

# FoE-Meeting

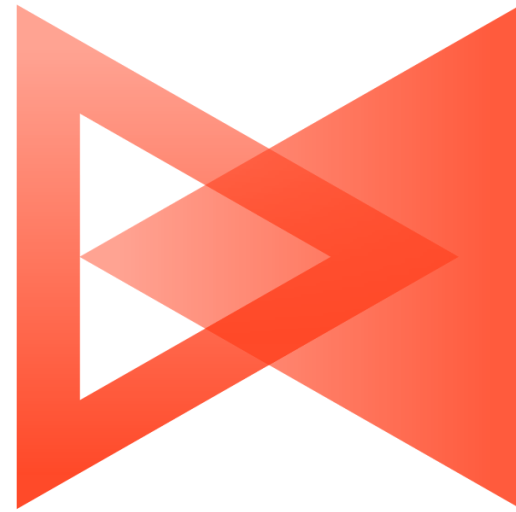
Labor für Innovation, Inffeldgasse 11/3, 8010 Graz

12. November 2018





**INNOVATION**

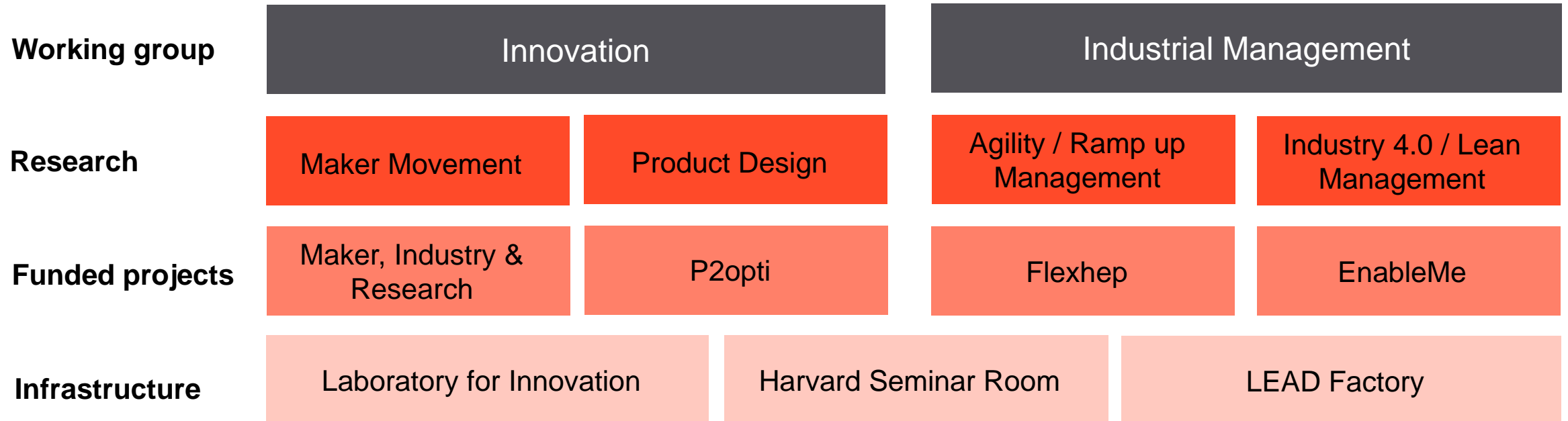


**INDUSTRIAL  
MANAGEMENT**

INSTITUTE OF

**INNOVATION  
AND INDUSTRIAL  
MANAGEMENT**

# IIM – Basic Structure



# IIM – Locations

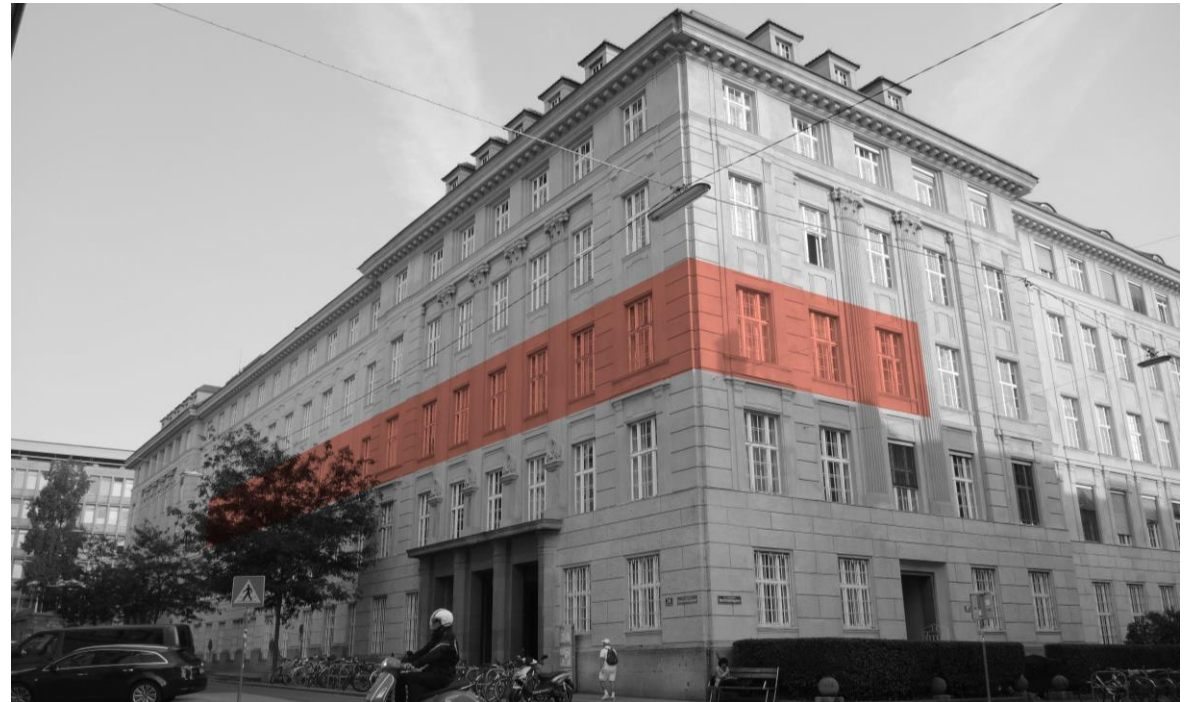
## Working Group Innovation

Inffeldgasse 11/3



## Working Group Industrial Management

Kopernikusgasse 24/2



# IIM – Man Power

## Professor / Scientific Assistants



## Project Assistants



Industry partner:

Plansee

AVL List

BMW

Rewe/Rosenbauer

## Administration / Communication



## Student Assistants



# IIM – External Lecturers

## **Günther Apfalter**

Magna Europe & Magna Steyr  
Management Topics in Automotive Industry

## **Prof. Dr. Hans Danzer**

Qualitätsmanagement

## **Raimund Diederichs**

McKinsey & Company  
Manufacturing and Supply Chain Network

## **Stefan Dobelhofer**

Mag. Doblhofer Unternehmensberatung  
Change Management

## **Maria Gabriele Ferruffino Vidal**

Magna Education & Research GmbH & Co KG  
Leadership and Motivation

## **Dr. Markus Hammer**

McKinsey & Company  
Learning Factory

## **Robert Hammer**

Knapp AG  
Warehouse Logistics

## **John Heugle**

Mitra Partners Inc.  
Safety and Sustainability

## **Brigitte Kroll-Thaller**

General Motors Europe  
Marketing in Automotive Business

## **Georg List**

AVL List GmbH  
Implementing Innovation through Merger and Acquisition

## **Dr. Hannes Oberschmied**

Austin / BFP Audit Wirtschaftsprüfungs GmbH  
Operational Risk Management

## **Roberto Piccioni**

Chevron Corporation  
Safety and Sustainability

## **Berhard Reisner**

MIBA AG  
Teambuilding

## **Prof. Dr. Josef Spitzer**

Energiewirtschaftslehre

## **Dr. Andreas Stugger**

Pewag International GmbH  
Operational Risk Management

## **Dr. Markus Tomaschitz**

AVL List GmbH  
Leadership and Motivation

## **Vladimir Valastiak**

Miba AG  
Quality Management
































## **Mathias Weyrer**

Conecta GmbH & Co KG  
Career Management

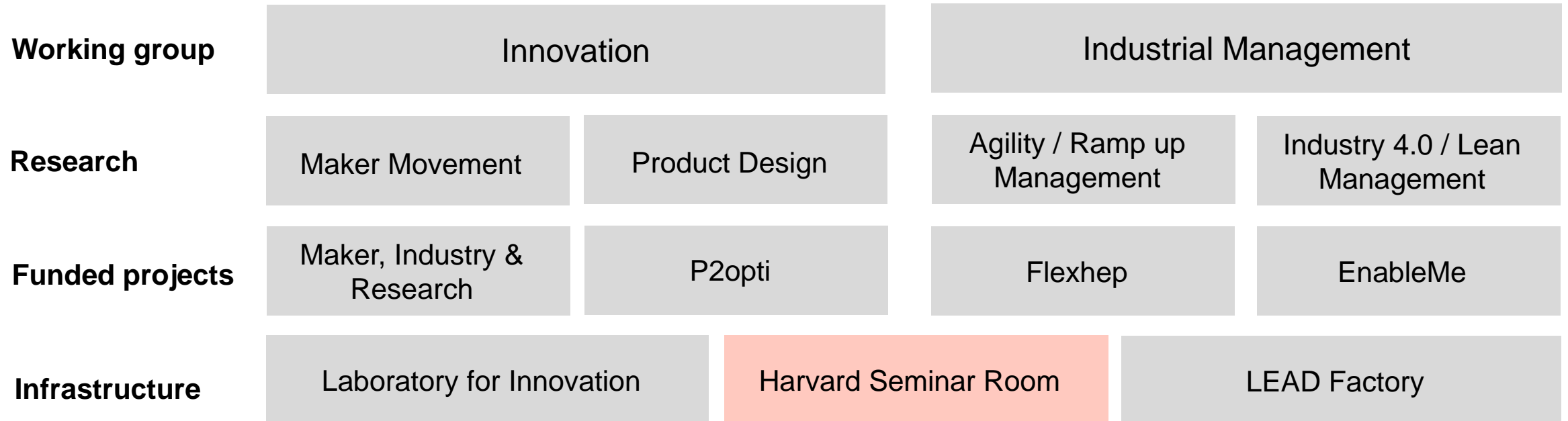
## **Prof. Siegfried Wolf**

Russian Machines  
Management Topics in Automotive Industry



<p><b>Basics</b></p>	<ul style="list-style-type: none"> <li>▪ Industriebetriebslehre </li> <li>▪ Industrial Management Seminar </li> <li>▪ Industrial Management and Innovation </li> </ul>	
<p><b>Innovation</b></p>	<ul style="list-style-type: none"> <li>▪ Betriebliches Innovationsmanagement </li> <li>▪ Product Innovation Project I </li> <li>▪ Product Innovation Project II </li> <li>▪ Kreativitätstechniken </li> <li>▪ Creativity Techniques </li> <li>▪ Product Innovation Management </li> <li>▪ Marketing in Automotive Business </li> <li>▪ Innovation strategy through M&amp;A </li> <li>▪ Value Management I </li> <li>▪ Value Management II </li> <li>▪ Design Thinking &amp; Rapid Prototyping </li> </ul>	<p><b>Industrial Management</b></p> <ul style="list-style-type: none"> <li>▪ Industrial Engineering </li> <li>▪ Arbeitssicherheit </li> <li>▪ Logistik Management </li> <li>▪ Lernfabrik - Learning Factory </li> <li>▪ Production Strategies </li> <li>▪ Manufacturing and Supply Chain Networks </li> <li>▪ Quality Management </li> <li>▪ Qualitätsmanagement </li> <li>▪ Warehouse Logistics </li> <li>▪ Operational Risk Management </li> <li>▪ Safety and Sustainability </li> </ul>
<p><b>Complementary Courses</b></p>	<ul style="list-style-type: none"> <li>▪ Energiewirtschaftslehre </li> <li>▪ Management Topics in Automotive Industry </li> <li>▪ Change Management </li> </ul>	<ul style="list-style-type: none"> <li>▪ Career Management </li> <li>▪ Leadership and Motivation </li> <li>▪ Teambuilding </li> </ul>

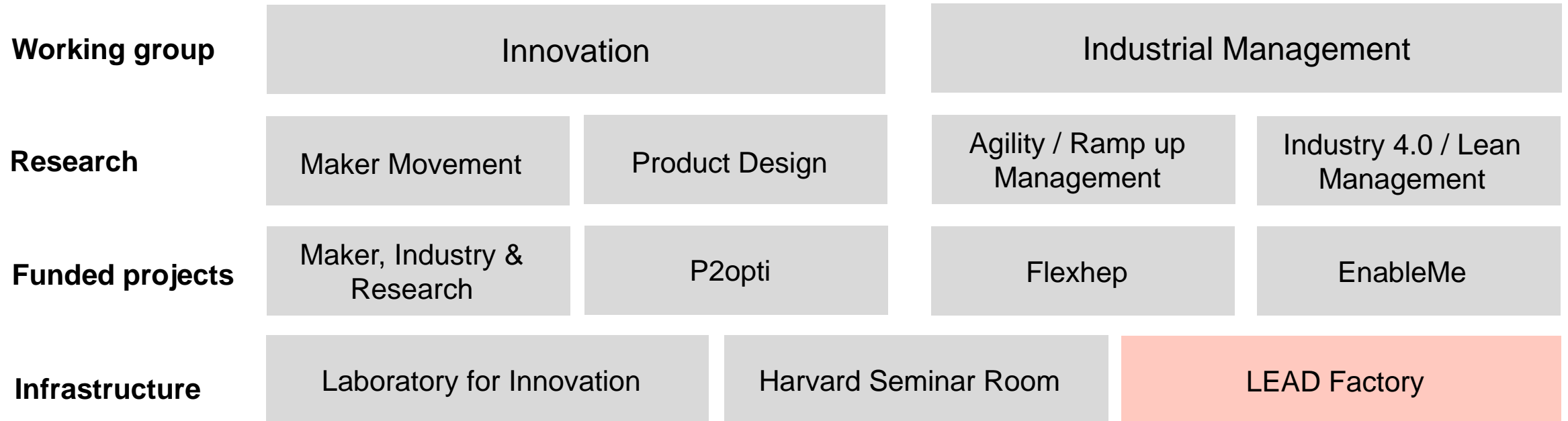
# IIM – Basic Structure





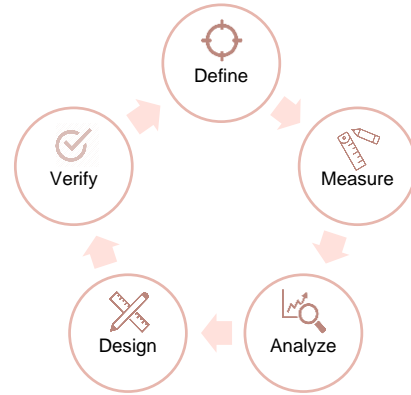


# IIM – Basic Structure



## L\_LEAN

Maximizing value through eliminating waste



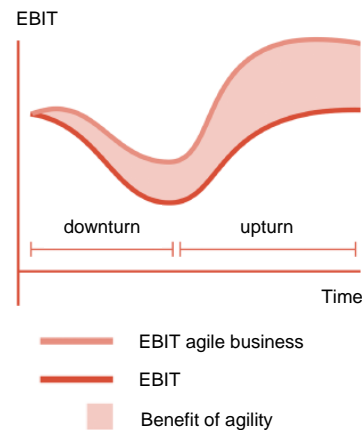
## E\_Energy Efficient

Minimize energy use and related carbon emissions



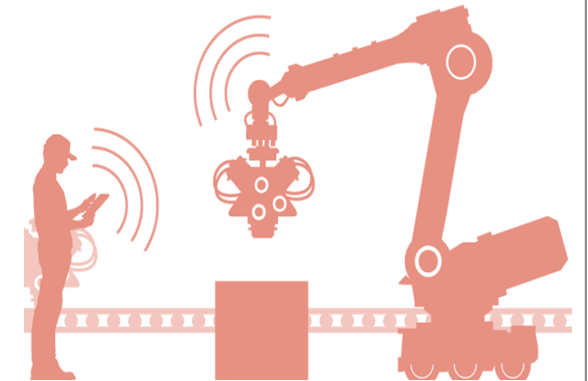
## A\_Agile

Proactively minimizing risks in market downturns and enabling growth in upturns



## D\_Digital

Increasing productivity by introducing digital technologies in manufacturing





## Facts

- ▶ Opened in 2014
- ▶ Focuses on assembling process
- ▶ Various courses offered for students ranging from 3 hours to 3 days
- ▶ Various courses offered to companies
- ▶ So far more than 300 students and 10 companies such as the Austrian Railway in our courses
- ▶ Continuous improvements of equipment and trainings
- ▶ Product produced: Scooter



# Digital State of the LEAD Factory

## Manufacturing Process

- ▶ 3D printer
- ▶ Mini oven
- ▶ CNC milling machine

## Lean Management

- ▶ KANBAN material slides
- ▶ Shop floor management board
- ▶ Milkrun wagon
- ▶ Heijunka board
- ▶ Andon

## Energy Efficiency and Sustainability

- ▶ Energy measurement devices
- ▶ CO<sub>2</sub> emission measurement

## Digitalization

- ▶ RFID technology
- ▶ Google glass
- ▶ Gesture control
- ▶ Screens
- ▶ Smart shop floor management board
- ▶ Smart Andon

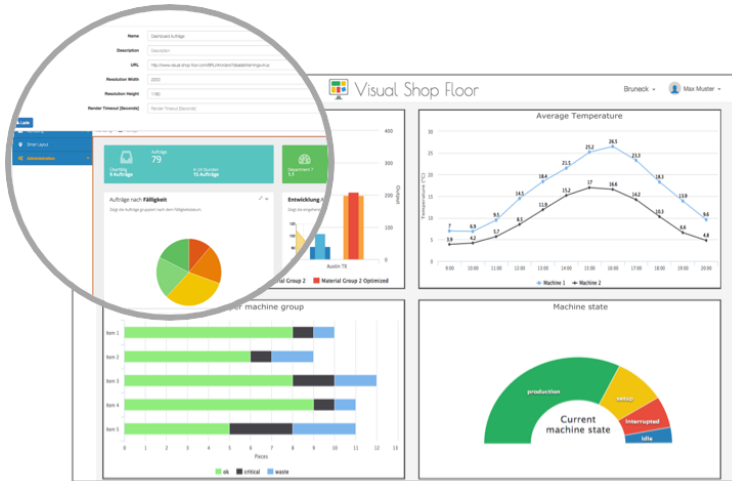
...and many more





## Implementation of a SFM Board

- ▶ Interactive touch display
- ▶ Visualization of manufacturing data and trends covering productivity, quality, delivery, cost, safety and morale
- ▶ Cause analysis by analyzing detailed information



## Implementation of Smart Andon

- ▶ Installed at every station and uses signal boards to indicate which station has the problem
- ▶ Immediate notification and problem solving
- ▶ Down time reduction



## Digitalization Teaching Concept

- ▶ Framed by a case study
- ▶ Digitalization implementation project
- ▶ Getting to know digital technologies
- ▶ Value creation based on digital strategies and tools



# Current / planned activities in the LEAD Factory

## Development of Augmented Reality use Cases

- ▶ Student project (Product Innovation Project)
- ▶ Corporation with Institute of Computer Graphics and Vision



## Smart Milk Run

- ▶ Warehouse picking system
- ▶ Development of an algorithm for optimized route planning for the milk run



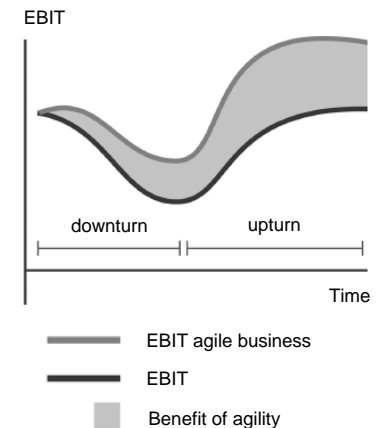
## Google Glass

- ▶ Implementation of the newest version of Google Glass



## Agility Training

- ▶ Capability building for volatile environments
- ▶ Training concepts for students and operation managers





- ▶ Circle of research institutions running learning factories
- ▶ Aims to cooperate to reach excellence in teaching in the field of manufacturing
- ▶ Members strive for:
  - ▶ Exchange knowledge
  - ▶ Use synergies in the establishment of learning factories
  - ▶ Leadership through innovative enhancements
- ▶ Founded in 2011 by several European learning factories
- ▶ **Since 2018 the LEAD Factory is a member of IALF**

## Members of IALF



Center für industrielle Produktivität

TU Darmstadt



Learning factory for optimal machining

TU München



Lean Learning Factory

University of Split



Stellenbosch Learning Factory

Stellenbosch University of South Africa



University of Patras



Logistics learning factory

ESB Reutlingen



TU Wien



Karlsruhe Institute of Technology



Ruhr Universität Bochum



TU Braunschweig



TU Graz

# 10<sup>th</sup> Conference on Learning Factories (CLF) in Graz



Organized by Institute of Innovation and Industrial Management



CIRP sponsored conference



April 15-17, 2020



Papers are published in Procedia Manufacturing



150 people expected (researchers and industry partners)

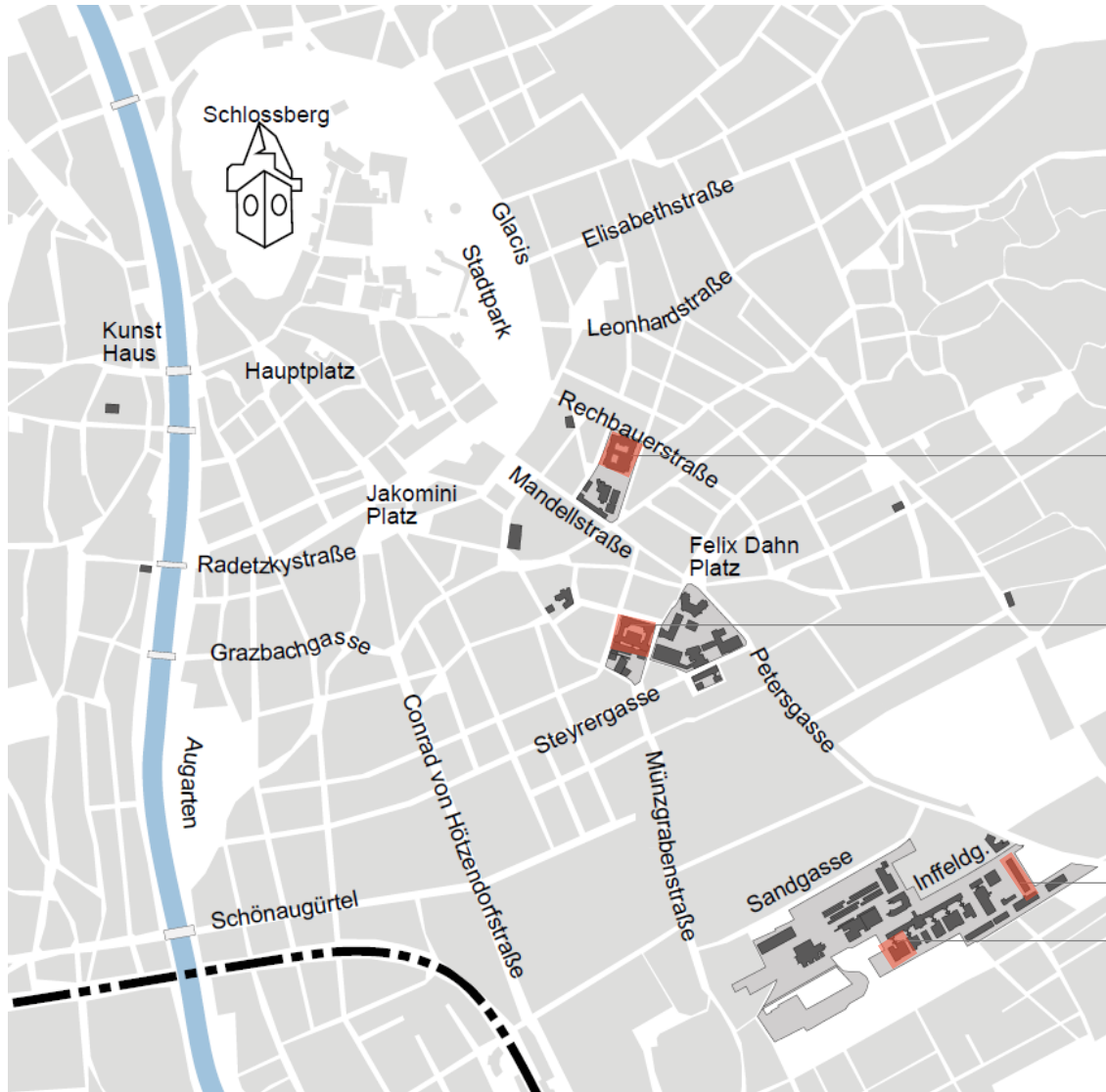


4 keynotes



Scientific committee Q2 2019

# Venue of CLF 2020 – IIM



Main Conference Sessions



LEAD Factory\*



Laboratory for Innovation\*



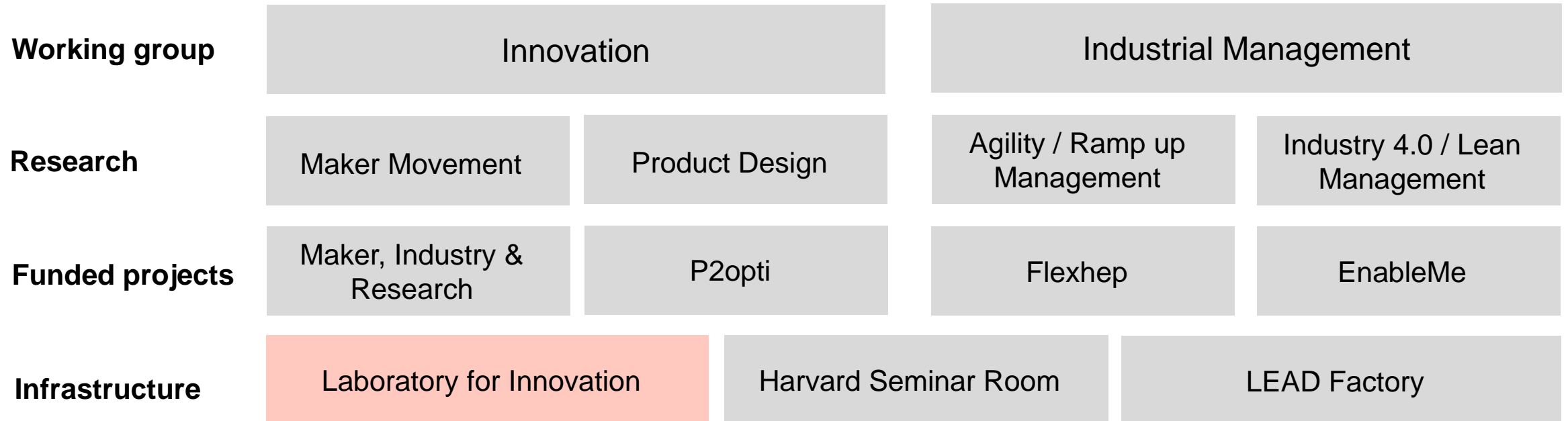
smartfactory@tugraz\*



\*Workshop Locations

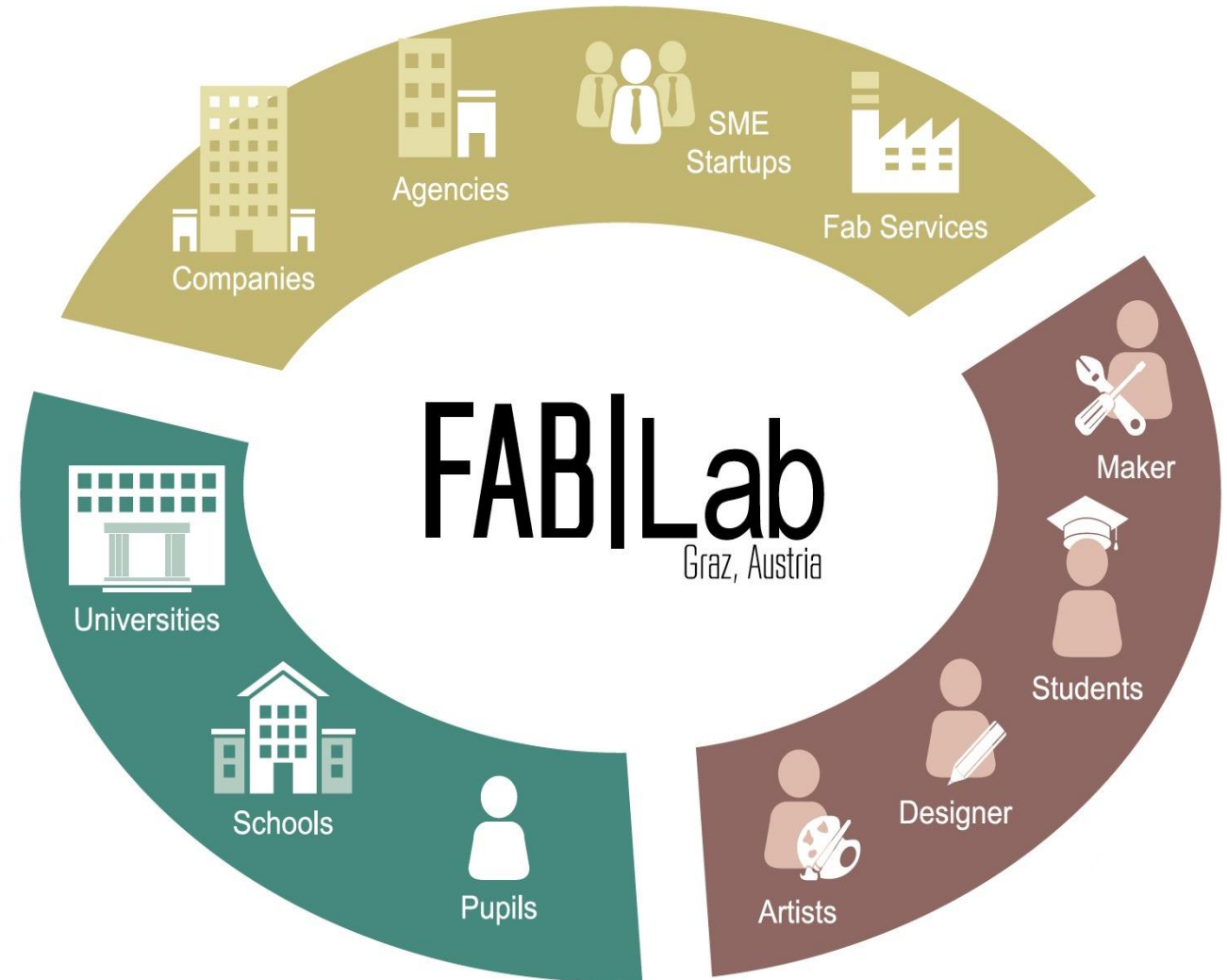


# IIM – Basic Structure



# Laboratory for Innovation - FabLab

- **First** academic FabLab in **Austria** in operation since **2014**
- The idea is to offer **access to digital manufacturing** for individuals
- Our mandate is to assist our **users** - **companies, SMEs, startups, Product Innovation Project teams, students** etc. - with support and solutions along the product design process from idea generation to market launch

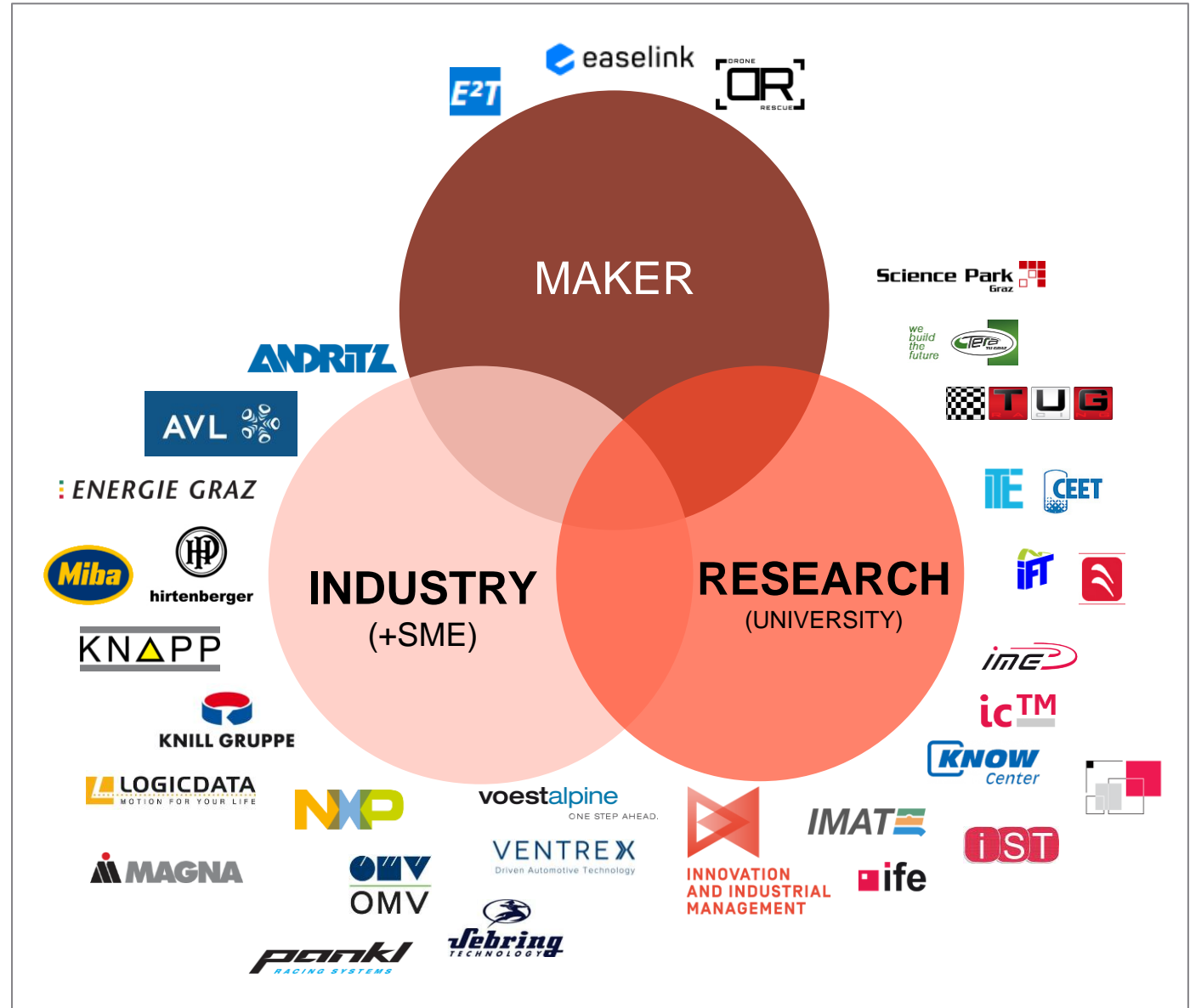


## Objectives

- Development and construction of a **laboratory environment for the investigation of the interfaces of Maker, Industry and Research** in product creation
- Development of a **holistic approach to support a transdisciplinary cooperation** in product creation across Maker, Industry and Research
- Derivation of **teaching concepts** to integrate gained knowledge in education and training programs for Maker, Industry and Research.

## Facts

- Duration **3 years**
- Funded by
- **15 Industrial Partners**







**+ 800 m<sup>2</sup>**

**new space to foster product innovation for  
students, startups and partner companies**





Baustart: 09.07.2017







2. Partner-Treffen: 26.02.2018

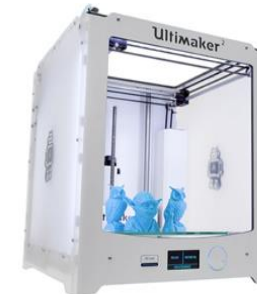
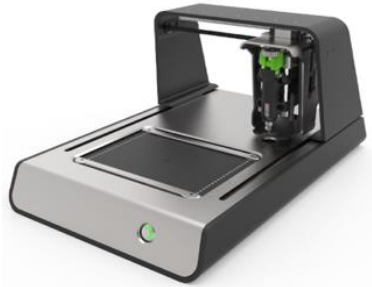




Übergabe der Räumlichkeiten: 13.09.2019

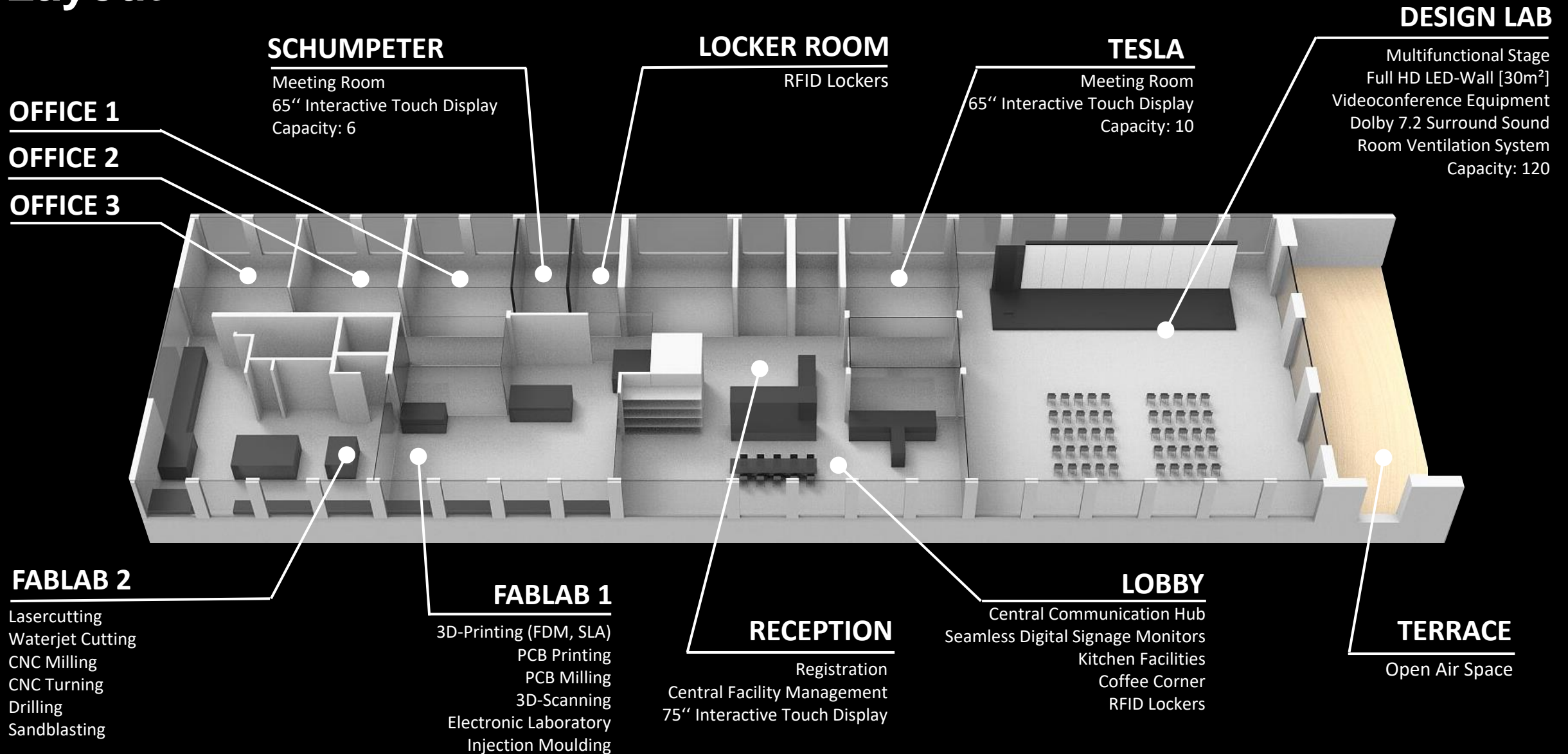


# State of the art digital production equipment





# Laboratory for Innovation Layout



Institute of Innovation and Industrial Management  
Graz University of Technology

**Head of Institute**

Christian Ramsauer  
Univ.-Prof. Dipl.-Ing. Dr.techn.

**Graz University of Technology**

Institute of Innovation  
and Industrial Management  
Kopernikusgasse 24 / II  
8010 Graz / Austria

Phone +43 316 873 7291  
Fax +43 316 873 7791  
E-Mail [iim@tugraz.at](mailto:iim@tugraz.at)  
Web [iim.tugraz.at](http://iim.tugraz.at)



**INNOVATION AND INDUSTRIAL MANAGEMENT**  
UNIV.-PROF. DR. CHRISTIAN RAMSAUER