

- International Conference -

LEADING AND MANAGING IN THE DIGITAL ERA

Shaping the Future of Work and Business Education

Main Conference: June 19-20, 2023 | Athens, Greece

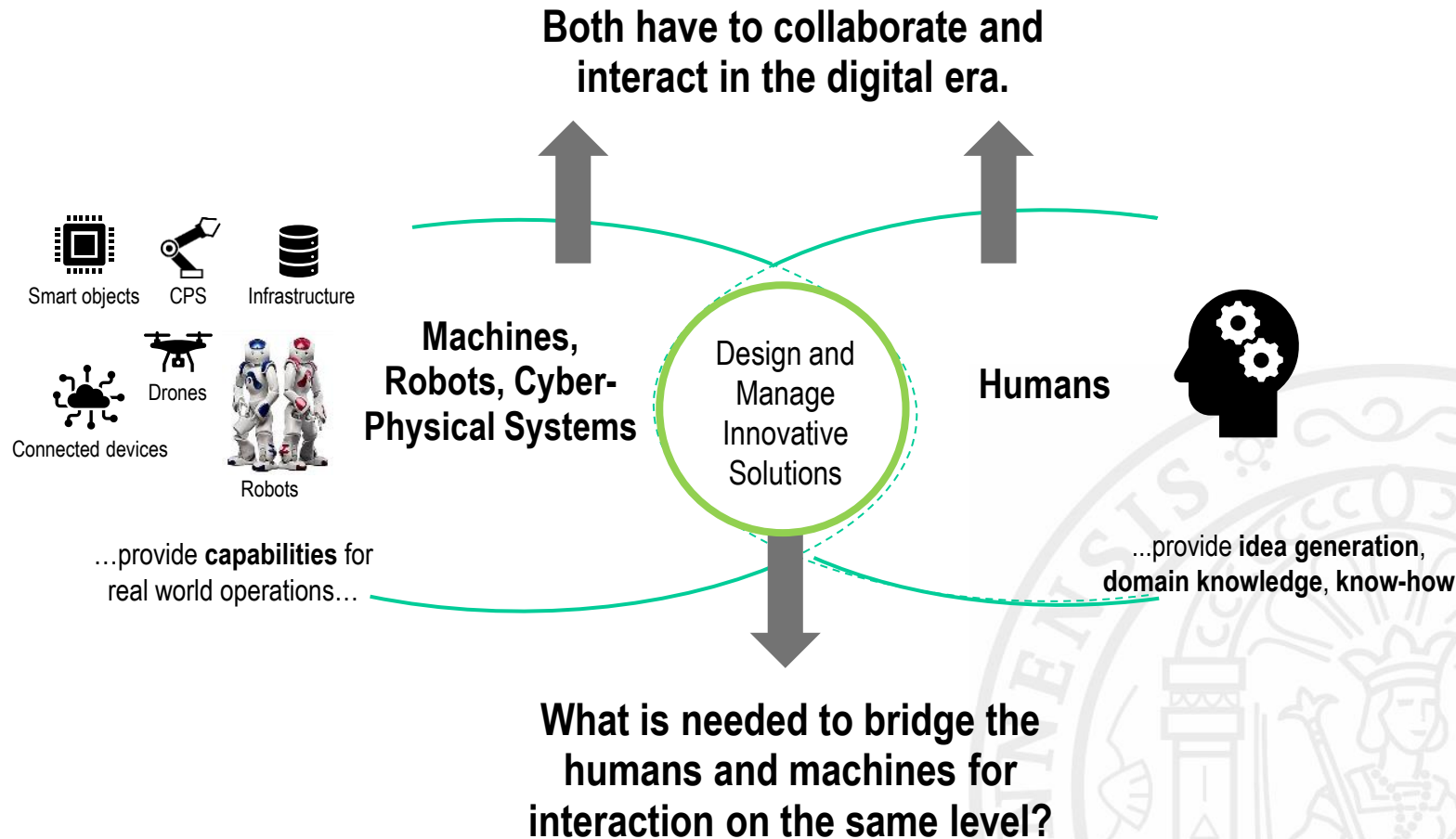
The OMiLAB Community of Practice: Product-Service Design for Factory of the Future

Iulia Vaidian, MSc¹, Prof. Dr. Xavier Boucher², Dr. Wilfrid Utz³

¹ University of Vienna, Austria, ² Ecole des Mines de Saint Etienne, France, ³ OMiLAB NPO, Germany

Session 1 B1: INNOVATIONS IN MANUFACTURING

DIGITAL ERA: THE CHALLENGE

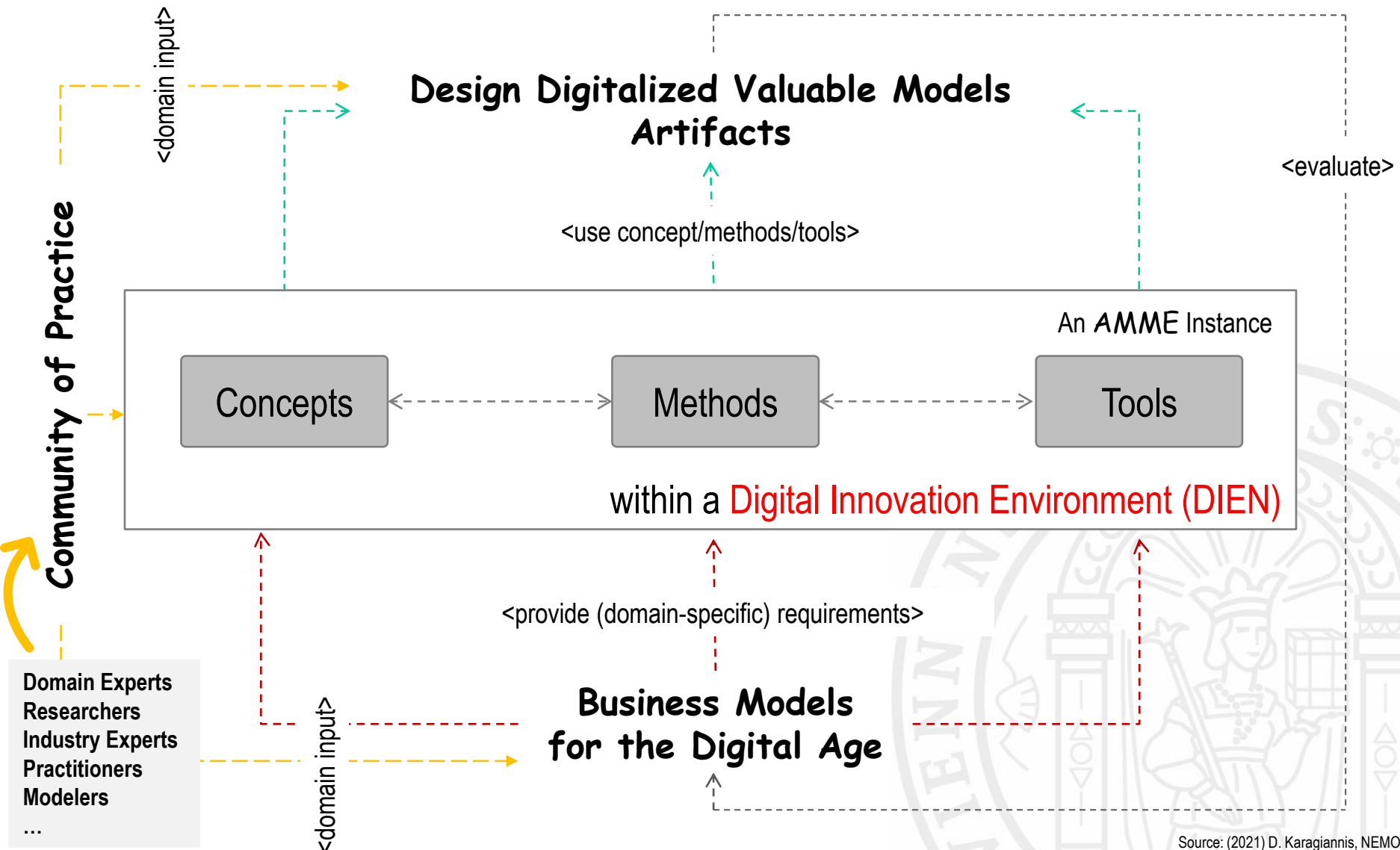


Digital Innovation Environment (DIEN) for „Bridging“

PART I



„BRIDGING“: THE INGREDIENTS



Source: (2021) D. Karagiannis, NEMO

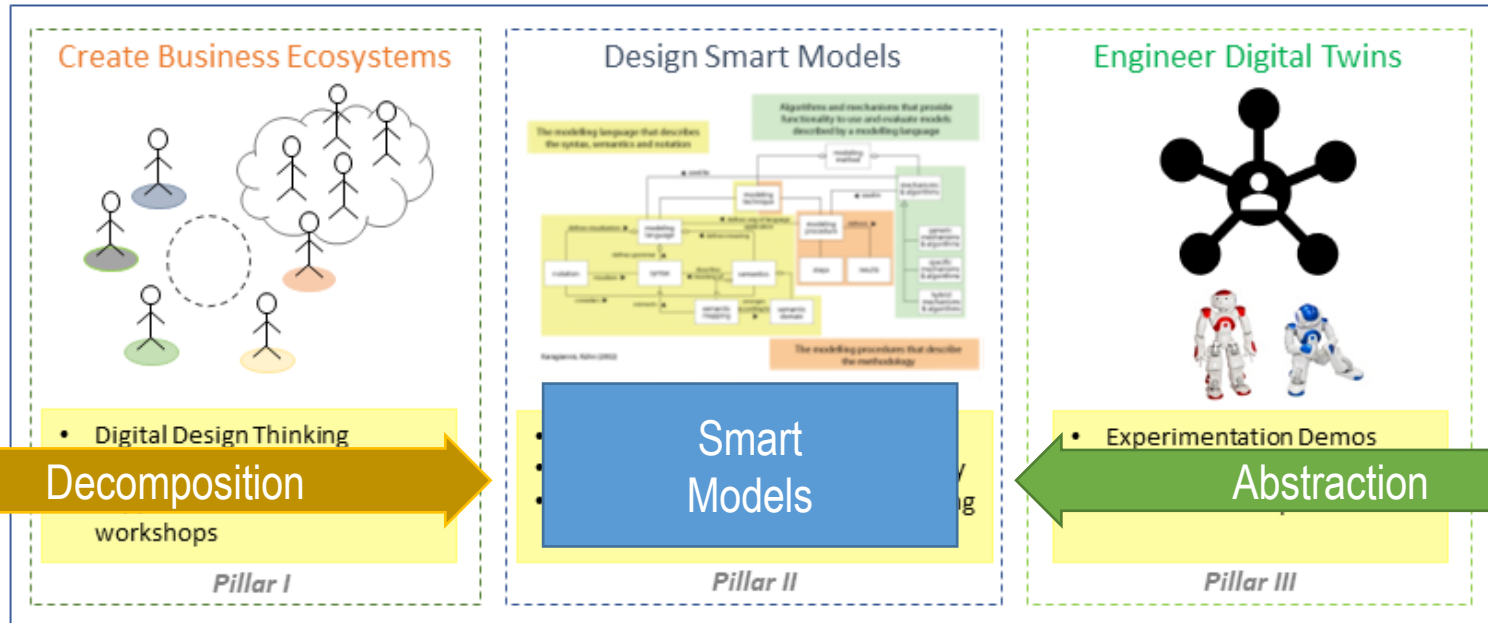
Karagiannis, D., Buchmann, R. A., & Utz, W. (2022). The OMI LAB Digital

Innovation environment: Agile conceptual models to bridge business value with

¹ University of Vienna, Austria, ² Ecole des Mines de Saint Etienne, France, ³ ON Digital and Physical Twins for Product-Service Systems development. *Computers*

THE OMI LAB COMMUNITY OF PRACTICE: PRODUCT-SERVICE DESIGN FOR FACTORY OF THE Industry, 138. <https://doi.org/10.1016/j.compind.2022.103631>

„BRIDGING“: THE EXPERIMENTATION ENVIRONMENT



Approach

Business Ecosystems, Design Thinking, Digital Twins, Conceptual Modelling, Artificial Intelligence

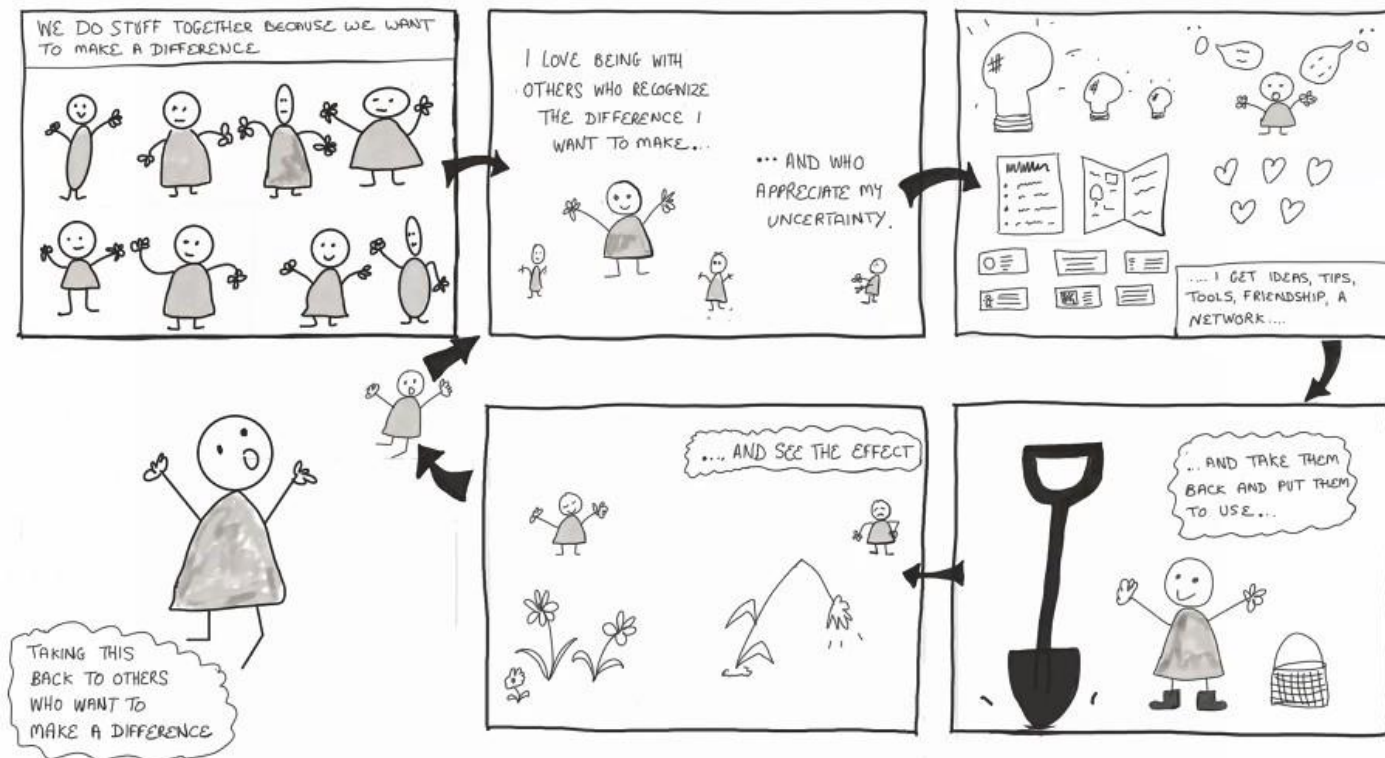
Technology



ROS Robot Operating System Raspberry Pi W3C Semantic Web Microservices

„BRIDGING“: THE COMMUNITY OF PRACTICE

- Is formed by people who engage in a process of collective learning in a shared domain of human endeavor.
- Is a group of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.



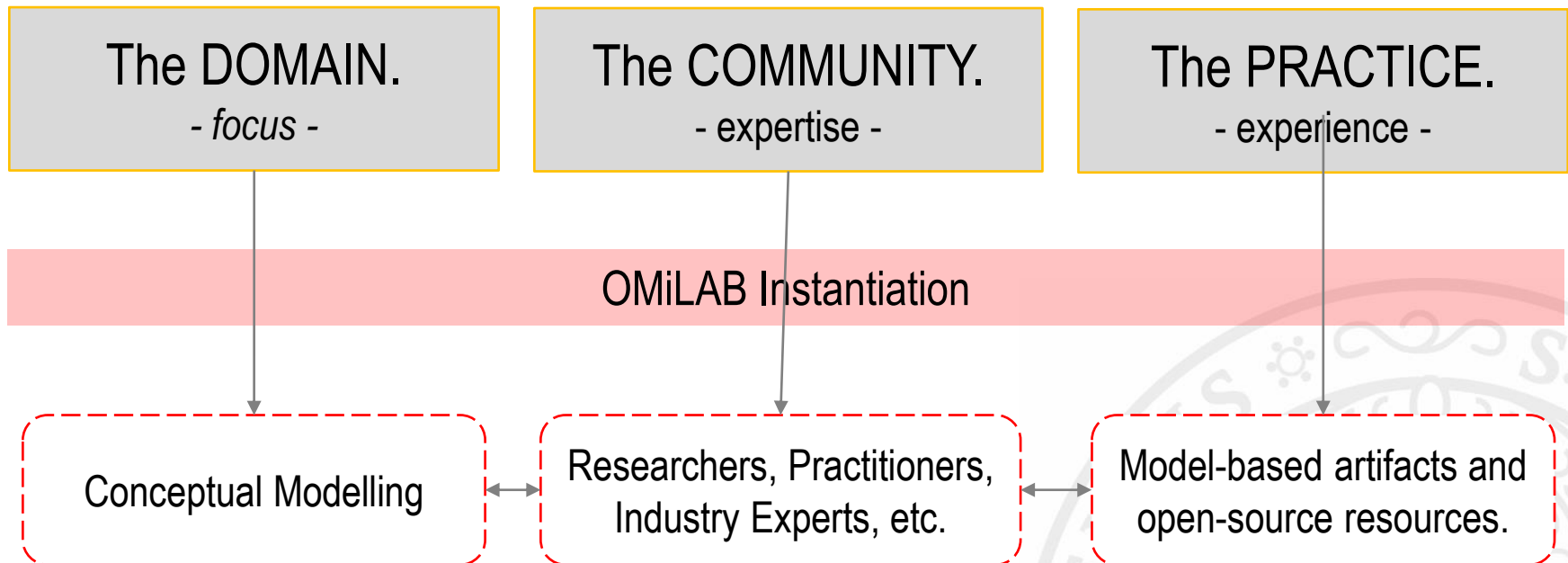
Iulia Vaidian, MSc¹, Prof. Dr. Xavier Boucher², Dr. Wilfrid Utz³

Source: Etienne and Beverly Wenger-Trayner, 2015

¹ University of Vienna, Austria, ² Ecole des Mines de Saint Etienne, France, ³ OMI LAB NPO, Germany
 THE OMI LAB COMMUNITY OF PRACTICE: PRODUCT-SERVICE DESIGN FOR FACTORY OF THE FUTURE

COMMUNITY OF PRACTICE: CHARACTERISTICS

Three characteristics are essential in classifying a community as a community of practice:



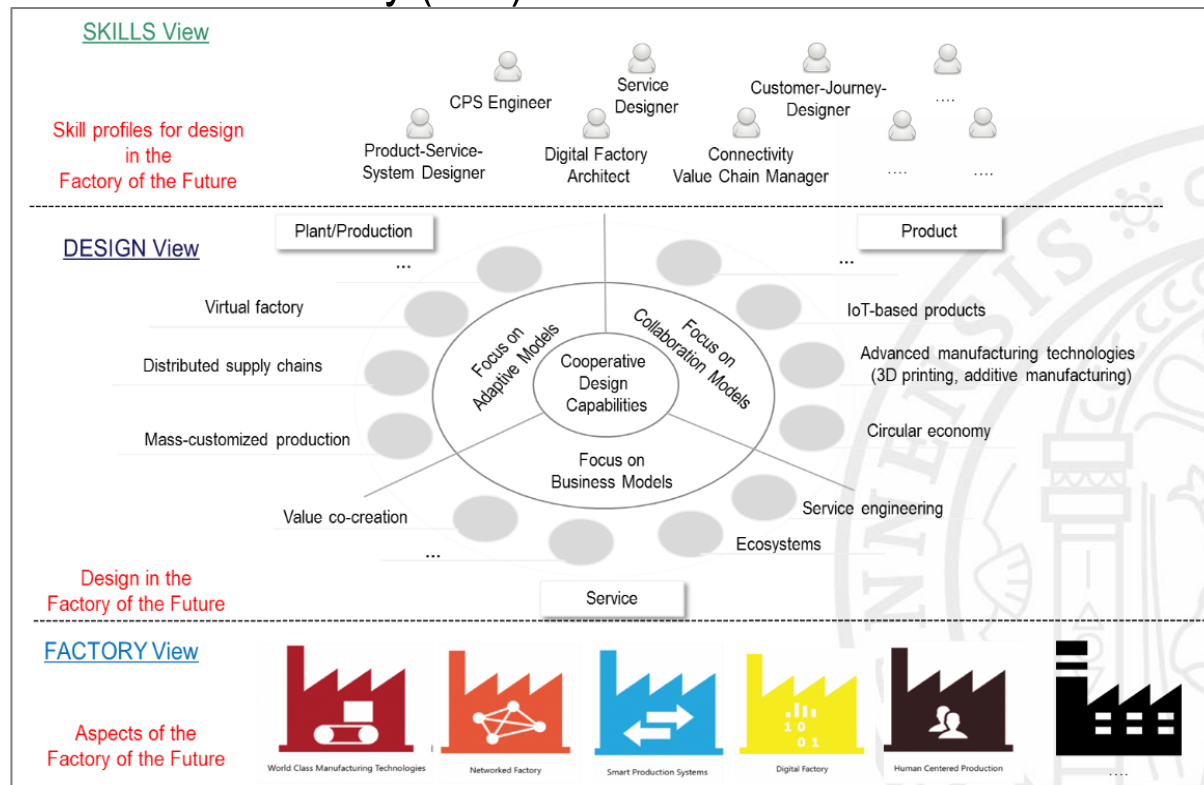
DigiFoF Case

PART II



SELECTED CASE: DIGIFOF

- Factory of the Future (FoF) build toward developments of Industry 4.0 where processes, infrastructures, and production flows, are adapted to act more efficiently and intelligently on the global market.
- Product-Service is one of the core elements of this transition, as it embeds the relationship between the industry (FoF) and the consumers.



Iulia Vaidian, MSc¹, Prof. Dr. Xavier Boucher², Dr. Wilfrid Utz³

v. Heynitz, Bremicker, & Amadori, 2016

¹ University of Vienna, Austria, ² Ecole des Mines de Saint Etienne, France, ³ OMILAB NPO, Germany
 Boucher, Pezzotta, Pirola, & Wiesner, 2022
 THE OMILAB COMMUNITY OF PRACTICE: PRODUCT-SERVICE DESIGN FOR FACTORY OF THE FUTURE

<https://www.digifof.eu/>

PRODUCT-SERVICE SYSTEMS DESIGN: DEFINITION

What is it about?

Product

A technical device, designed, and produced to ensure predefined functions, and delivered to be purchased by a client.

Service

Realisation of activities by some actor(s) with the intention to create and deliver value for some other actor(s), resulting in a change of state for this (these) actor (s).

System

An interconnection of products and services, designed to fulfill complex functionalities, in a specific context.



SMART PSS

“digital-enabled **holistic solution**, developed and supplied within an **ecosystem**, which provides economic and **sustainable value** to a main customer and **complementary stakeholders**, by integrating into a unique offer connected products together with data-driven services delivered all along the **solution lifecycle**, supported by **physical and digital infrastructures**” (Boucher et al., 2022)

X.Boucher, G. Pezzotta, F. Pirola, S. Wiesner, Digital technologies to support lifecycle management of smart product-service solutions, Editorial paper, Computers in industry, 141 (October 2022) , 103691.
 F.Pirola X.Boucher, S. Wiesner, G. Pezzotta, Digital technologies in product-service systems: a literature review and a research agenda, Computers in Industry 123 (2020) 103301.

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Tim McAloone, IPSS 2015

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FACTORY OF THE FUTURE ECOSYSTEM: REQUIREMENTS

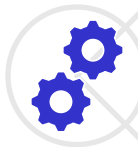
What does a FoF ecosystem require from a scientific- and technical-based perspective?



Teaching and learning materials for FoF-design



A collection of industry-driven case studies



A network of open design labs (OMiLAB4FoF) for experimentation with FoF-design methods

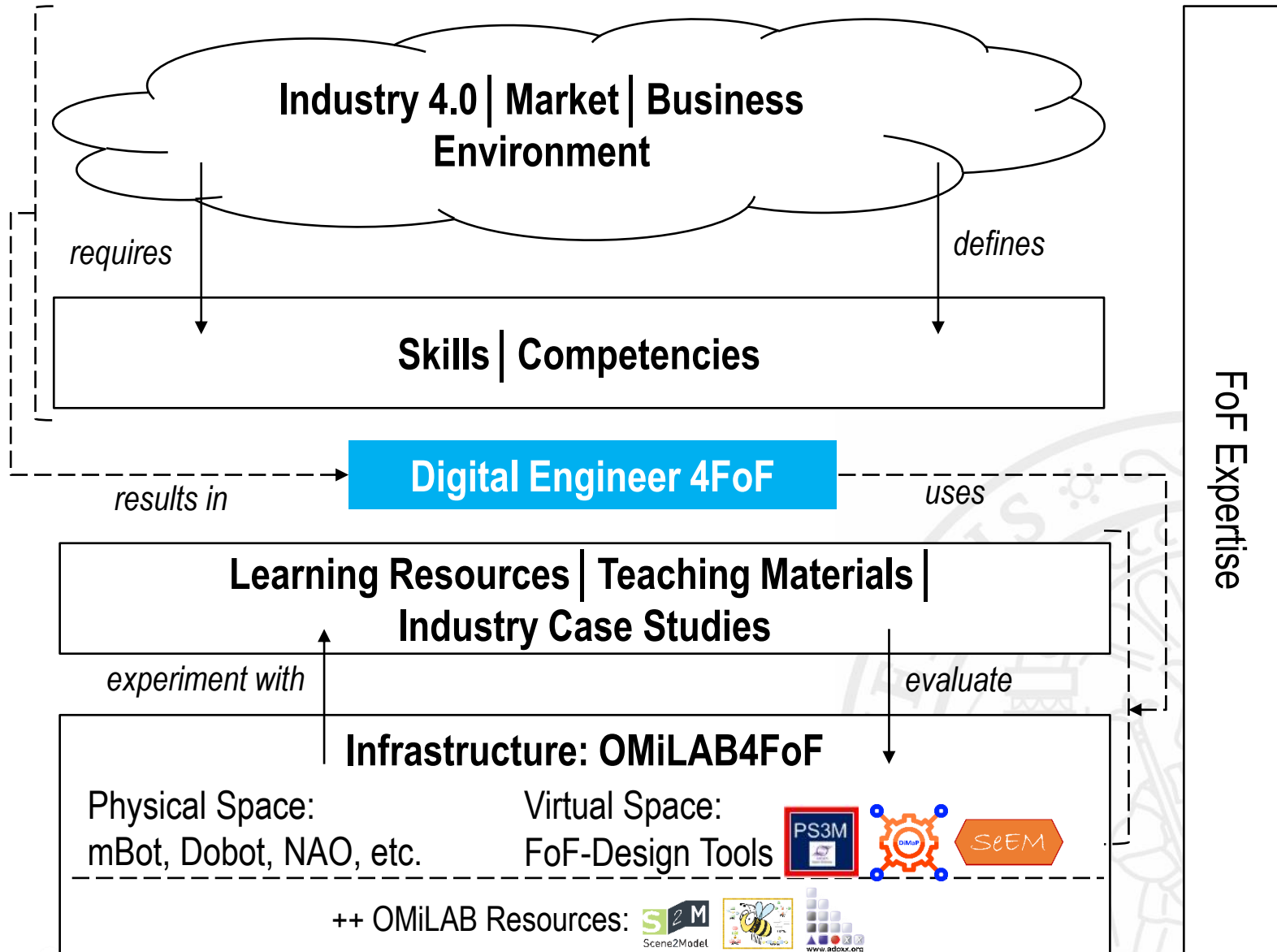


Skill identification & requirements for FoF-design



FoF-Design Competence Network

FoF ECOSYSTEM

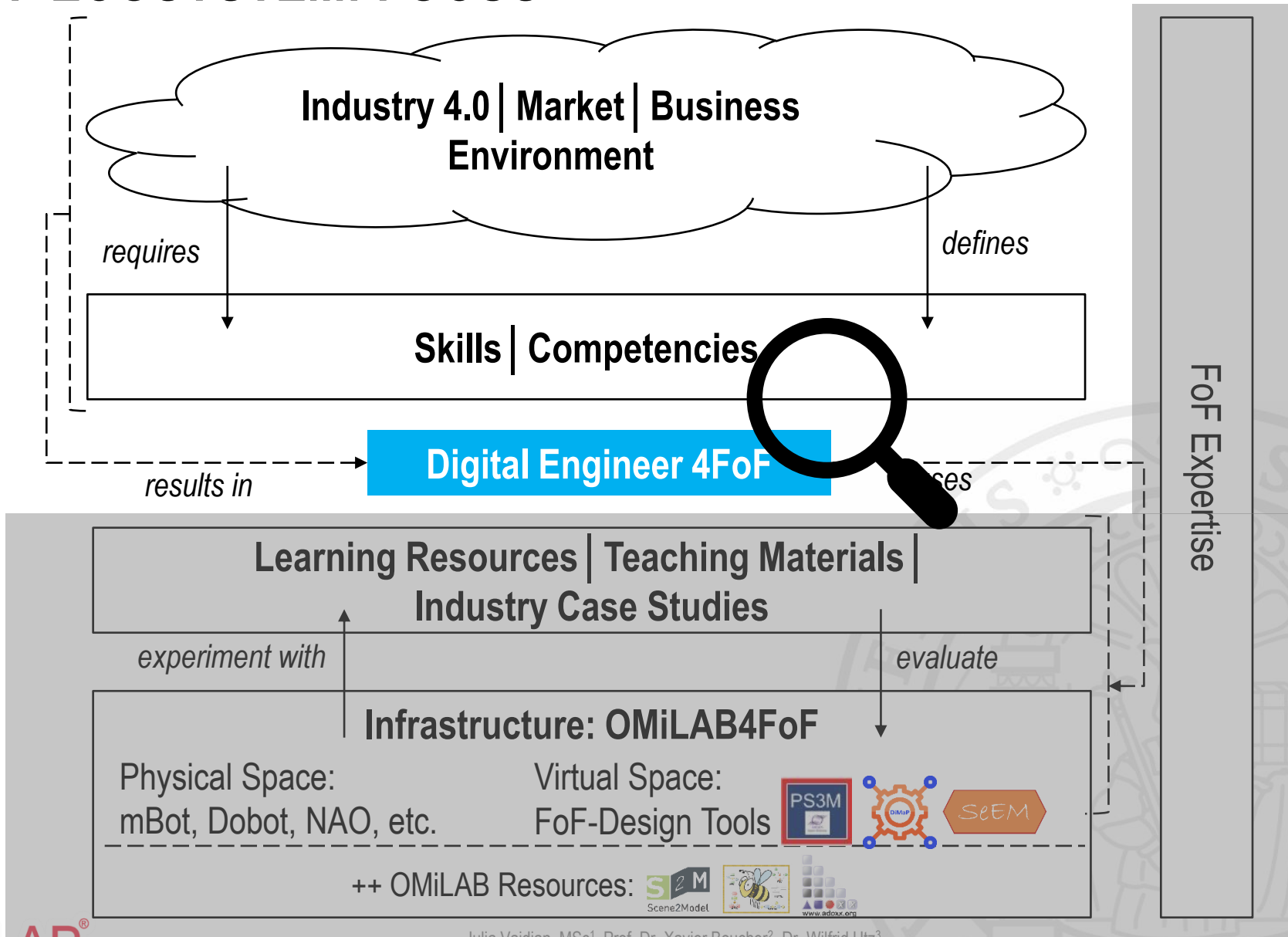


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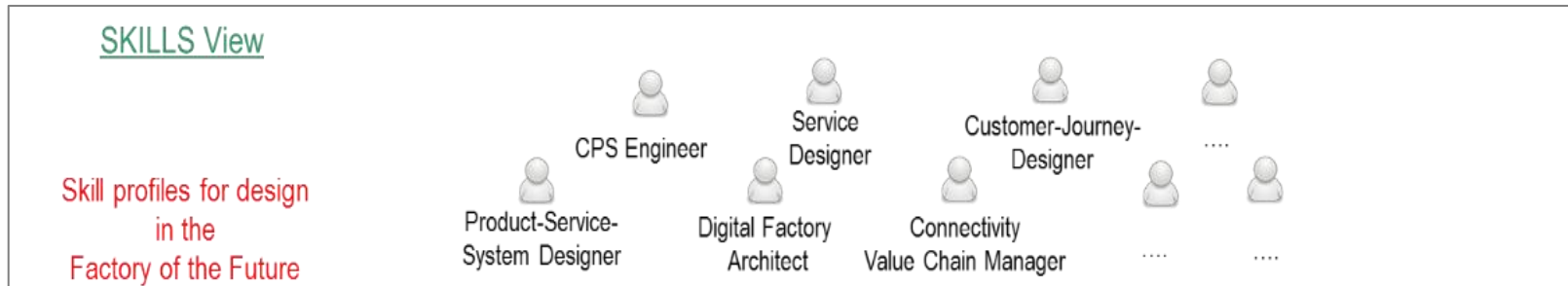
FoF ECOSYSTEM: FOCUS



Iulia Vaidian, MSc¹, Prof. Dr. Xavier Boucher², Dr. Wilfrid Utz³

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THE OMILAB COMMUNITY OF PRACTICE: PRODUCT-SERVICE DESIGN FOR FACTORY OF THE FUTURE

DIGITAL ENGINEER 4FoF



Focus on Business Ecosystems
(innovation co-creation)

Focus on Digital Twins
(proof-of-concept experiments)

Focus on Model Value
(domain-specific knowledge asset)

*"...the Digital Engineer will be a person with **knowledge** and skill in the use of **engineering and digital technology** to enable major process improvements and performance increases in both physical and **business operations**."*

Holland and Crompton, *The Future belongs to the Digital Engineer*, 2013

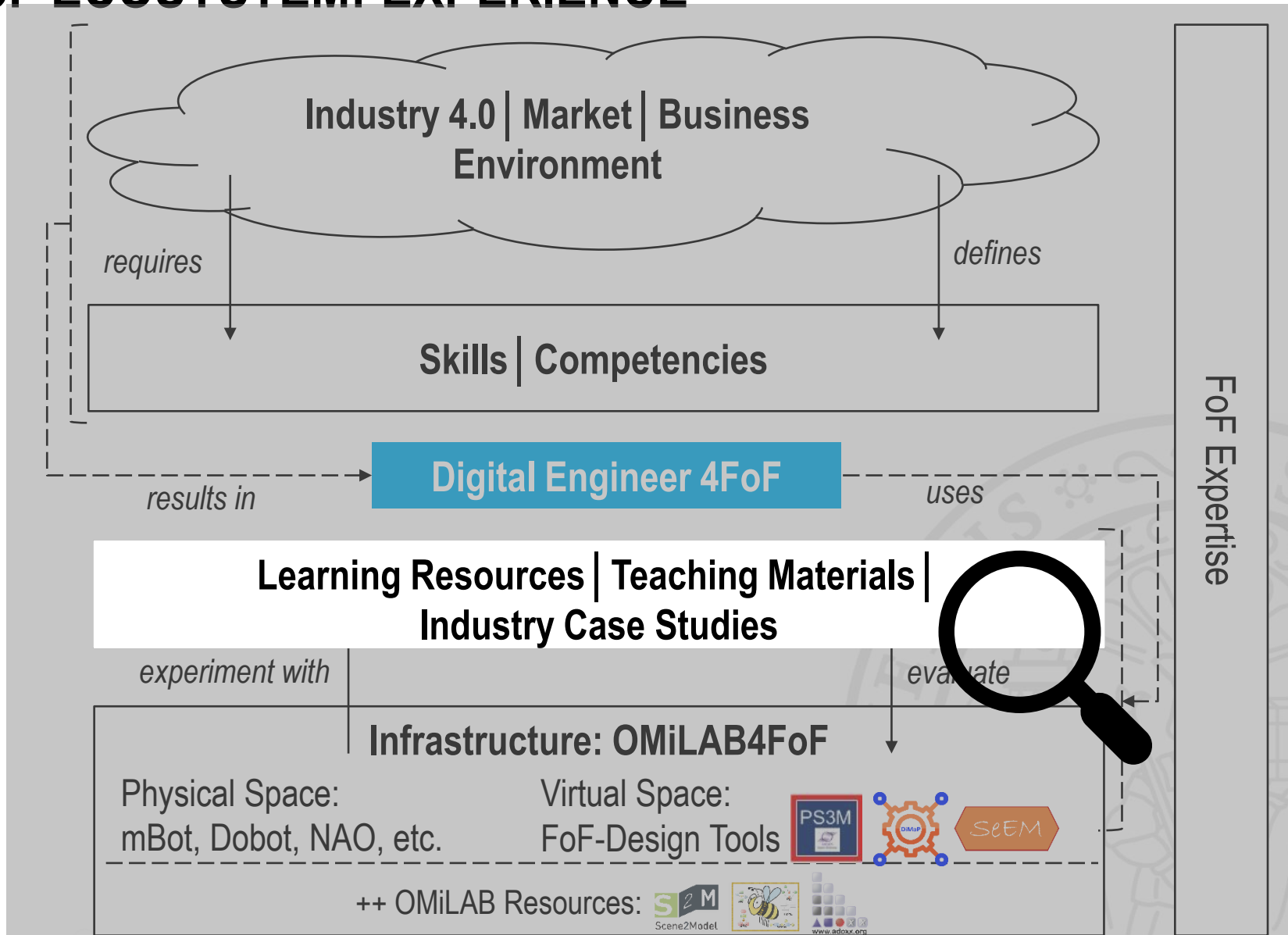
Karagiannis D. et al. (2020) OMILAB: A Smart Innovation Environment for Digital Engineers. In: Camarinha-Matos L.M., Afsarmanesh H., Ortiz A. (eds) Boosting Collaborative Networks 4.0. PRO-VE 2020. IFIP Advances in Information and Communication Technology, vol 598. Springer, Cham. https://doi.org/10.1007/978-3-030-62412-5_23

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FoF ECOSYSTEM: EXPERIENCE



FoF ECOSYSTEM: EXPERIENCE

- | | | | |
|----|------------------|----|-----------------------|
| 1 | Curricula | 27 | Webinars |
| 35 | Courses | 21 | Case studies |
| 19 | Workshops | 25 | Conference Papers |
| 35 | Training Modules | 11 | Academic Publications |

<https://www.digifof.eu/>



Jun 25 2021 Study cases

OPTIMIZATION OF THE ORDERSFLOW PROCESS THROUGH SOLUTIONS OF THE DIGITAL WORKFLOW DETAILS AND INTERACTIVE WAREHOUSES IN AN ADDITIVE

Jun 25 2021 Study cases

INTEGRATED DESIGN OF A PRODUCT SERVICE SYSTEM AND THE ASSOCIATED ECONOMIC MODEL


Jun 25 2021 Study cases

COMPLETE REVAMPING OF MATERIALS AND PRODUCT HANDLING SYSTEMS ALONG THE ASSEMBLY LINE

Feb 04 2021 Educational material

DESIGN THINKING FOR PRODUCT-SERVICE SYSTEM DESIGN

[Read more](#)



Sep 03 2021 Webinar

ROBOTIC PROCESS AUTOMATION – POSSIBILITIES OF PRACTICAL APPLICATIONS

Sep 25 2020 Webinar

DIGITALIZATION AND OPTIMIZATION OF PRODUCTION PROCESSES LESSONS LEARNED FROM MPC

Jun 28 2021 Webinar

DOMAIN SPECIFIC INTELLIGENT ASSESSMENT SERVICES

[Read more](#)

OMLAB: A Smart Innovation Environment for Digital Engineers

Dimitris Karagiannis¹, Robert Andrieu², Xavier Boucher³, Sergio Cavallari⁴, Adrian Pui⁵ and Mouskoulis Lou⁶

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⁴ CELIS Research Group, University of Bergamo, 24121 Bergamo, 24121

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⁶ ICT4EM Group, SCK-CBR, Saveno Park 4, 1000 Leuven, 3001

⁷ OMLAB KOREA Research Center, Chonbuk, 561 Bado-gu, Daejeon, 30538

Abstract: This position paper introduces a Smart Innovation Environment (SIE) for digital engineers. The SIE is a platform for digital engineers to collaborate and create value. The SIE is a platform for digital engineers to collaborate and create value. The SIE is a platform for digital engineers to collaborate and create value.

Keywords: OMLAB | Digital Twin | Digital Engineering | Additive Manufacturing | Cyber-Physical Systems

Case Design Sheet

1. CASE DESCRIPTION

Optimization of the orders flow process through solutions of the digital workflow of details and interactive warehouses in an additive manufacturing environment.

PARTNER	LOCATION	TIME/DURATION
Technology Applied	Poland, Bratislava	2018.01 - now

2. DIGITAL TRANSFORMATION CHALLENGE

2.1. BUSINESS TRANSFORMATION CHALLENGE

Industry: additive manufacturing

- Improving communication between the client and the contractor.
- Simplifying the ordering procedure (time, order warehouse - digital details, quotations).
- Optimizing cost reduction (reduction of human error in the manufacturing process).
- Introducing flexibility for the customer (interventions in the ordering process, detail flow monitoring and implementation stage).

2.2. CONCEPTUAL TRANSFORMATION

- Internal integration of the CRM ERP MES and BI structure
- External integration of the CRM ERP client system with the manufacturer's (contractor's) digital engineering (additive)
- Development of the concept of work flow for automatic acquisition of external orders
- Development of a human-machine communication system
- Designing of "front end" of the system interface

2.3. TECHNICAL TRANSFORMATION

- Use of cloud solutions
- Server installation
- Integration of devices and workstations
- Software platform
- System integrator

3. SOLUTION

- Ensuring cyber security in the cloud-based level of digital details by storing orders with virtual solutions and protection of details by encryption

Tool: SEEM

SEEM Tool: SEEM

SEEM Tool: SEEM

Tool: DiMaP


DiMaP Tool: DiMaP

DiMaP Tool: DiMaP

Tool: PSS Scenario Modeller

PSS Scenario Modeller Tool: PSS Scenario Modeller

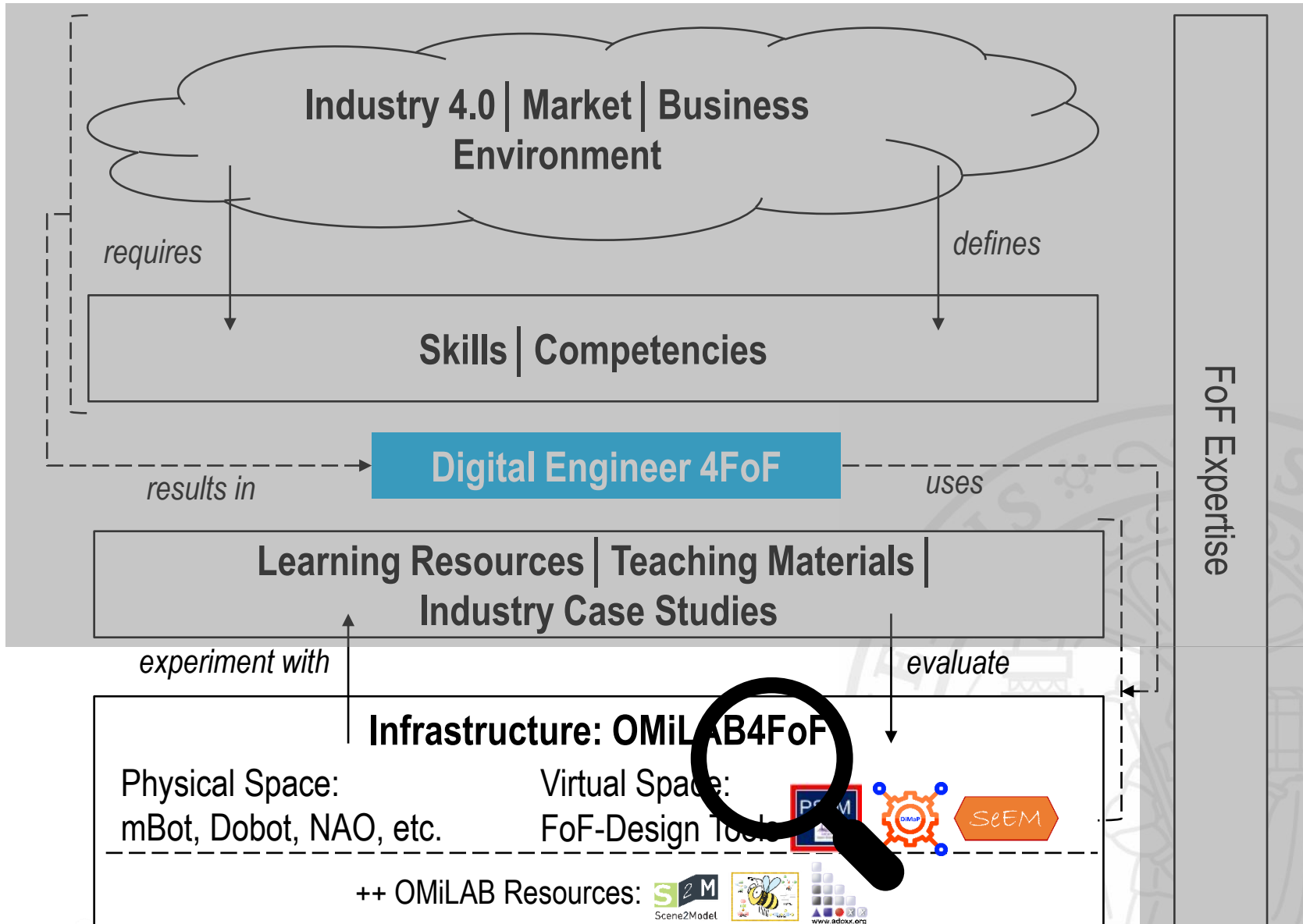
PSS Scenario Modeller Tool: PSS Scenario Modeller



www.adoxx.org
Based on

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 THE OMLAB COMMUNITY OF PRACTICE: PRODUCT-SERVICE DESIGN FOR FACTORY OF THE FUTURE

FoF ECOSYSTEM: EXPERIENCE

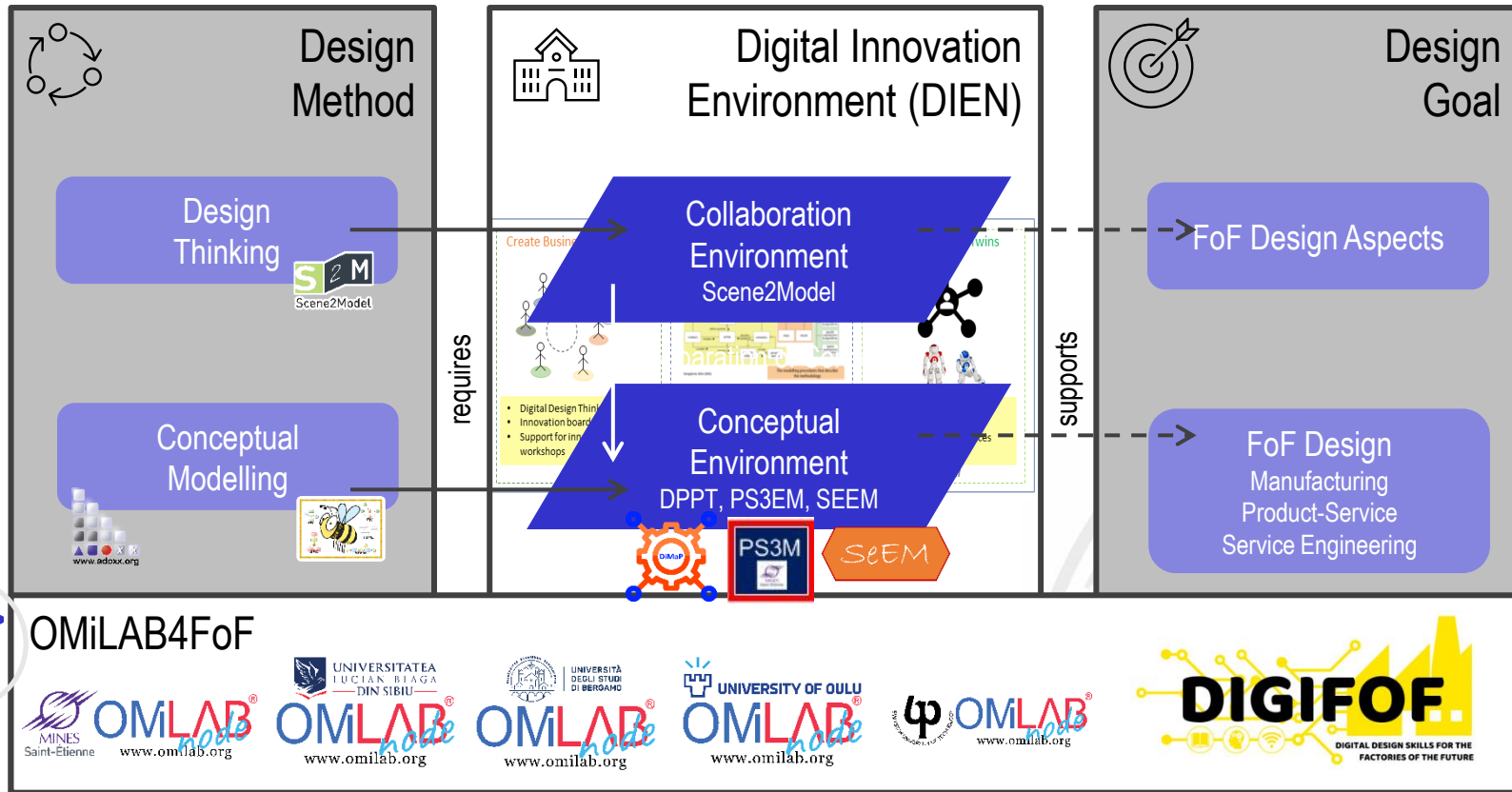


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THE OMILAB COMMUNITY OF PRACTICE: PRODUCT-SERVICE DESIGN FOR FACTORY OF THE FUTURE

FoF ECOSYSTEM: CONCEPTUAL & TECHNICAL SUPPORT



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<https://www.digifof.eu/>

OMiLAB4FoF NETWORK

DigiFoF:

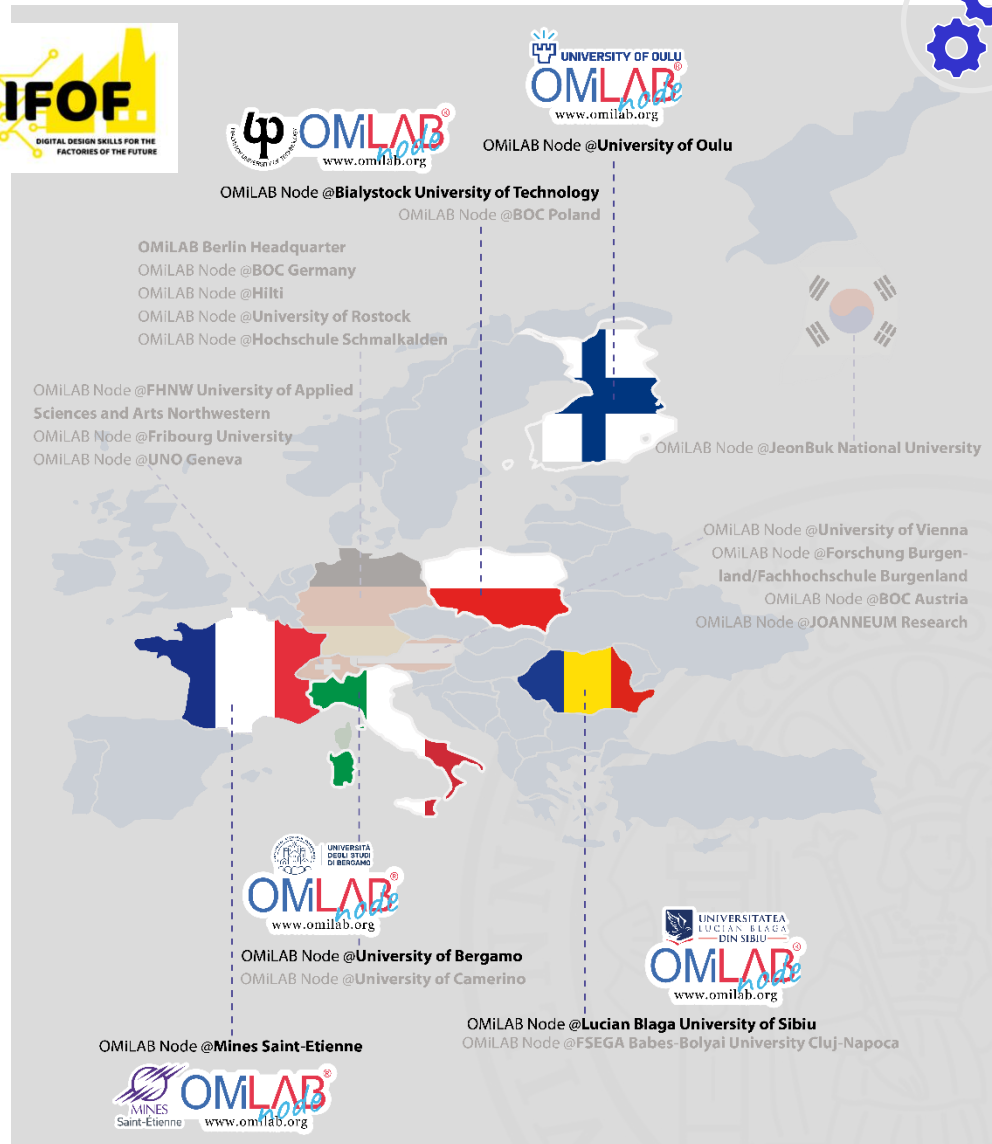
- 5 OMiLAB4FoF
- 5 Countries
- 1 Continent



part of the

OMiLAB Network of Nodes

- 20 OMiLAB Nodes
- 9 Countries
- 2 Continents



Iulia Vaidian, MSc¹, Prof. Dr. Xavier Boucher², Dr. Wilfrid Utz³

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OMILAB4FoF NETWORK EXPERTISE

"OUR FOCUS IS ON INDUSTRIAL BUSINESS MODEL TRANSFORMATION"

Hosted and Powered by Mines Saint-Etienne research centers, the French OMILAB Node is a collaborative platform for industrial and academics to develop together education material, proofs of concepts, and applied for research advances on digitalization and servitization for the industry of the future.



MINES
Saint-Étienne

Une école de l'IMT

Facts and Figures

Host: Fayol Institute,
Campus Fauriel,
Mines Saint-Etienne

Location: Espace Fauriel, 29 rue
Pontcharlier



"EXPERTISE IN EMBEDDED SYSTEMS, SMART CITY DOMAIN AND MANUFACTURING SYSTEMS AND PROCESSES"

The OMILAB node at the Lucian Blaga University of Sibiu focuses on modeling and simulation-based design, optimization of manufacturing systems and processes, and optimizing smart cities specific processes.



UNIVERSITATEA
LUCIAN BLAGA
— DIN SIBIU —

Facts and Figures

Host: Engineering Faculty,
Lucian Blaga University of
Sibiu

Location: 1 Mihailo Cioba Street, no. 4,
Room 3423
550025 Sibiu Romania

Established: 2006-10-13



<https://www.omilab.org/nodes/>

"OUR EXPERTISE IS ON ROBOTIC APPLICATIONS"

The OMILAB node at University of Oulu provides resources for quick prototyping of different robotic applications and facilitates interesting business cases to be solved via robotics.



UNIVERSITY OF OULU

Facts and Figures

UNIVERSITY OF OULU

"SERVICE AND MANUFACTURING OPERATIONS MANAGEMENT"

The OMILAB node at the University of Bergamo is in the field of service and manufacturing operations management, with particular reference to data-driven service operations and smart manufacturing.



UNIVERSITÀ
DEGLI STUDI
DI BERGAMO

Facts and Figures

Host: Research Group on
Industrial Systems
Engineering, Logistics and
Service operations (CELS),
University of Bergamo

Location: Viale Marconi 5
24124 Bergamo



"OUR FOCUS IS ON PROCESS MANAGEMENT"

The OMILAB node at the Bialystok University of Technology is in the field of process management. It is focused and powered by international Chair of Logistics and Service Engineering, Faculty of Engineering Management. The laboratory was established thanks to the cooperation with the Innovation and Development Promotion Centre (IDPC) the coordinator of Metal Processing Cluster (MPC).



WYDZIAŁ
POLITECHNIKA BIAŁYSTOCKA

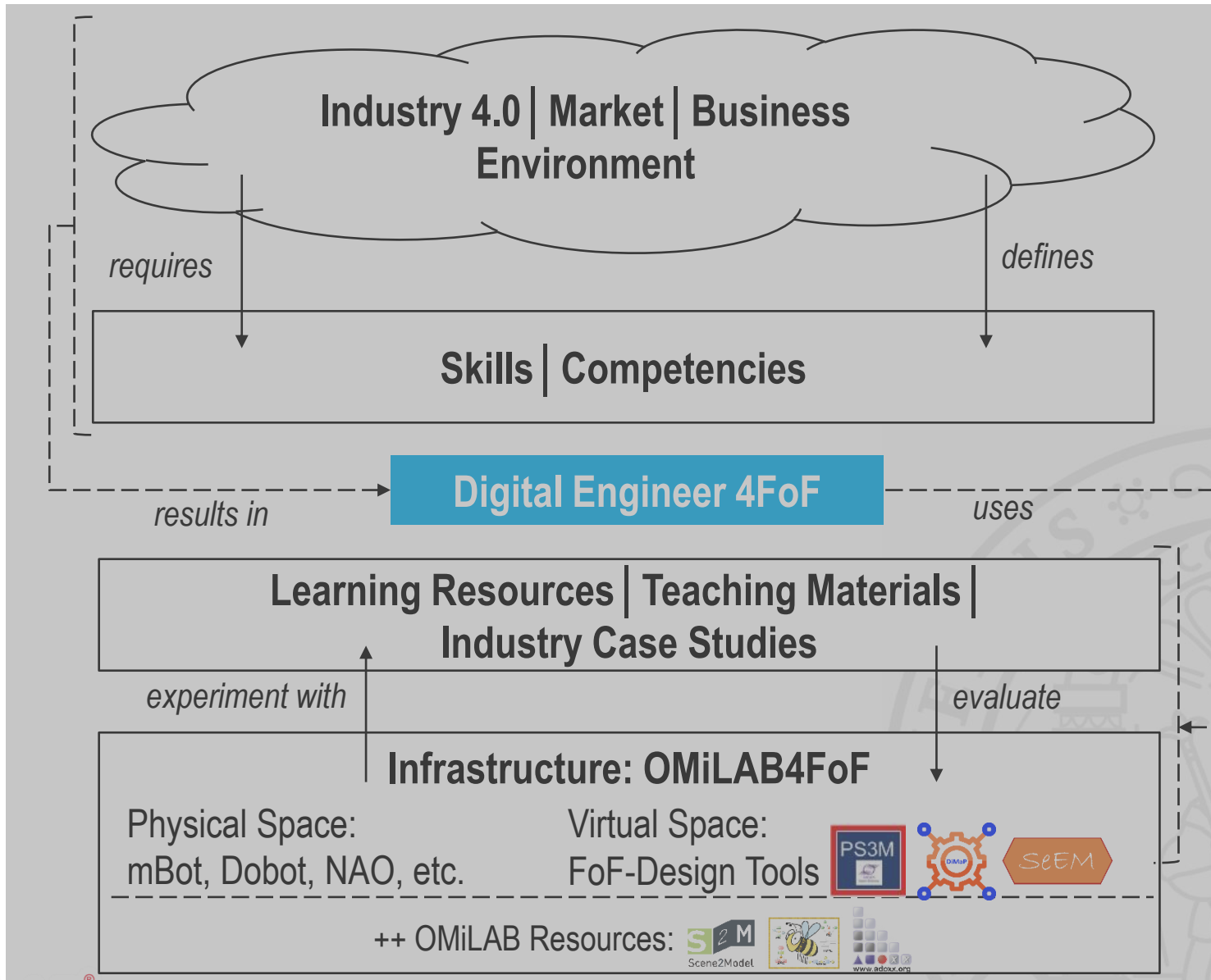
Facts and Figures

Host: Faculty of Engineering
Management,
Bialystok University of
Technology

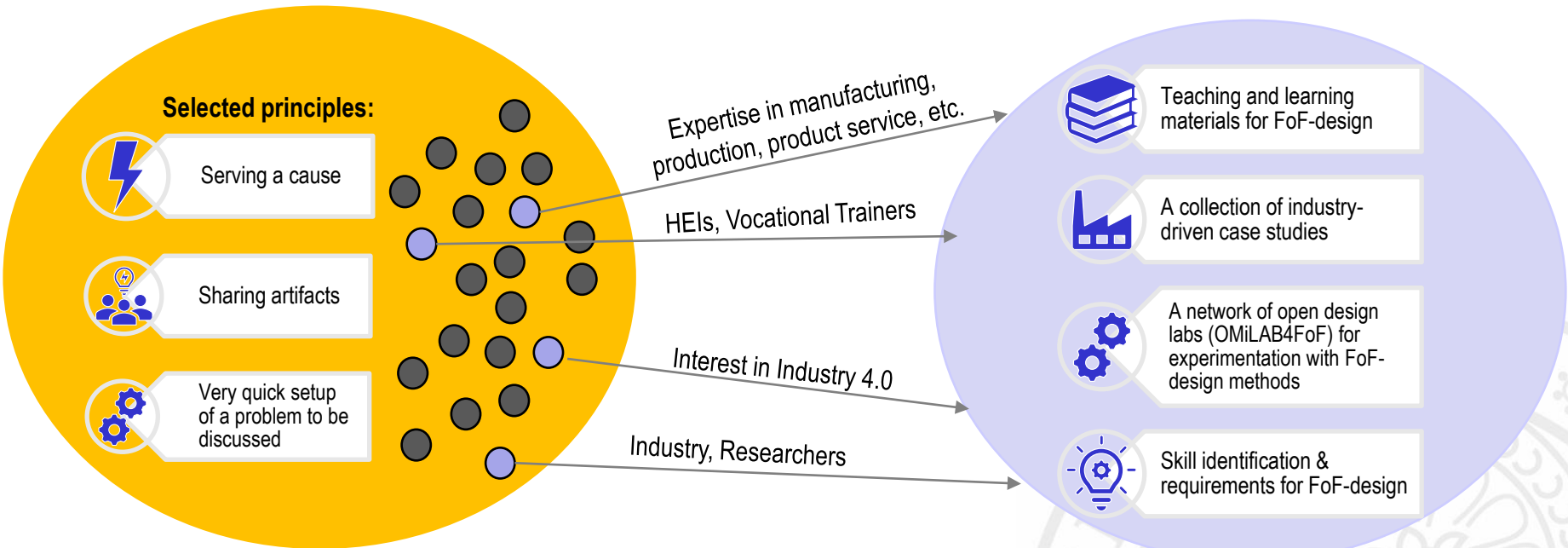
Location: 3 Ciepła Tarnobrzeg Street
15-004 Białystok, Poland



FoF ECOSYSTEM: EXPERTISE



FoF ECOSYSTEM: EXPERTISE



OMiLAB
Community of Practice

FoF Expertise



82	Students	25	Professors
18	Company Staff	5	HEIs
18	Trainers	3	Enterprises
3	Researchers	7	NGOs

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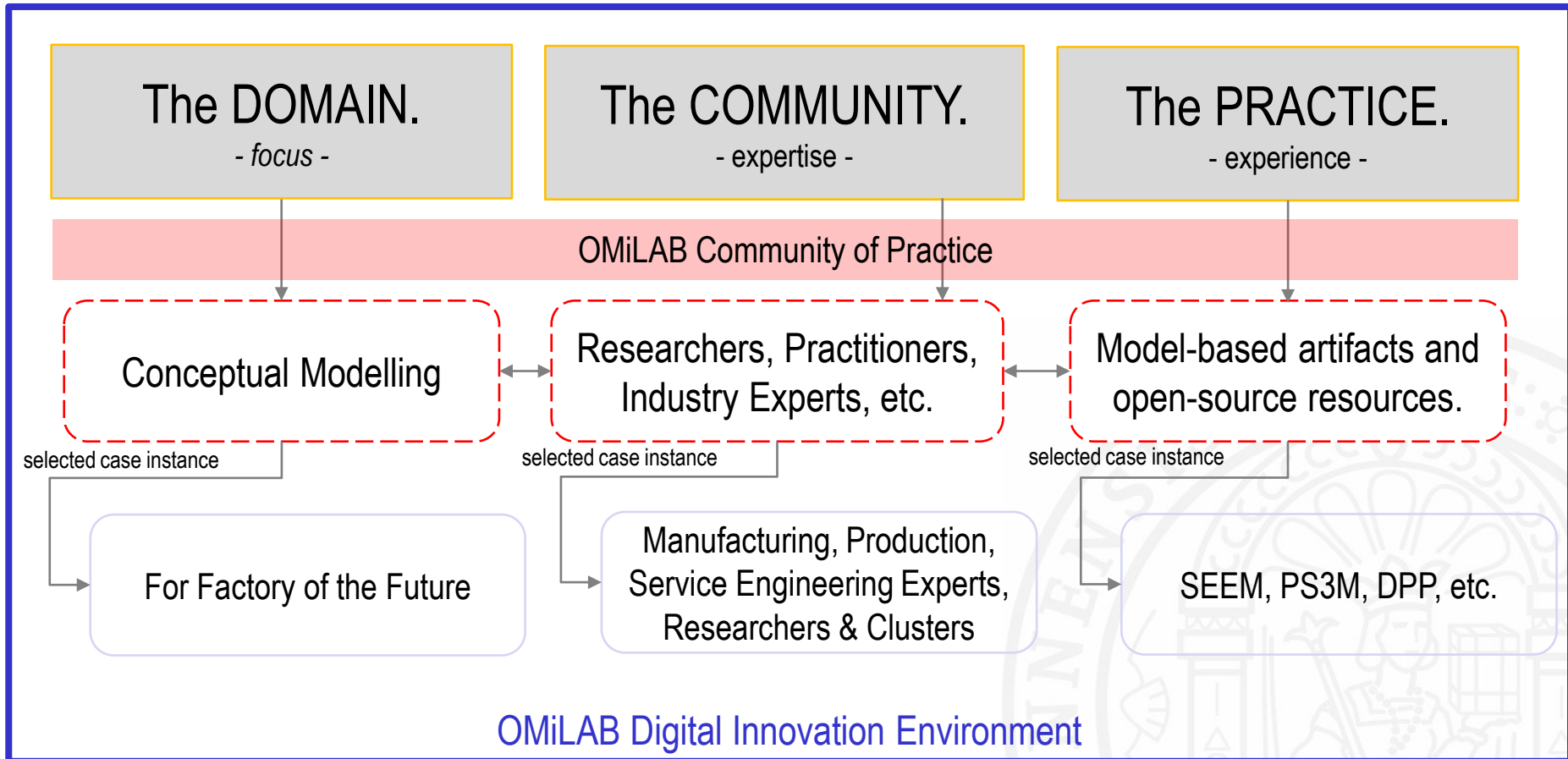
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Takeaways

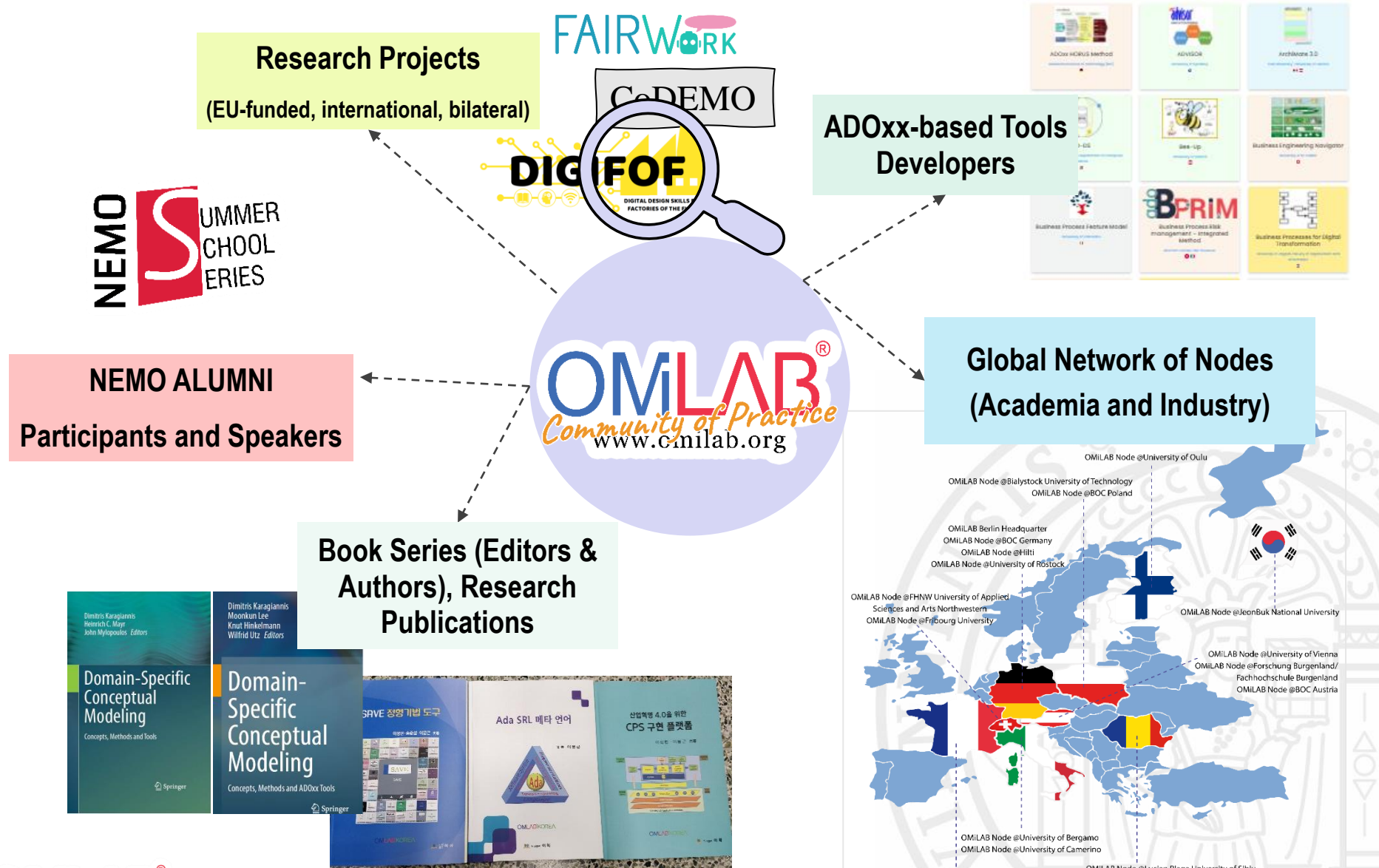
PART III



TAKEAWAYS



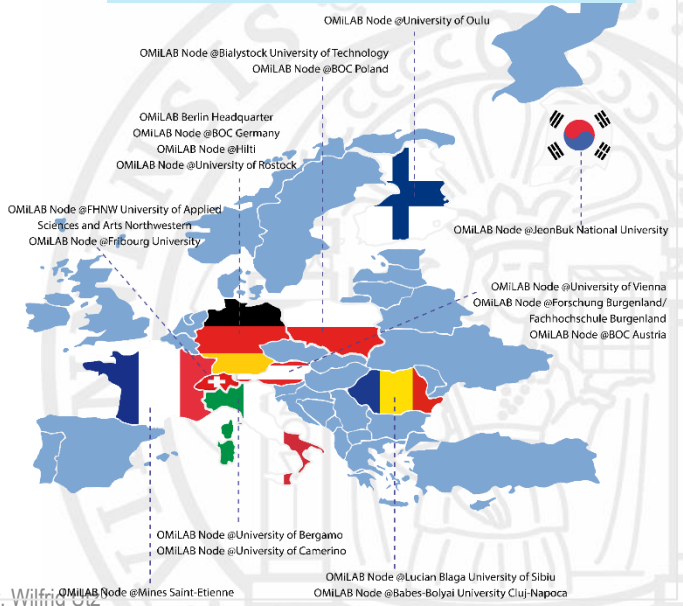
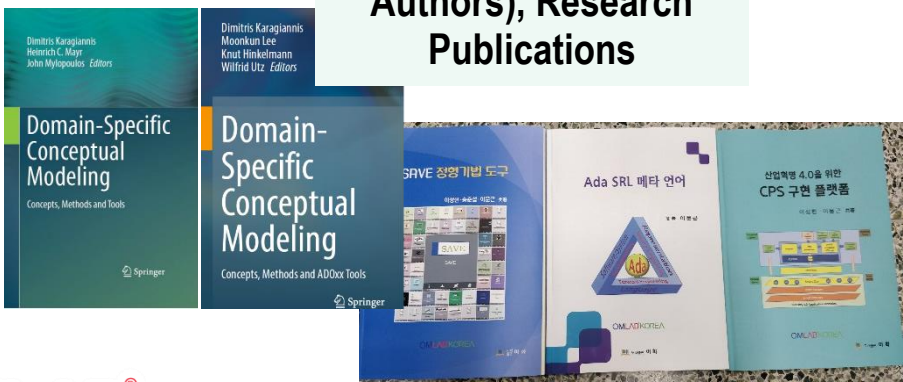
OMILAB: A COMMUNITY OF PRACTICE



NEMO SUMMER SCHOOL SERIES

NEMO ALUMNI
Participants and Speakers

Book Series (Editors & Authors), Research Publications



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INSTANTIATION: OMILAB INNOVATION CORNER

Academic

OMiLAB Innovation Corner

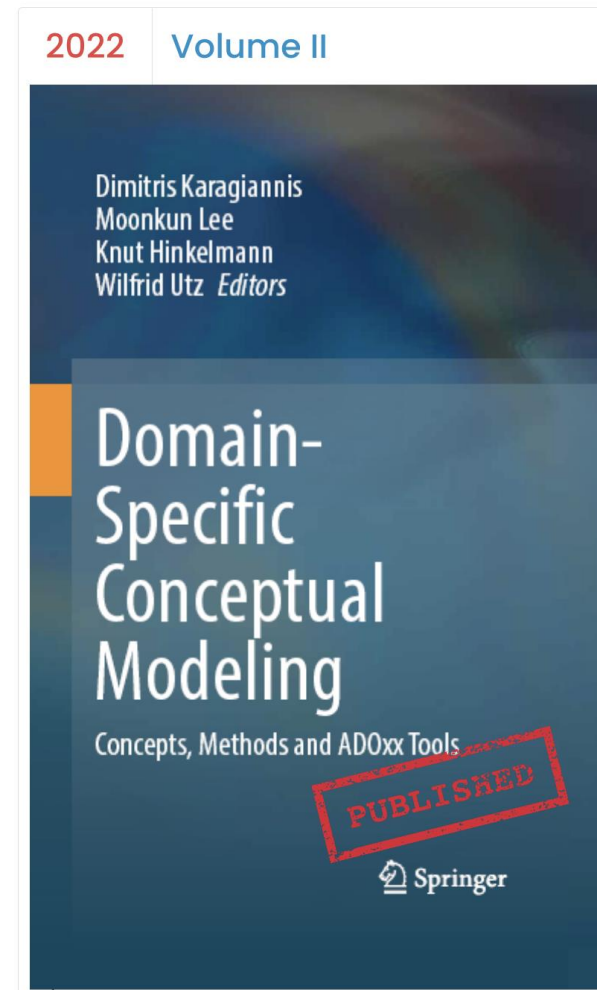
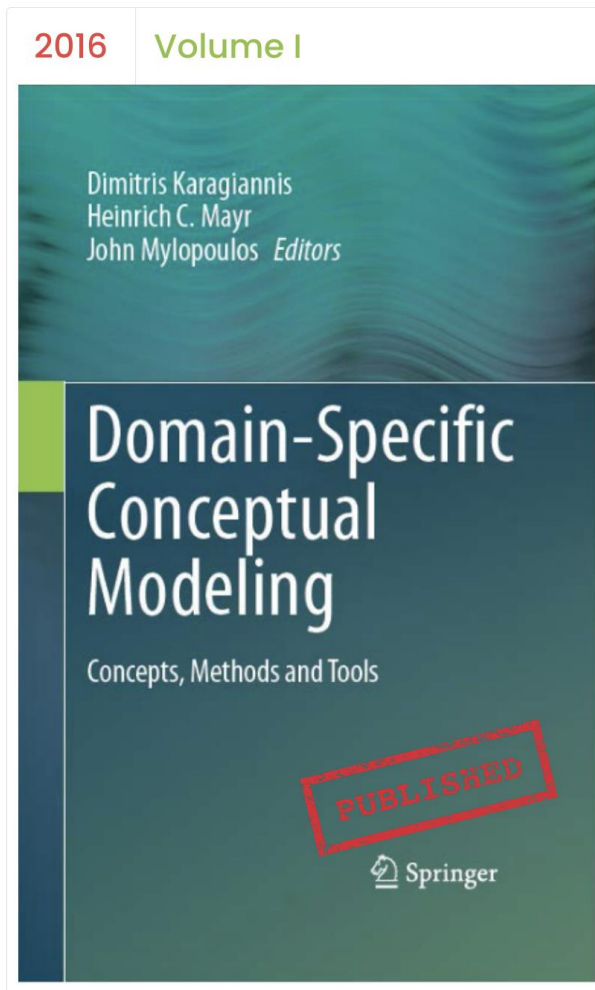


Industrial

OMiLAB Innovation Corner



COMMUNITY RESULTS: PUBLICATION



<https://www.omilab.org/activities/books/>

9th Edition



Become a digital leader!



nemo.omilab.org

Learn
CONCEPTUAL MODELLING
to innovate, design and
engineer
digital ecosystems

- Focuses on the conceptualization, design, and implementation of Next Generation Enterprise Modelling Methods.
- Modelling tools and platforms that support domain-specific methods must provide user interaction functionalities and enable management capabilities for the execution environment in addition to the modelling method design and implementation.

The 9th Edition takes place between the 17th and 28th of July 2023.

- Two weeks program in English combining lectures and practical work, for Master and PhD students.
- Impressions: <https://nemo.omilab.org/previous-editions/>

THANK YOU FOR YOUR ATTENTION!

QUESTIONS?

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RG Knowledge Engineering

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