

# **NEMO Day 2021**

## **Introduction DigiFoF Project**

### **The FoF-Designer:**

### **Digital Design Skills for Factories of the Future**

**Virtual meeting**  
**29<sup>th</sup> January, 2021**

<https://www.gotomeet.me/OMILAB/nemo-day-2021>

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"The FoF-Designer: Digital Design Skills for Factories of the  
Future" - <https://digifof.eu/>

Since 2019 professor Florea is leading the HPI Knowledge  
Transfer Centre at ULBS <http://centers.ulbsibiu.ro/itchpiulbs/en/>



## DigiFoF: Digital Design Skills for Factories of the Future

- Type: Erasmus + Knowledge Alliance educational project
- Aim: Foster knowledge transfer and cooperation between industry and academia
- Means: through a network of training environments and training programs
- Start: January 1st 2019
- End: December 31st 2021
- Budget: € 999,259 (96% on staff costs – “*value for money*”)

The context: the **Digitalization of society**

# Three kind of challenges due to Digitalization

1. one which **targets the companies** (their strategy and management to revitalize existing manufacturing systems using hardware/software interconnected embedded systems, to optimize the factory floor and increase reliability, repeatability, and revenues)
  - Barriers: *legacy complexity of software applications, cybersecurity concerns, and gaps for most of employers of IT skills and competencies*
2. other which **target the employees** (and their personal interest for owning adequate digital skills needed for future jobs)
3. the last one **aiming the educational system** which should include in its curricula bachelor (BSc) and master (MSc) study programs which prepare students for the following jobs: *Virtual Reality/Augmented Reality System Specialist, Digital Manufacturing Engineer, Digital Factory Automation Engineer, Chief Digital Officer, User Experience*

# DigiFoF PARTNERSHIP

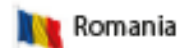
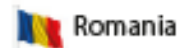


## Type of partners:

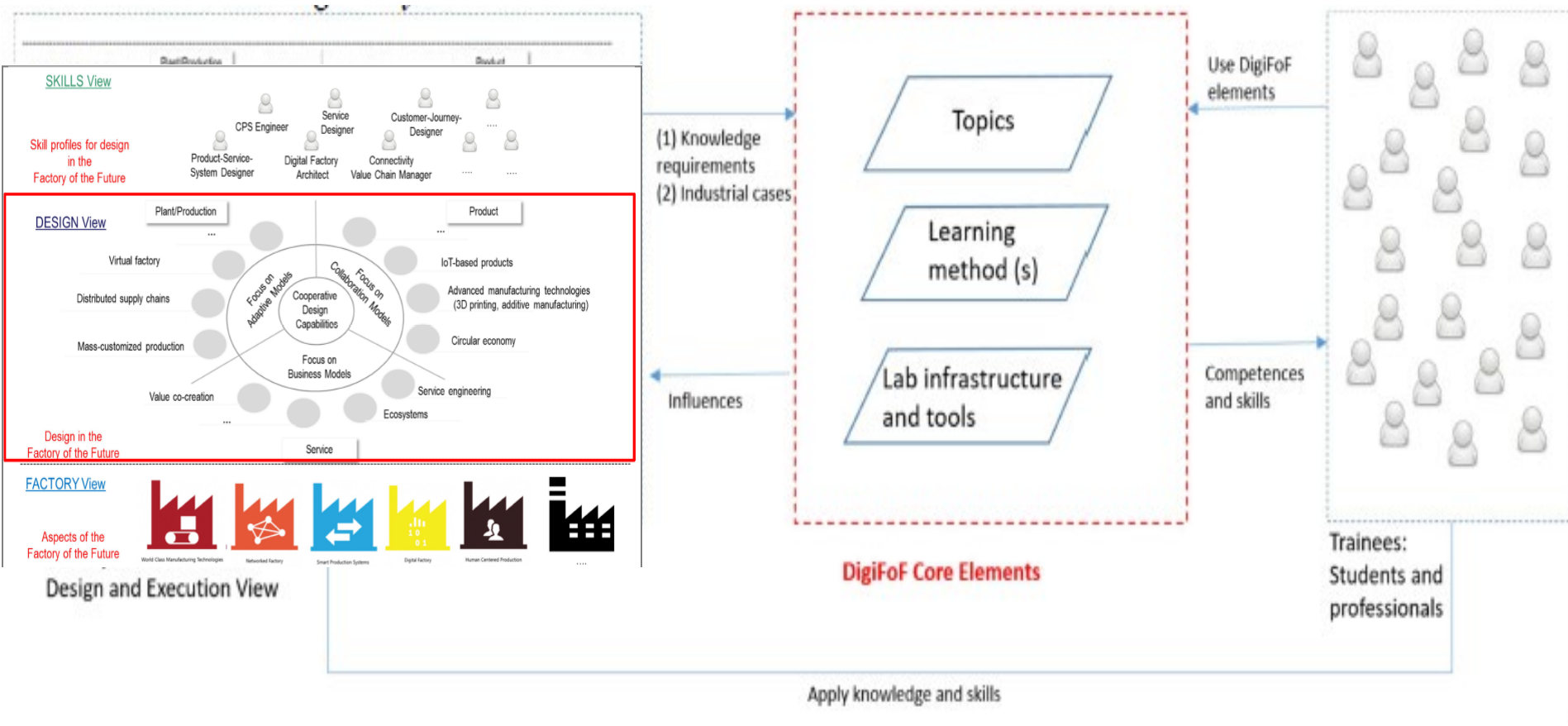
- **9 countries / 15 Full Partners**
- **PARtners** (5 HEIs)
- **Affiliated Entities** (Enterprises, Training institutions, etc)
- **2 Associated Partner organisations**

## The roles and responsibilities:

- **Egalitarian** participation and contribution in the project
- Respecting the core **competences** of the partners.



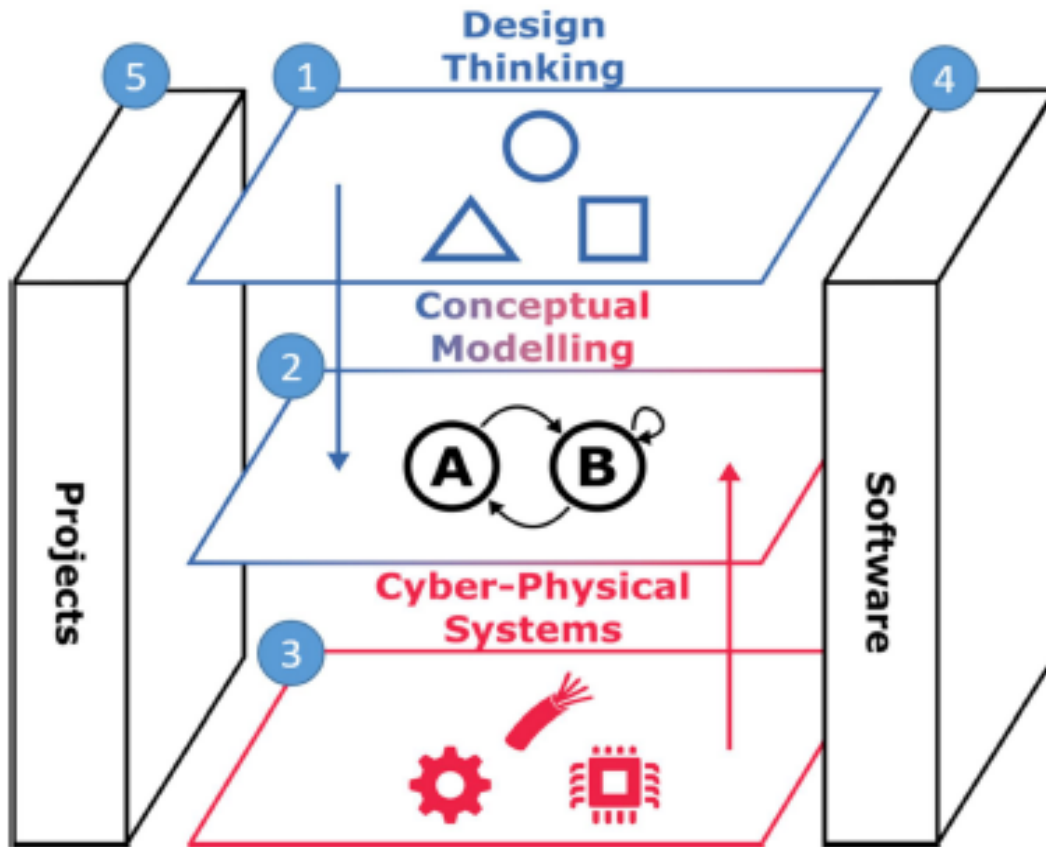
# DigiFoF IDEA



- DigiFoF proposes an organizational platform where HEIs, enterprises, and training institutions come together to develop skill profiles, trainings and teaching concepts as well as materials for different FoF-design aspects.
- The platform is completed by 5 laboratories equipped with a variety of open source tools, which provide educational and experimental environments, where aspects of FoF can be taught practically or experimented with.

# DigiFoF DESIGN LABS

OMLAB4FoF



1 – FoF-[specific scenarios](#)

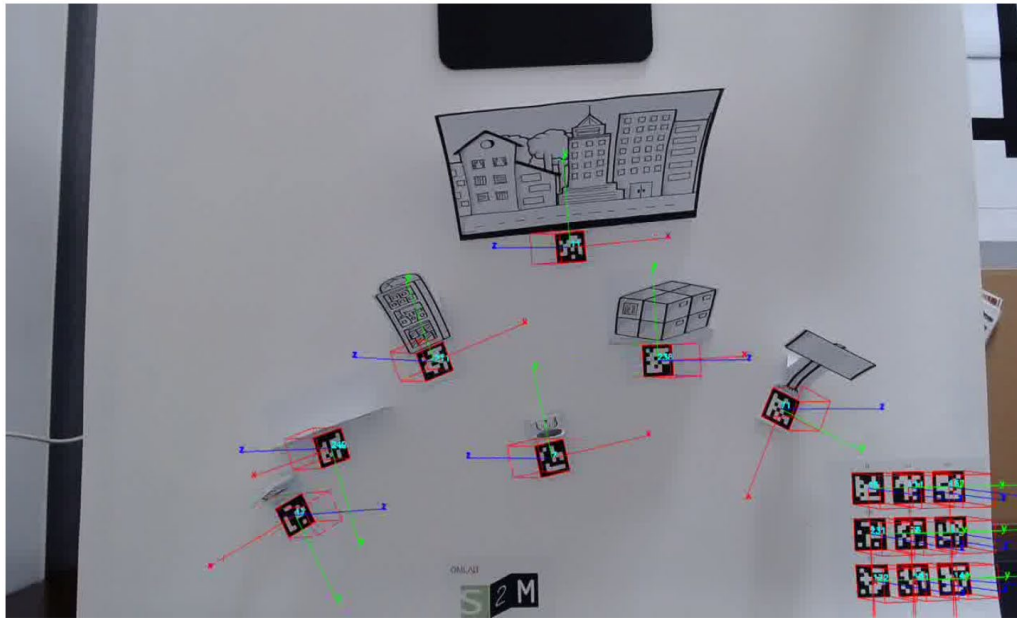
2 – Conceptual models

3 – Scenario execution with focus on CPS

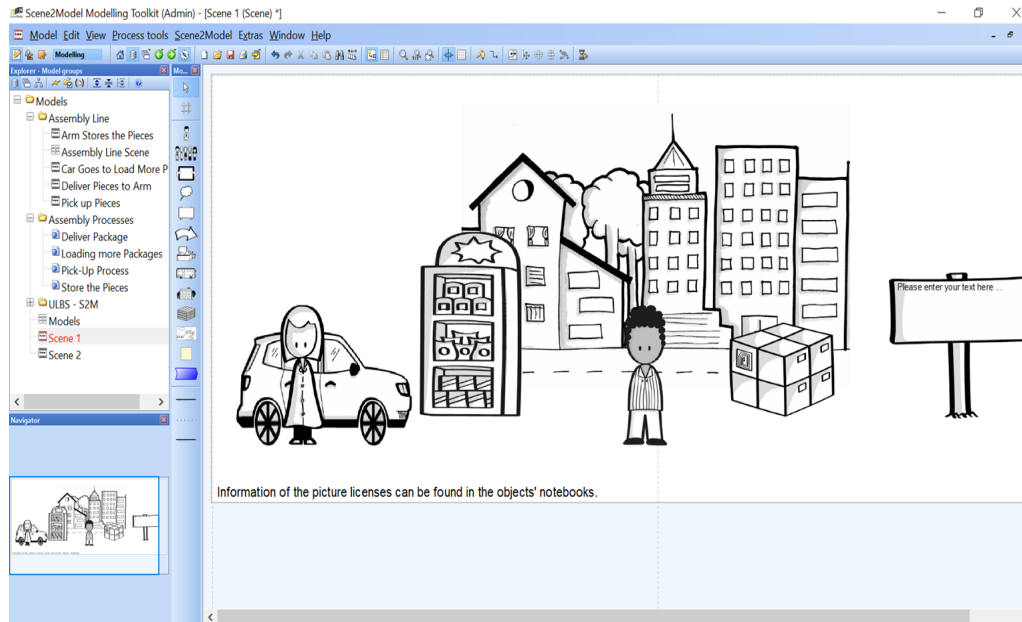
4 – IT-support

5 – (Company-specific) projects

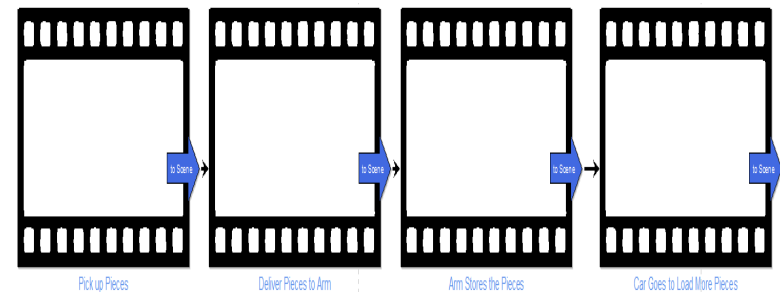
# From Design Thinking to Conceptual Modeling



**S<sup>2</sup>M**  
Scene2Model



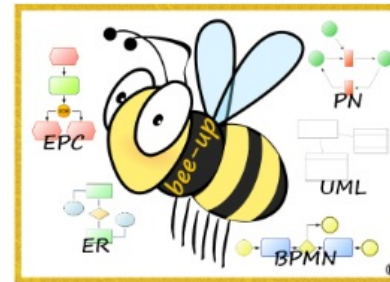
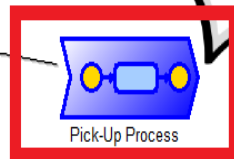
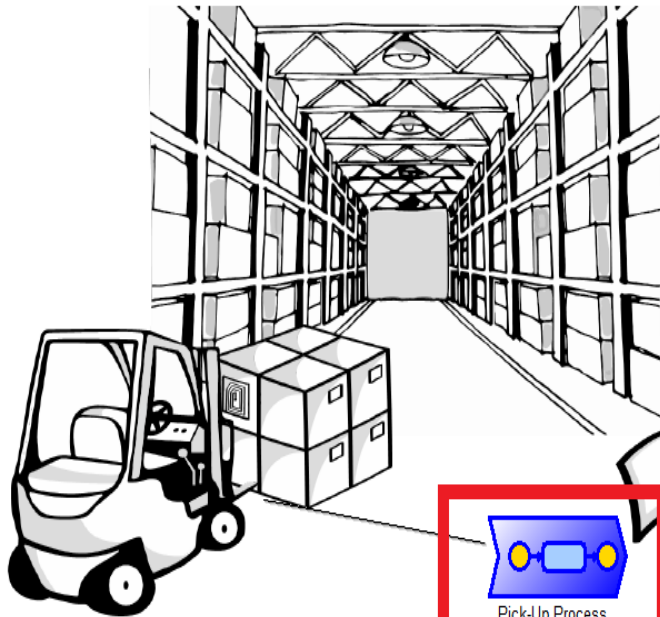
## Storyboard



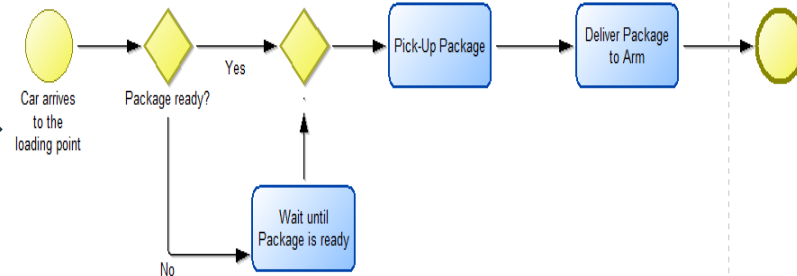


# DESIGN LABS

## Conceptual Modelling

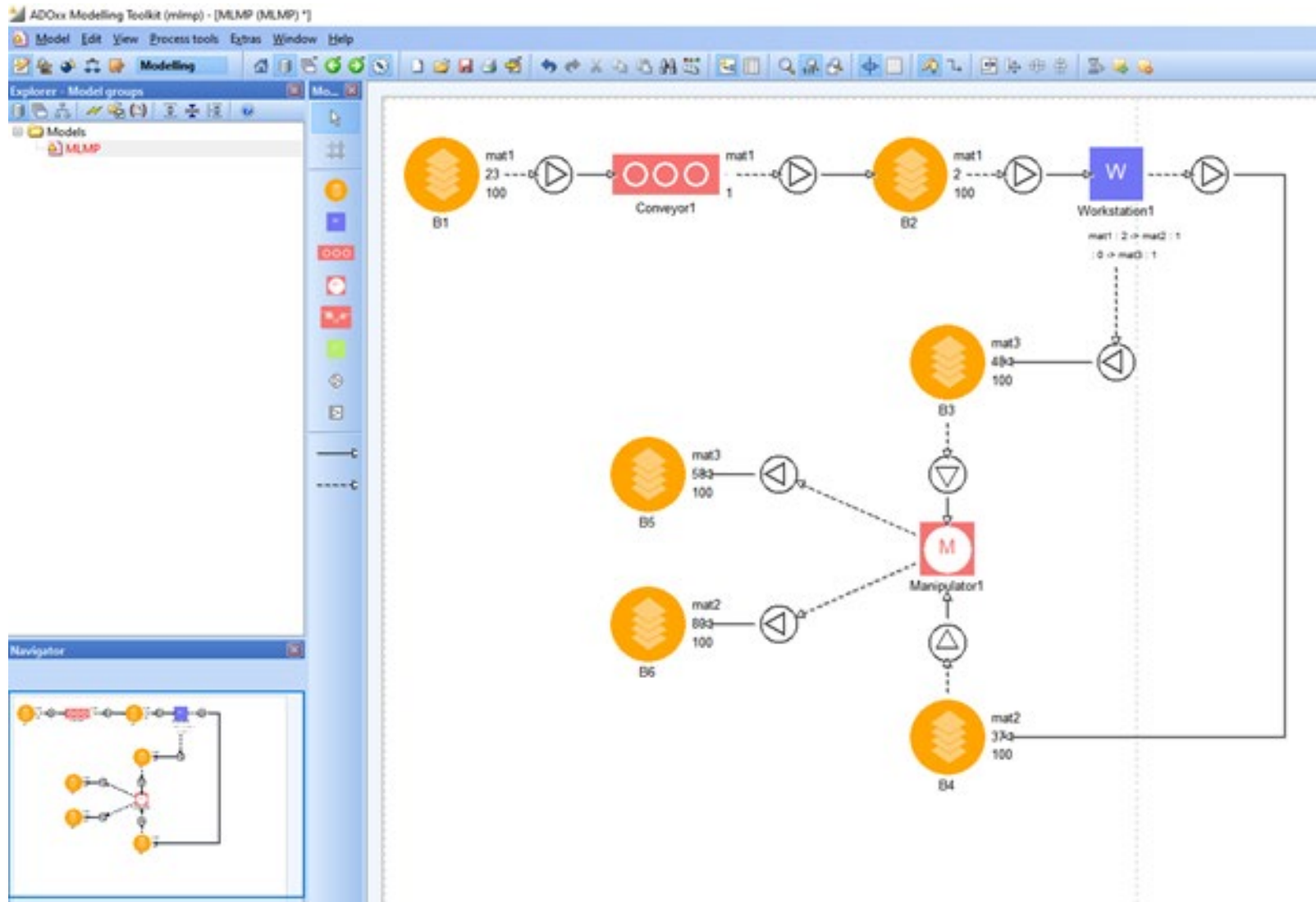


bee-up



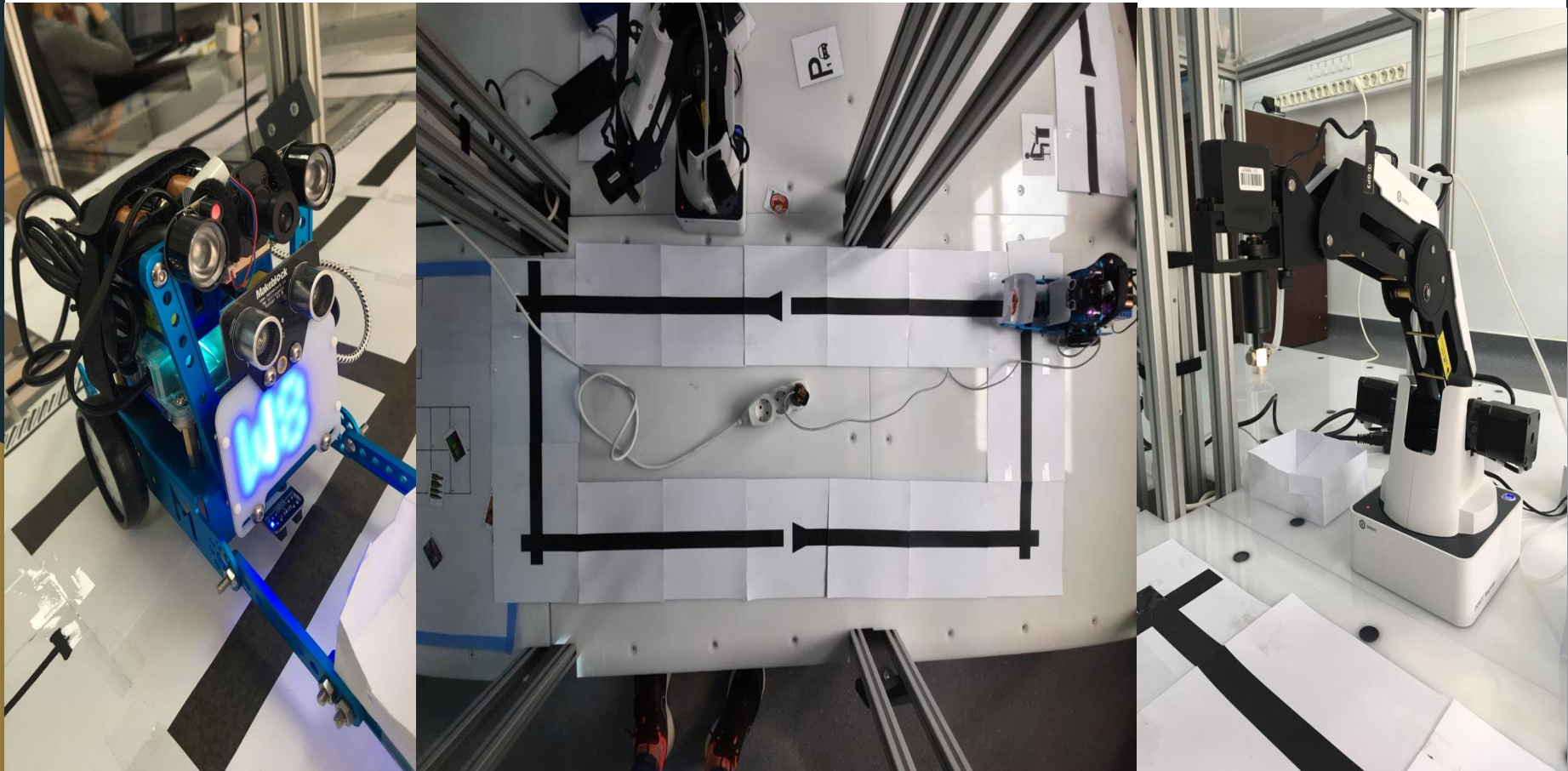
- Provides several types of solutions and models that can be applied depending on the requirements of the problem
- Includes several modeling languages like: BPMN, ER, UML, EPC, Petri Nets DPPT (*Digital Production Planner Tool*).

# Modeling Language for Manufacturing Processes



DPPT (*Digital Production Planner Tool*) developed for MLMP models

# DESIGN LABS – CPS simulation



# DigiFoF TOPICS

## ❖ Strategy:

- **topics** like **business models**, product-service-systems, crowdsourcing
  - Customers needs' services deployment
  - Transformation of Industrial Business Model through Digitalization and Servitization
  - Sibiu – Smart City Modelling
- **methods** like design thinking, open innovation

# DigiFoF TOPICS

## ❖ Processes:

- **topics** like business process management, **IT architecture and service management, data management, cybersecurity,** product/service-lifecycle-management
  - Process modelling using BPMN
  - Process performance / Service operations monitoring
  - AI tools and modelling virtualized resources for Industry 4.0 transformation
  - Robotic applications in Virtual Laboratory
- **methods** like domain specific languages, formal languages, descriptive modelling, analytic modelling, benchmarking

# DigiFoF TOPICS

## ❖ Systems:

- **topics** like **cyber-physical systems**, **digital factory** reference architecture, semantics, **production automation**, product-service-data-transmission, network security
  - Computer Vision for Manufacturing Industry Application
  - Petri Nets based automation of manufacturing systems
  - Cobots - installing and programming information needed for a rapid implementation of Cobots in industrial environment
- **methods** like computer-aided-design, model-driven software engineering, case study and lab activities

# DigiFoF RESULTS

- (1) Interdisciplinary **teaching and learning materials** using a learner-centred approach and problem-based learning for FoF-design
  - 34 (produced) / 30 (expected) learning units/modules
- (2) A collection of **industry-driven case studies** and **webinars**
  - 21 / 20 [industry case studies](#)
  - 20 / 24 [webinars](#)
- (3) A **network of 5 open design labs (OMiLABs)** which include high quality OERs, innovative design open-source tools and instruments for community-supported collaborative learning
  - Sibiu ([1](#), [2](#)), Saint-Étienne, Bialystok, Bergamo, Oulu
- (4) A **guideline for an industry-academia Master program** on FoF-design
- (5) Contribution to **summer schools** (e.g. [NEMO Series](#)); [ECTS](#)
- (6) [Vocational training programs](#)
- (7) A joint [Open Badge certification](#) for vocational trainings
- (8) The **FoF-Design Competence Network**



# DigiFoF Main Indicators [Link to indicators](#)

Structured on **Categories** and **Target groups**:

- **Categories:**
  - ✓ Skill requirements
  - ✓ Labs
  - ✓ Teaching content
  - ✓ Tools
  - ✓ Professional trainings
  - ✓ Students
  - ✓ Sustainability
  - ✓ QA and Evaluation
  - ✓ Dissemination/ Exploitation
  - ✓ Project management
- **Target groups:**
  - ✓ Students, professionals, teachers
  - ✓ Enterprises
  - ✓ All stakeholders
  - ✓ Training Institutions
  - ✓ HEIs
  - ✓ All project partners

## **Challenges:**

- local rules and legislation affect installation of the laboratories
- COVID-19 pandemic affect physical participation to trainings (vocational or academic). These should be moved in online.



# Beyond DigiFoF

- Developing a network of digital transformation laboratories around existing OMiLABs characterized by excellence in RDI. Enhancing the hardware and software portfolio of each OMiLAB node based on own or collaborative research projects.
- Engaging students and staff in mobilities between partners for good-practices exchanges.
- Strengthening the cooperation between partners
  - DoCEIS 2021 – **12<sup>th</sup> Advanced Doctoral Conference on Computing, Electrical and Industrial Systems, 2021, 7-9<sup>th</sup> July, Caparica, Portugal – ONLINE**, <https://doceis.dee.fct.unl.pt/>
  - PRO-VE 2021 – **Smart and Sustainable Collaborative Networks 4.0, 22<sup>nd</sup> IFIP Working Conference on Virtual Enterprises, 2021, 22 -24th November**, [www.pro-ve.org](http://www.pro-ve.org)
    - Special Session: *Linking educational efforts and digital platforms to support knowledge transfer as an innovation accelerator for Factories of the Future*