operations Management

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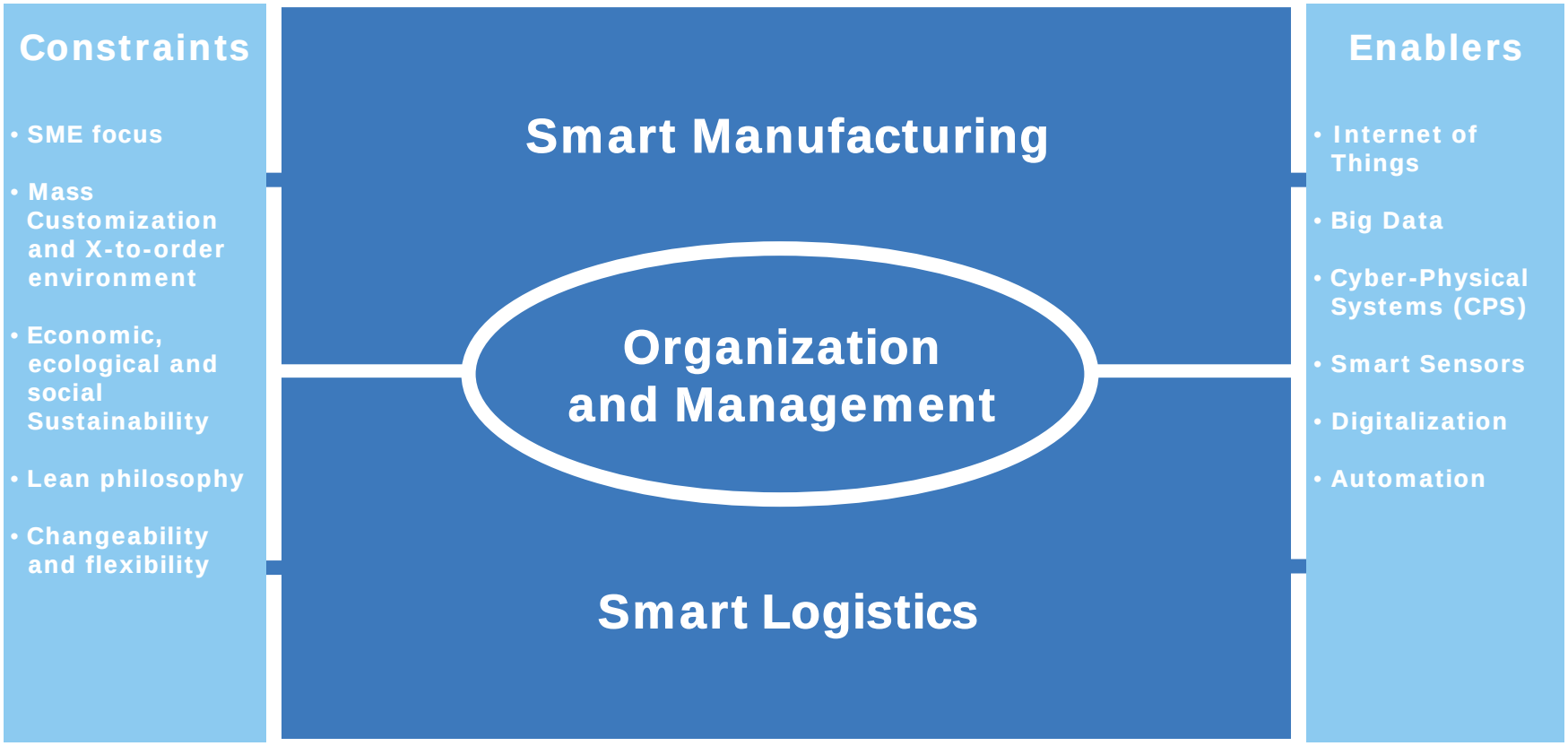
Research fields, constraints and enablers

Focusing on **Small and Medium-sized Enterprises and an X-to-order and / or Mass Customization environment**



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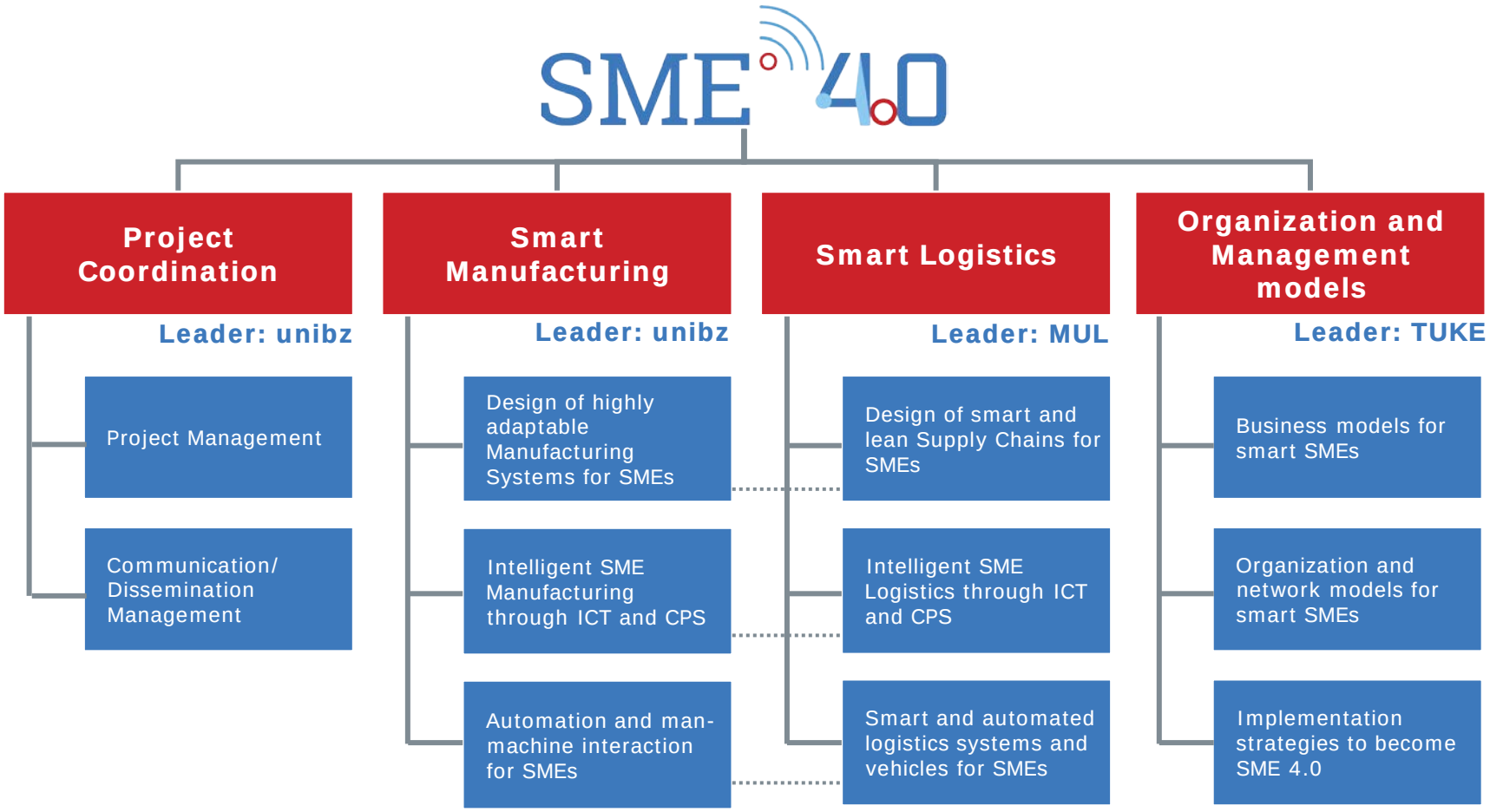
Project structure plan



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Project structure plan
WP Leaders

Project Coordination

Leader: unibz

- Project Management
- Communication/ Dissemination Management

Prof. Dominik T. Matt — unibz

Dr. Erwin Rauch — unibz

Dr. Susanne Altendorfer-Kaiser

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Project structure plan
WP Leaders

Smart Manufacturing

Leader: unibz

- Design of highly adaptable Manufacturing Systems for SMEs
- Intelligent SME Manufacturing through ICT and CPS
- Automation and man-machine interaction for SMEs

Prof. Dominik T. Matt — unibz

Dr. Erwin Rauch — unibz

Dr. Rafael Rojas — unibz

Prof. Renato Vidoni — unibz

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Project structure plan
WP Leaders

Smart Logistics

Leader: MUL

- Design of smart and lean Supply Chains for SMEs
- Intelligent SME Logistics through ICT and CPS
- Smart and automated logistics systems and vehicles for SMEs

Prof. Helmut Zsifkovits

Manuel Woschank, M.Sc.

Dr. Susanne Altendorfer-Kaiser

Johannes Kapeller, M.Sc.

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Project structure plan
WP Leaders

Organization and Management models

Leader: TUKE

Business models for smart SMEs		**Prof. Vladimir Modrak**
Organization and network models for smart SMEs		**Prof. Vladimir Modrak**
Implementation strategies to become SME 4.0		**Dr. Guido Orzes**
		**Dr. Slavomir Bednar**

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SME 4.0 > Industry 4.0 for SMEs

Project structure plan
Scheduling and Work packages

Jan 2017 — 2017 — 2018 — Jan 2019 — 2019 — 2020 — Dec 2020

Phase 1 – Analysis of Industry 4.0 concepts and assessment for SME suitability

Phase 2 - Synthesis and recommendation for action / implementation

WP 1 Project Management

WP 2 Communication and Dissemination Management

WP 3 Analysis of Industry 4.0 concepts for Smart Manufacturing in SMEs
- WP 3.1 Requirements analysis for SME 4.0 Manufacturing Systems
- WP 3.2 Suitability analysis of ICT and CPS concepts in SME Manufacturing
- WP 3.3 Analysis of the potential of automation in SME Manufacturing

WP 6 – Synthesis and solutions for Smart Manufacturing in SMEs
- WP 6.1 Design of highly adaptable Manufacturing Systems for SMEs
- WP 6.2 Intelligent SME Manufacturing through ICT and CPS
- WP 6.3 Automation and man-machine interaction for SMEs

WP 4 Analysis of Industry 4.0 concepts for Smart Logistics in SMEs
- WP 4.1 Requirements analysis for smart and lean Supply Chains for SMEs
- WP 4.2 Suitability analysis of ICT and CPS concepts in SME Logistics
- WP 4.3 Analysis of the potential of automation in SME Logistics

WP 7 – Synthesis and solutions for Smart Logistics in SMEs
- WP 7.1 Design of smart and lean Supply Chains for SMEs
- WP 7.2 Intelligent SME Logistics through ICT and CPS
- WP 7.3 Smart and automated logistics systems and vehicles for SMEs

WP 5 Analysis of Industry 4.0 concepts to the organization of SMEs
- WP 5.1 Analysis of the suitability of SME strategies for Industry 4.0
- WP 5.2 Analysis of organizational requirements in smart SMEs
- WP 5.3 Analysis of actual implementation of Industry 4.0 in SMEs

WP 8 – Organization and Management models for Smart SMEs
- WP 8.1 Business models for Smart SMEs
- WP 8.2 Organization and network models for smart SMEs
- WP 8.3 Implementation strategies to become SME 4.0

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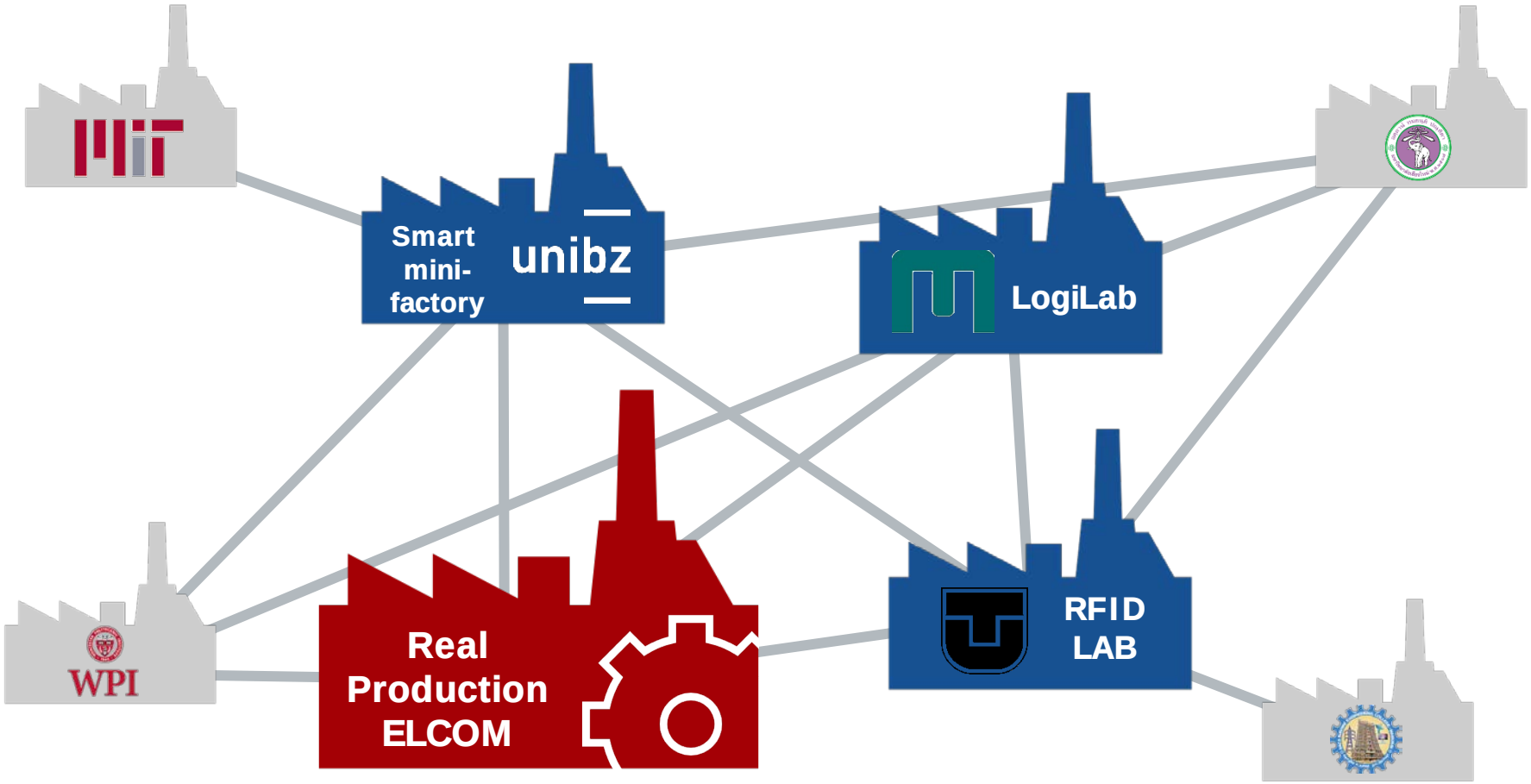
Laboratory structure



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Knowledge sharing activities

- **Regular annual meetings**
- **Joint workshops and/or joint participation in conferences**
- **Joint use of laboratories:**
  - **UNIBZ:** smart mini-factory Manufacturing/Assembly/Robotics Laboratory
  - **MUL:** LogiLab Logistics/Warehouse Automation Laboratory
  - **TUKE:** Laboratory of RFID in Production Management
  - **MIT:** Park Center for Complexity
  - **WPI:** Engineering labs
  - **SACS:** Manufacturing Technology Lab
  - **CMU:** Excellence Center in Logistics and SCM
- **Joint papers**
- **Participation in trainings during secondment**
- **Common lecture programs**
- **Series of lectures**
- **Project website**
- **Online meetings**
- **Involvement of (graduate and under-graduate) students**

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Key deliverables

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For further information please follow us on...

Website

www.sme40.eu

Project film

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Thank you for your kind attention

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