The FoF-Designer: Digital Design Skills for Factories of the Future

OMiLAB Day

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Welcome

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Since 2019 professor Florea is leading the HPI Knowledge Transfer Centre at ULBS

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DigiFoF PROJECT

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

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)
   - Bariers: *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*
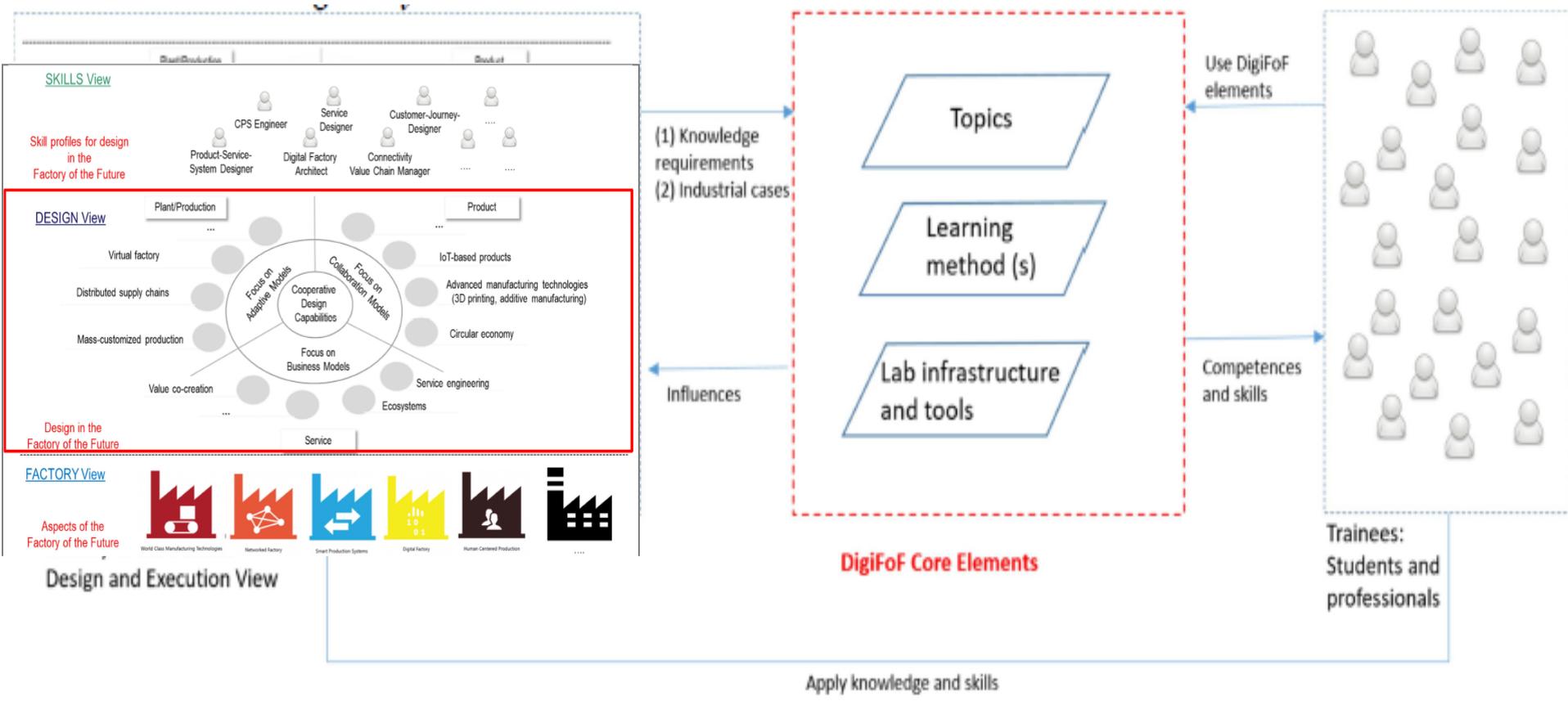
DigiFoF PARTNERSHIP

Erasmus+

Type of partners:

- **9 countries / 15 Full Partners**
- **PAR**tners (5 HEIs)
- **A**ffiliated **E**ntities (Enterprises, Training institutions, etc)
- **2 A**ssociated **P**artner organisations
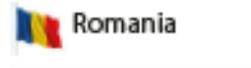
The roles and responsibilities:

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

Romania
ULBS
Universitatea "Lucian Blaga" din Sibiu

France
MINES
Saint-Étienne

Italy
UNIVERSITÀ DEGLI STUDI DI BERGAMO

Finland
UNIVERSITY OF OULU

Poland
POLITECHNIKA BIAŁOSTOCKA

Poland
BOC

Romania
Continental

France
CLEXTRAL

France
ViaMéca

France
ciridd

Italy
AFIL Lombardia

Poland
KLASTER OBRÓBKI METALI

Romania
Clusterul Prelucrări Metale Transilvania – PrelMet

Germany
OMLAB

Portugal
SoCol net

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.
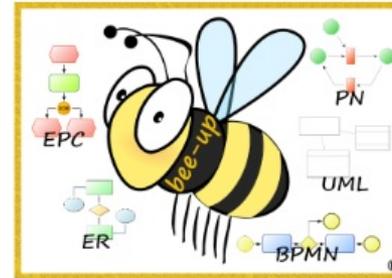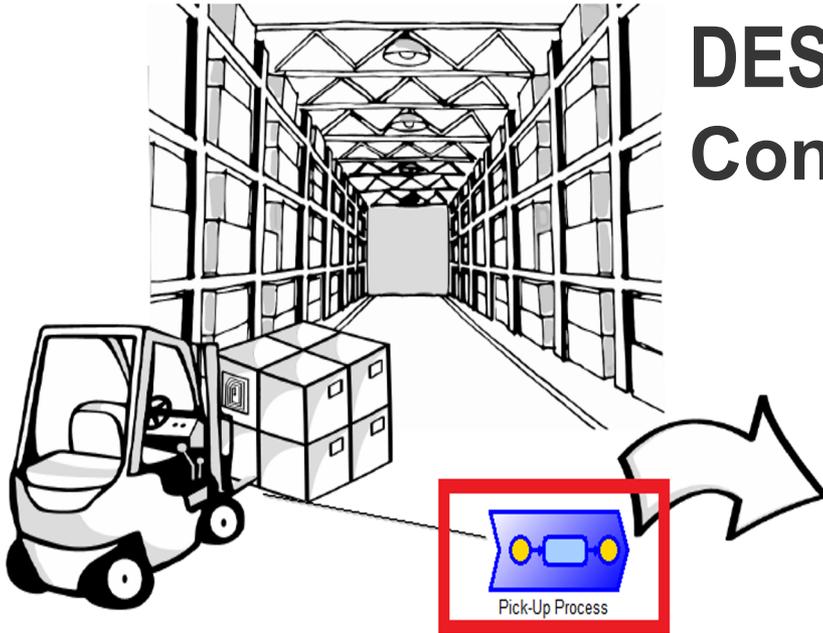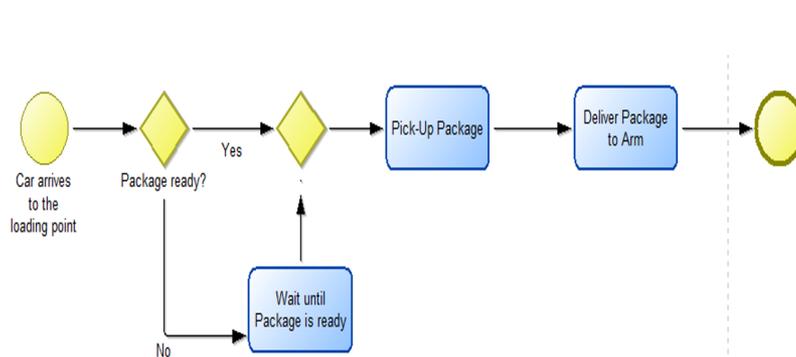
S2M
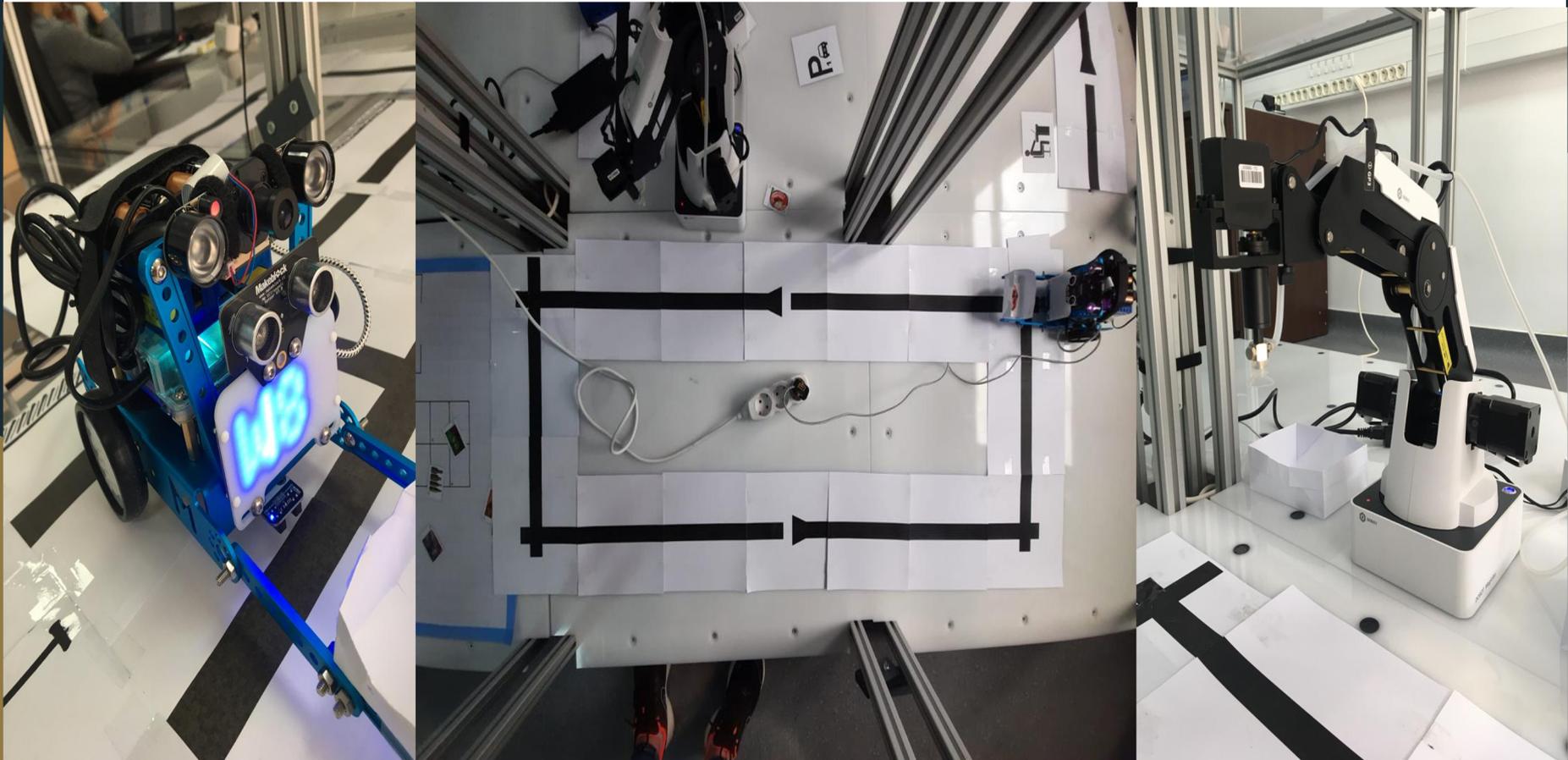Scene2Model
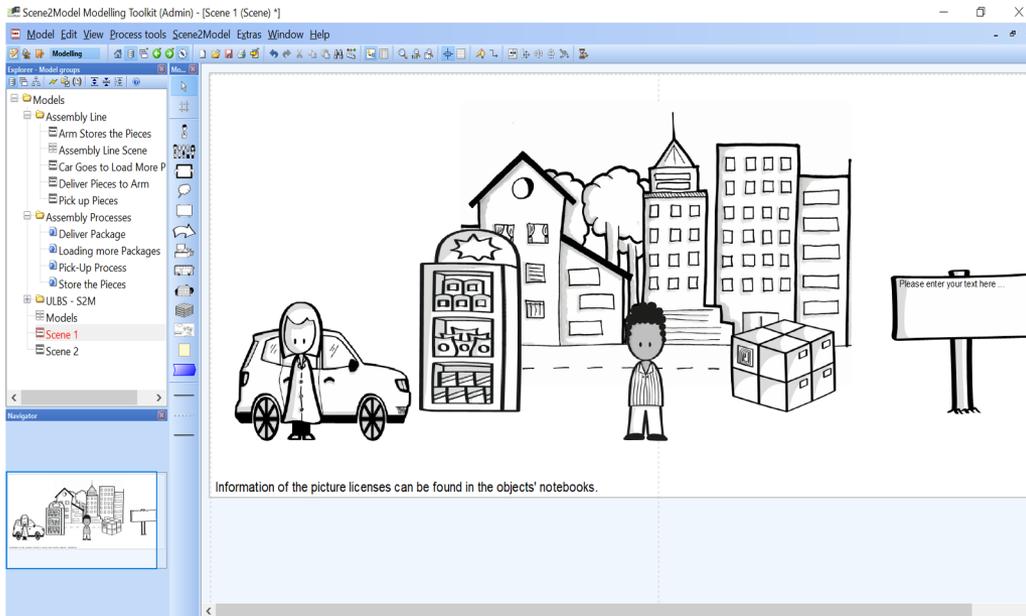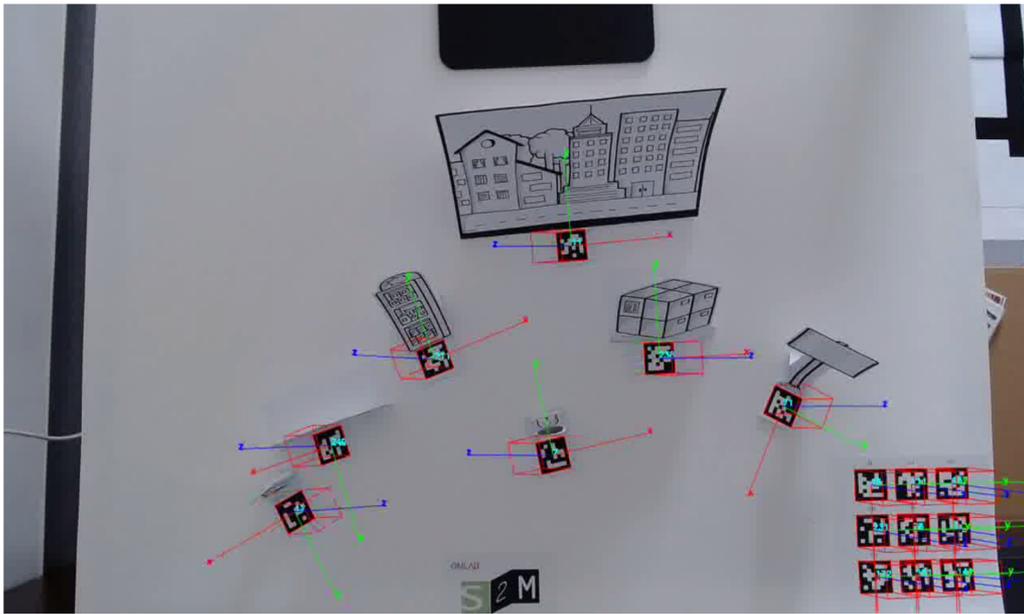
Storyboard
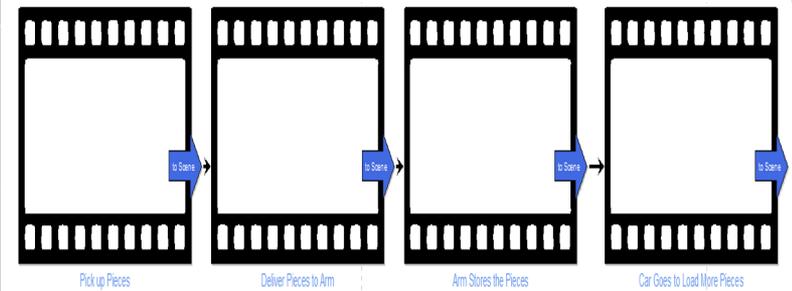
DESIGN LABS
Conceptual Modelling

- 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.

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
  - Artificial intelligence tools and modelling virtualized resources for Industry 4.0 transformation
  - Robotics application 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
   - 15 / 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, Byalistok, 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) A vocational training programs

(7) A joint Open Badge certification for vocational trainings

(8) The FoF-Design Competence Network

DigiFoF Main 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

[Link to indicators](#)

DigiFoF Budget: € 999,259

- The DigiFoF projects cost focus to **96% on staff co**sts – "***value for money***"
- Principles of budget allocation between partners:
  - The budget allocation has been designed toward the achievement of the project goals, within the constraints of the available resources and respecting the Erasmus+ ceilings.
  - HEIs (5 partners) haven been allocated 46% of the budget, training institutes (2 partners) 9.4%, enterprises (3 partners) 24%, and the multiplier organisations (4 partners) 18.6%.
- Arrangements for financial management:
  - Documentation and reporting of financial issues will be done in accordance to the [grant agreement](#) and the consortium agreement. Regular monitoring and financial web-meetings will ensure the correct and timely implementation of the financial arrangement.
  - **Challenges:**
    - **local rules and legislation affect installation of the laboratories**
    - **COVID-19 pandemy 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 research and development. Enhancing the hardare and software portofolio of each OMiLAB node based on own or collaborative research projects.
- Engaging students and staff in mobilities between partners for good-practices exchanges.
- Strenghtening the cooperation between partners
  - **OMiLAB: A Smart Innovation Environment for Digital Engineers**
    Dimitris Karagiannis, Robert Andrei Buchmann, Xavier Boucher, Sergio Cavalieri, Adrian Florea, Dimitris Kiritsis and Moonkun Lee, PRO-VE 2020 - 21st IFIP / SOCOLNET Working Conference on Virtual Enterprises, 23-25 November 2020 – Valencia, Spain.
  - ***Digital technologies in product-service systems: a literature review and a research agenda.***
    F. Pirola, X.Boucher, S.Wiesner, G.Pezzotta, Computers in Industry, Volume 123, December 2020.