

IV Sympozjum BPM 2024

Cel: Spotkanie i integracja w gronie ekspertów, praktyków i entuzjastów Business Process Management - wykłady, prezentacje i warsztaty

Temat Sympozjum: Automatyizacja procesów biznesowych i sztuczna inteligencja w dobie wyzwań gospodarki

Termin: 19 kwietnia 2024 r.

Miejsce: Centrum Nowoczesnych Technologii Informatycznych, Uniwersytet Ekonomiczny w Katowicach, ul. Bogucicka 5, 40-266 Katowice



Uniwersytet
Ekonomiczny
w Katowicach



Europejskie Miasto Nauki
Katowice 2024

CHALLENGING INNOVATION IN BUSINESS PROCESS MANAGEMENT: OMiLAB'S DIGITAL INNOVATION ENVIRONMENT IN ACTION

Dr. Wilfrid Utz
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Katowice
April 19, 2024



AGENDA

Challenging Innovation in Business Process Management Market-Driven Innovation Environment in Action

INNOVATION
IN BUSINESS PROCESS MANAGEMENT

Keynote Speaker: Dr. Wilfrid Utz (OMiLAB NPO, Berlin, Germany, wilfrid.utz@omilab.org)

CO-CREATION / DESIGN
OF BUSINESS PROCESSES

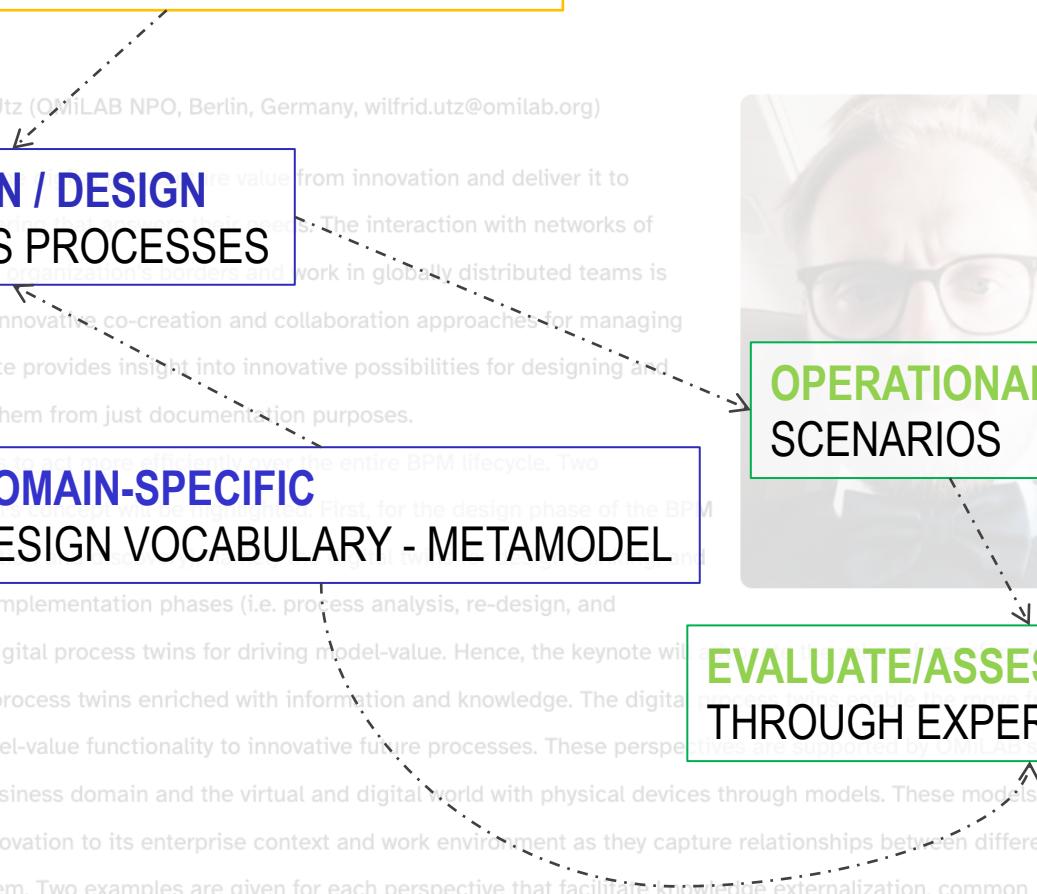


DOMAIN-SPECIFIC
DESIGN VOCABULARY - METAMODEL

OPERATIONALIZE
SCENARIOS



EVALUATE/ASSESS FEASIBILITY
THROUGH EXPERIMENTS



Agenda

Motivational Case: Smart Mobility (ISD2022 Keynote)

Design: Digital Design Thinking using Scene2Model

Feasibility Assessment: Experimentation support through Bee-Up

Operationalisation: The OMiLAB Digital Innovation Environment

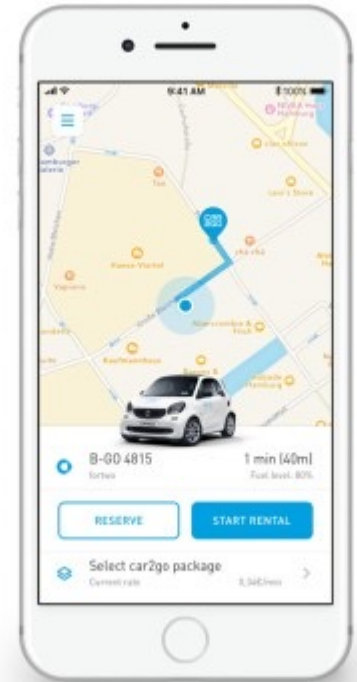
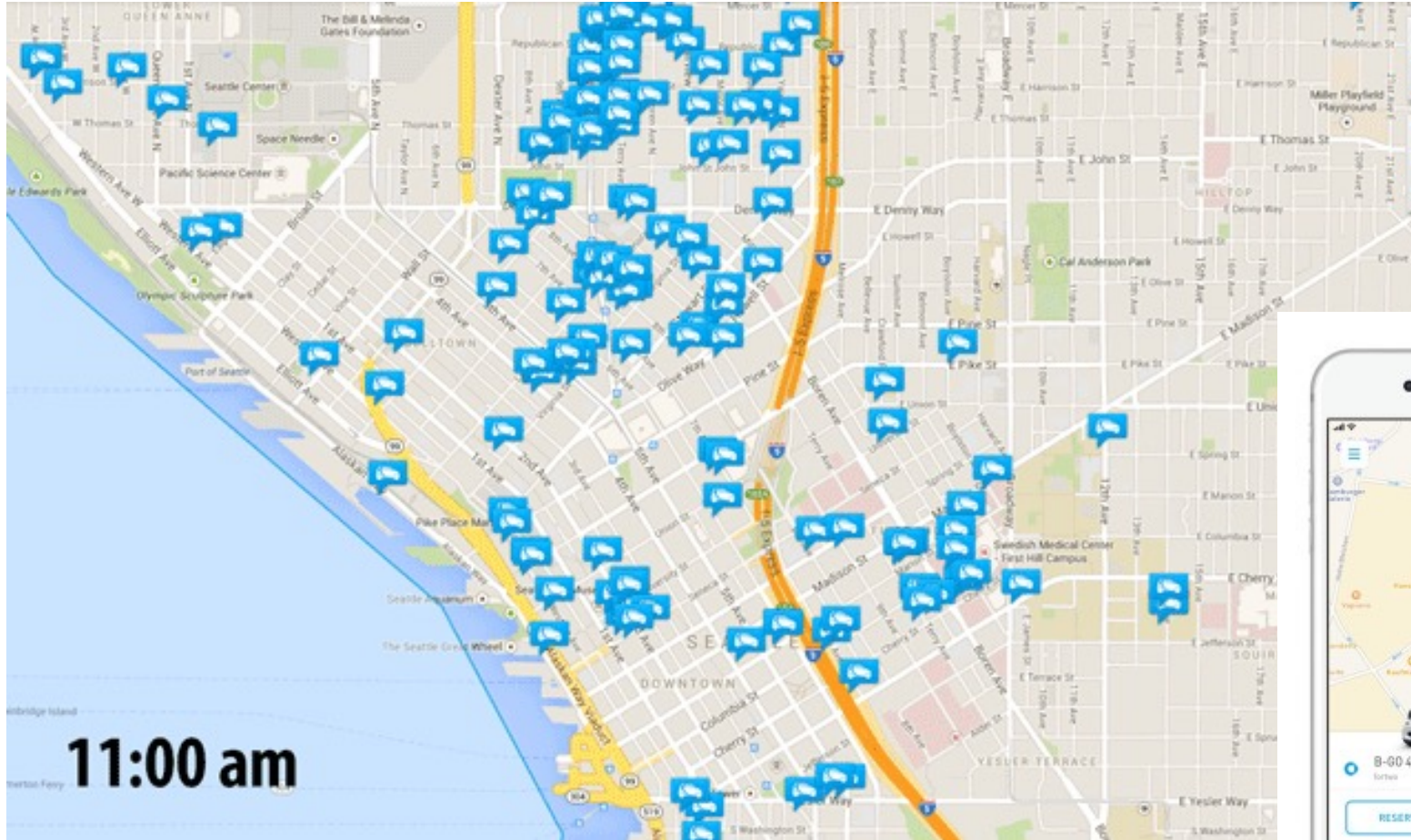
Evaluation: OMiLAB Network of Nodes and Community of Practice

Conclusion

MOTIVATIONAL CASE: SMART MOBILITY

Source: Prof. Karagiannis, NEMO Summerschool

STATE-OF-THE-ART: On-demand Mobility



Source: <http://www.landscapeandurbanism.com/2014/09/15/catch-while-catch-can-car2go/>
<https://www.car2go.com/AT/en/alexal/>

STATE-OF-THE-ART: On-demand Mobility



Challenge:

You find a car in close proximity

Option A:

+ Direct access (close proximity)

- Long ride/distance due to road logic in first district of Vienna

Option B:

+ Short distance

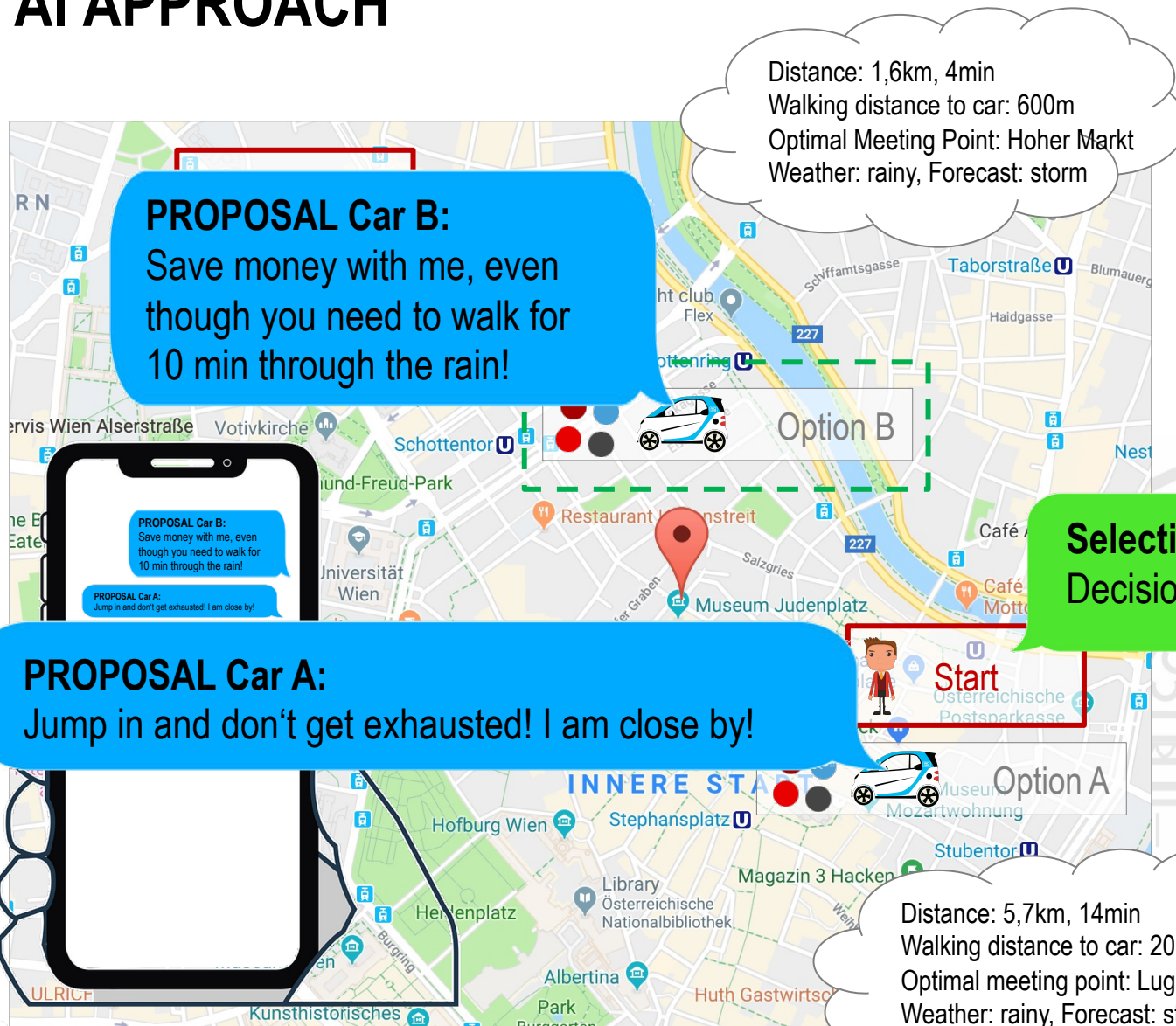
- Long commute -> search and find car

On-Demand Mobility: A REAL SITUATION



Source: Keynote Prof. Karagiannis, ISD2022

On-Demand Mobility: AN AI APPROACH



PROPOSAL Car B:
Save money with me, even though you need to walk for 10 min through the rain!

PROPOSAL Car B:
Save money with me, even though you need to walk for 10 min through the rain!

PROPOSAL Car A:
Jump in and don't get exhausted! I am close by!

PROPOSAL Car A:
Jump in and don't get exhausted! I am close by!

Selection:
Decision for Car B

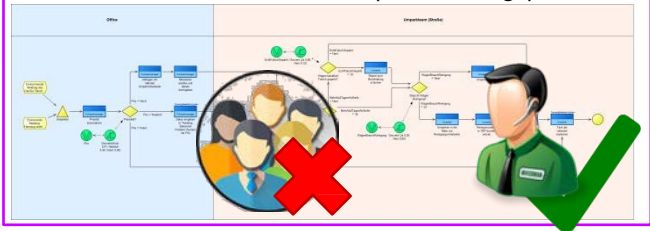
Distance: 1,6km, 4min
Walking distance to car: 600m
Optimal Meeting Point: Hoher Markt
Weather: rainy, Forecast: storm

Distance: 5,7km, 14min
Walking distance to car: 200m
Optimal meeting point: Lugeck
Weather: rainy, Forecast: storm



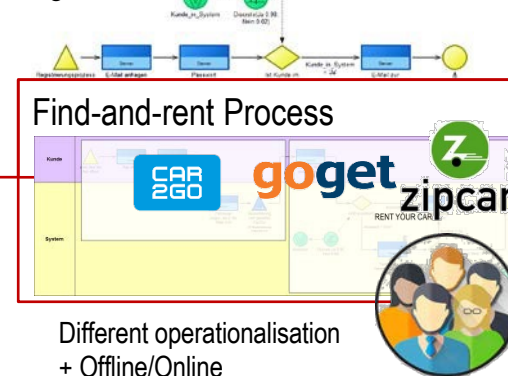
MODEL ECOSYSTEM

Car Maintenance Process („Refueling“)



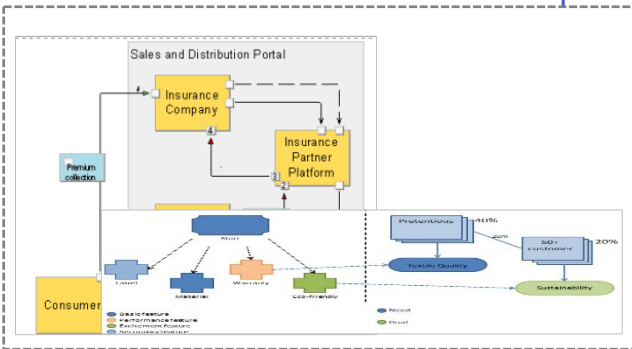
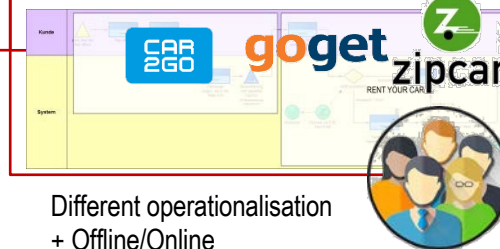
Full Service Takeover by Provider

Registration

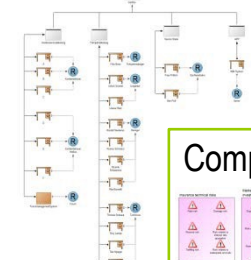


Different operationalisation
 + Offline/Online
 + Mobile
 + Call-center

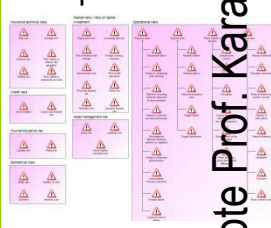
Find-and-rent Process



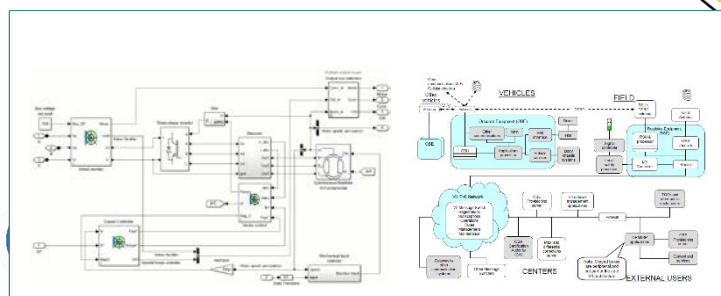
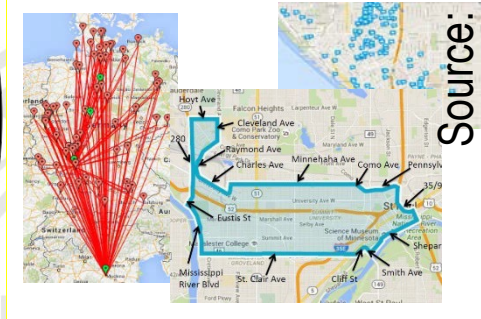
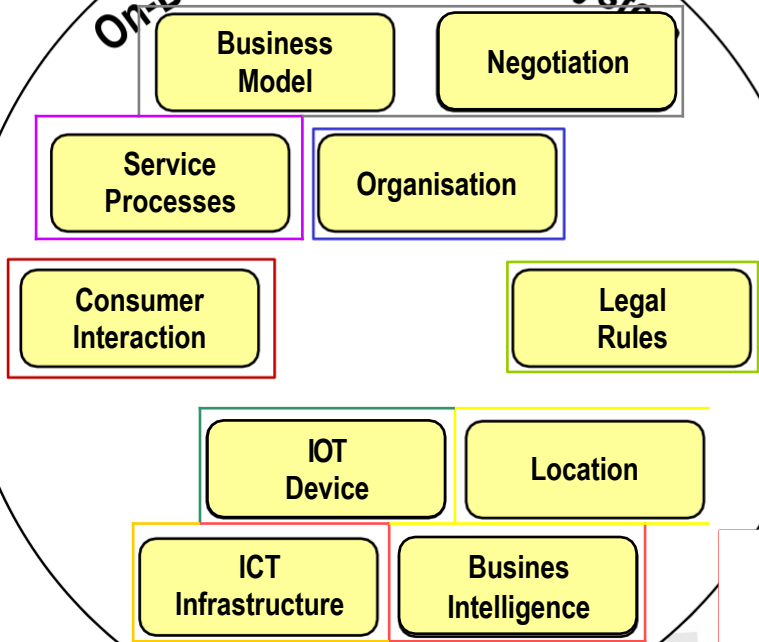
Customer support organisation



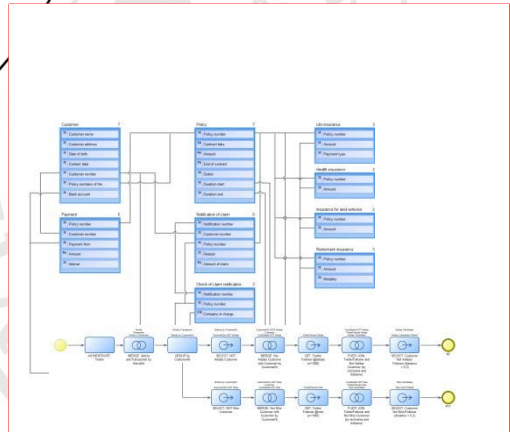
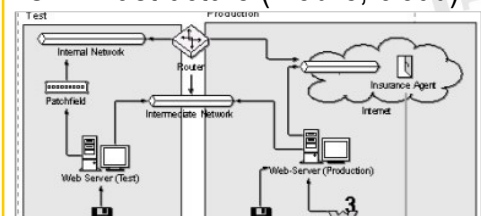
Compliance



On-Demand mobility Ecosystem



ICT infrastructure (mobile, cloud)



Source: Keynote Prof. Karagiannis, ISD2022



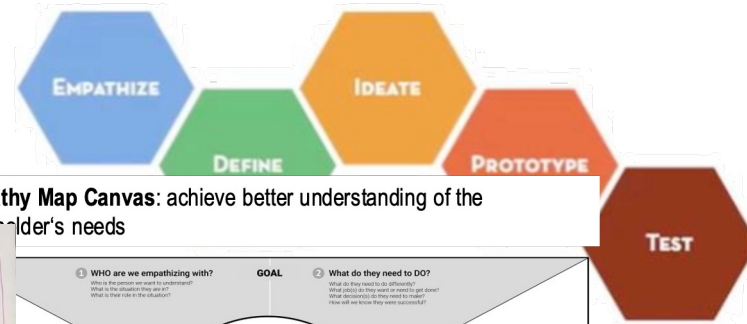
DESIGN

DIGITAL DESIGN THINKING USING SCENE2MODEL

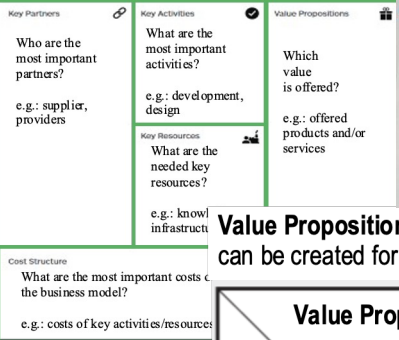
DESIGN THINKING

Frameworks, Methods & Tools

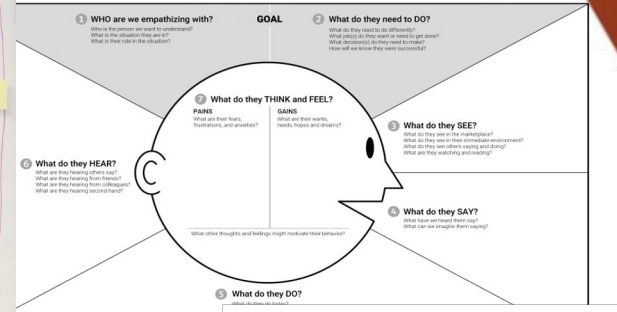
THE DESIGN THINKING PROCESS



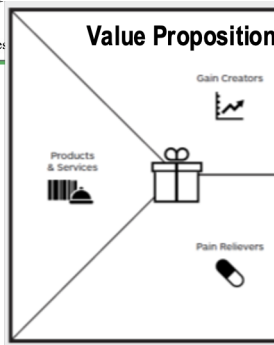
Business Model Canvas: represent graph (new or existing) by structuring the information



Empathy Map Canvas: achieve better understanding of the stakeholder's needs



Value Proposition Canvas structured representation of how value can be created for customers

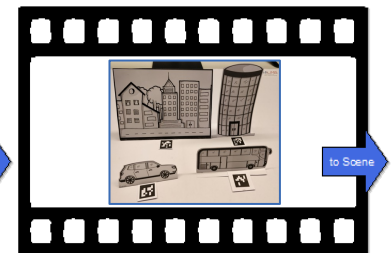
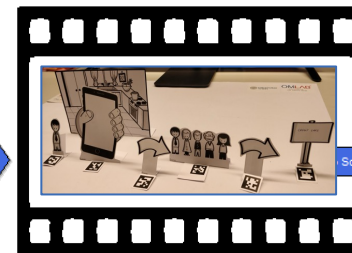
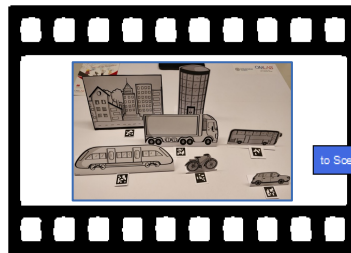
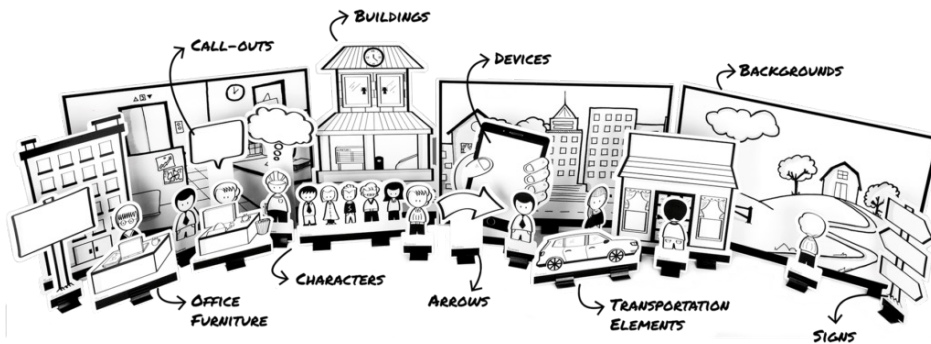
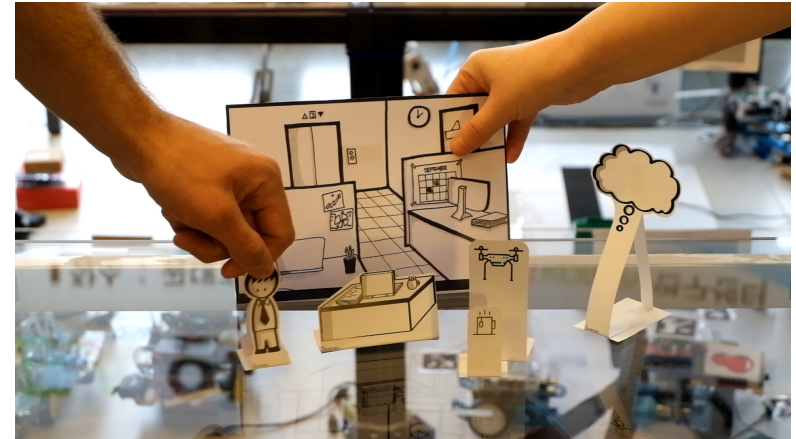


Customer Journey: identify and visualize the touchpoints of a stakeholder with a company



Design Thinking Method: Storyboarding with SAP Scenes

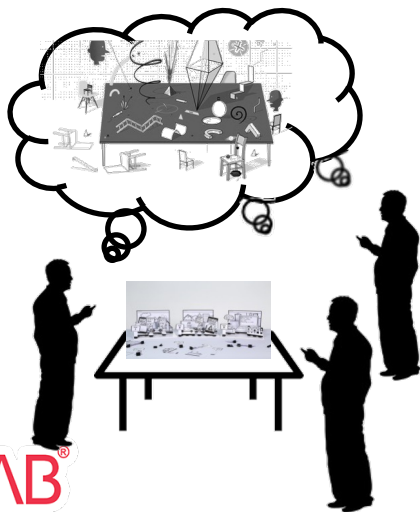
- **Scene:** the visual representation of a key moment in a scenario, built with different **haptic figures**
- **SAP Scenes:** set of pre-defined figures to build tangible scenes
- **Storyboards:** sequence of multiple scenes



Digital Design Thinking: WHY

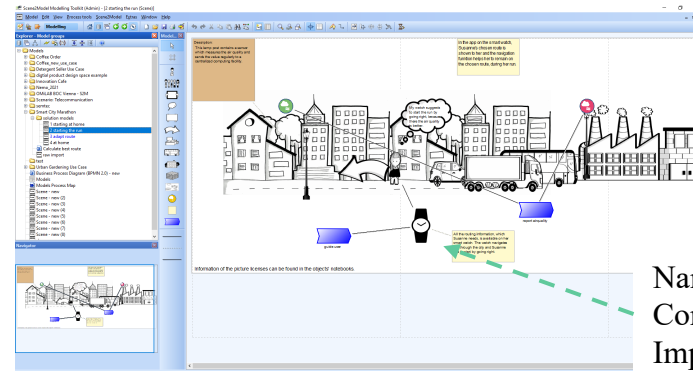
Design Thinking

- Restriction location and time availability
- Restriction number of participants
- Limitation of the tangible representation modalities (drawing skills, haptic figures, post its)
- Difficulty in sharing the results achieved
- Hard to transfer assumptions



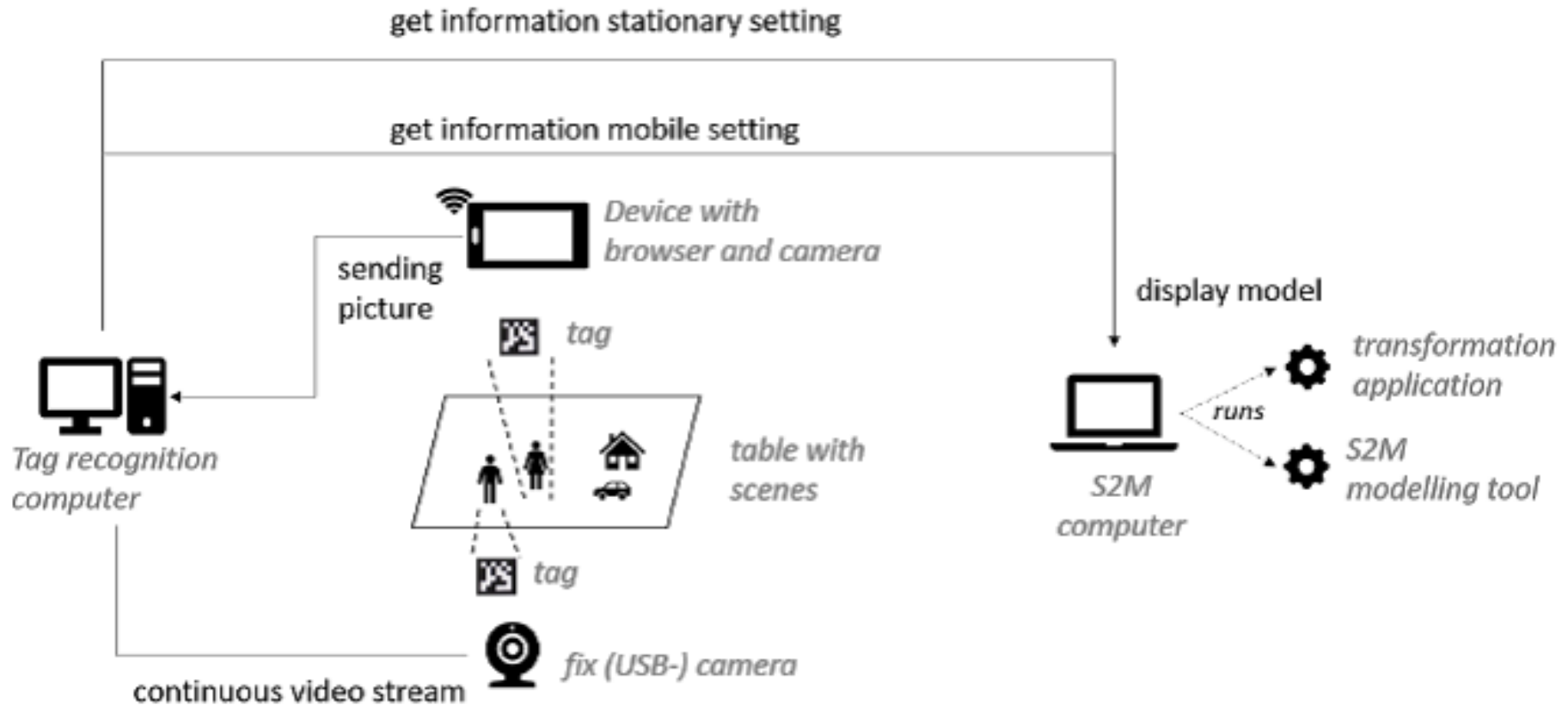
Digital Design Thinking

- Space and time independent
- Enables innovation in distributed environments
- Adaptability of objects
- “no borders” knowledge transfer enabled
- Enrichment of domain scenario



Name: Smart Watch
Connectivity: Bluetooth
Important App: Air2Run

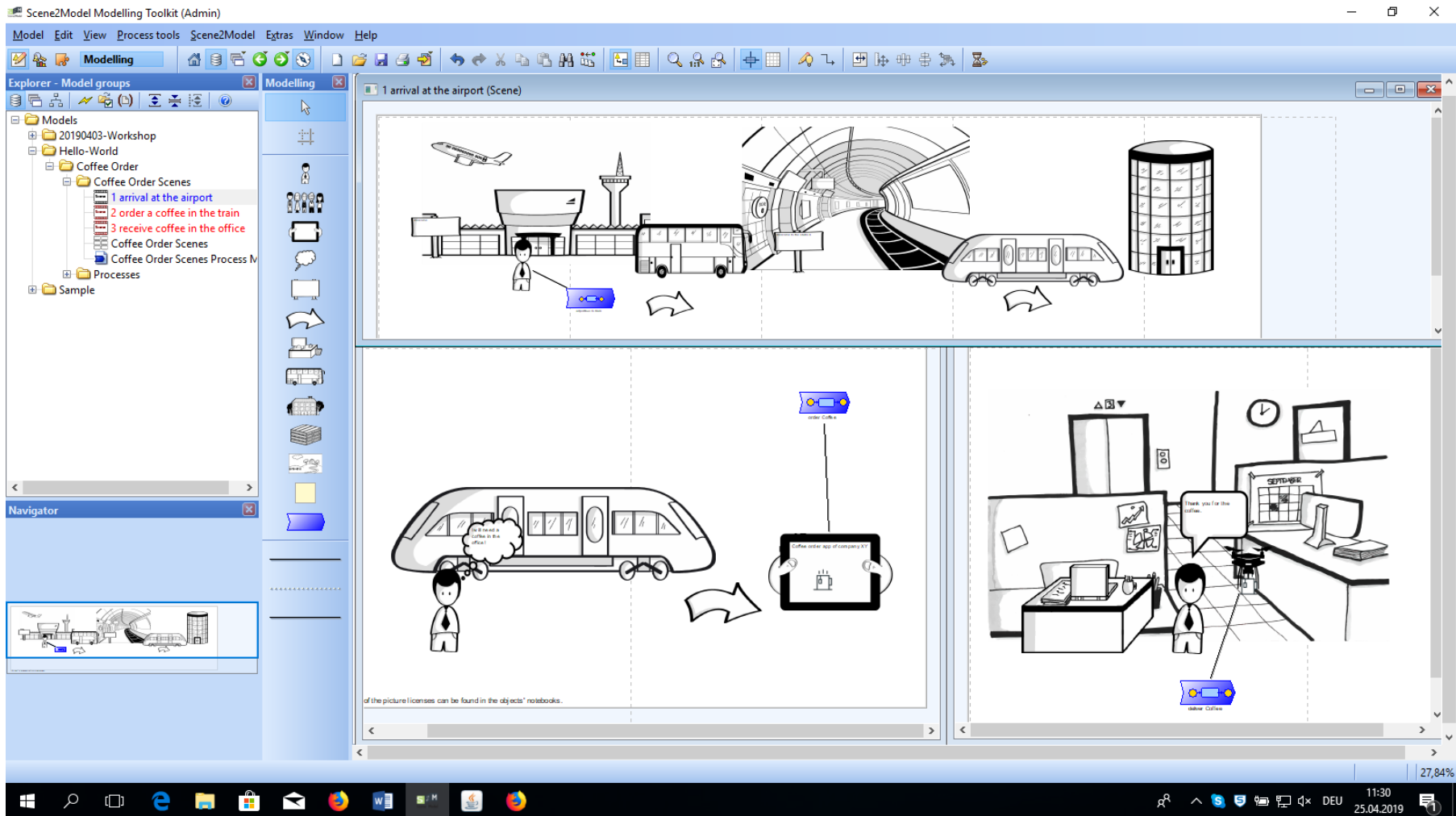
Tool Support: Scene2Model



Muck, C., Palkovits-Rauter, S. (2022). Conceptualizing Design Thinking Artefacts: The Scene2Model Storyboard Approach. In: Karagiannis, D., Lee, M., Hinkelmann, K., Utz, W. (eds) Domain-Specific Conceptual Modeling. Springer, Cham. https://doi.org/10.1007/978-3-030-93547-4_25DOI: https://doi.org/10.1007/978-3-030-93547-4_25

Scenario: Smart Grocery

DIGITAL DESIGN THINKING DEMONSTRATION



LIVE DEMONSTRATION

USAGE: NEMO 2019



Feasibility Assessment

EXPERIMENTATION SUPPORT THROUGH BEE-UP

VALUE OF MODELS

Modelling

Model(s)

Value by itself

obtain Value through

Analysis

- Querying information

Simulation

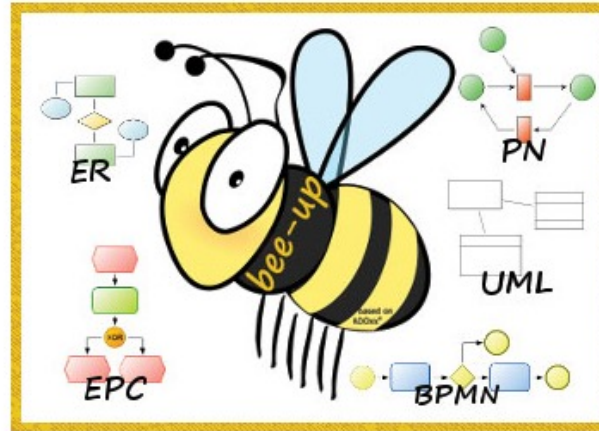
- Capacity Analysis
- Petri Net Behavior

Transformation

- Deriving SQL Code
- RDF Export
- Models for Runtime

EXAMPLE: Bee-Up

Details



Bee-Up is an implementation of a hybrid modelling method incorporating and extending several modelling languages that gained wide popularity, namely the Business Process Model and Notation (BPMN), Event-driven Process Chains (EPC), Entity-Relationship models (ER), the Unified Modeling Language (UML) and Petri Nets. Bee-Up does not enforce a specific procedure when solving a problem. Instead it provides a set of different types of models and tools that can be employed according to the requirements of the task at hand.

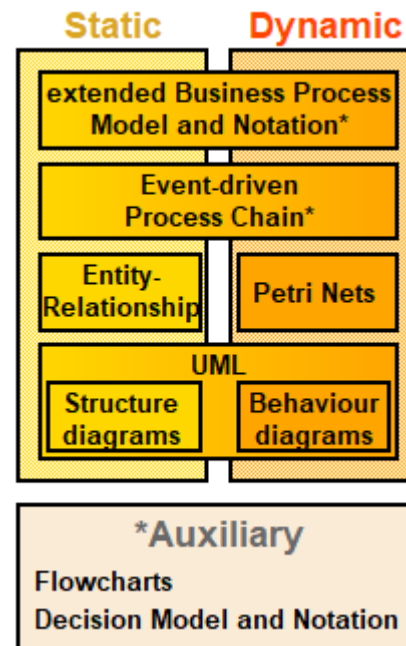
[from the Bee-Up OMiLAB page]

1. It's a tool – install it, use it, enjoy it.
2. It hybridizes several popular modelling languages.
3. It provides functionality to utilize created models.

MODELLING LANGUAGES

- **BPMN** – Business Process Model and Notation
- **EPC** – Event-driven Process Chains
- **ER** – Entity Relationship
|
- **UML** – Unified Modeling Language
- **Petri Nets**

- ++ Auxiliary
 - **DMN**
 - **Flowcharts**
 - ...



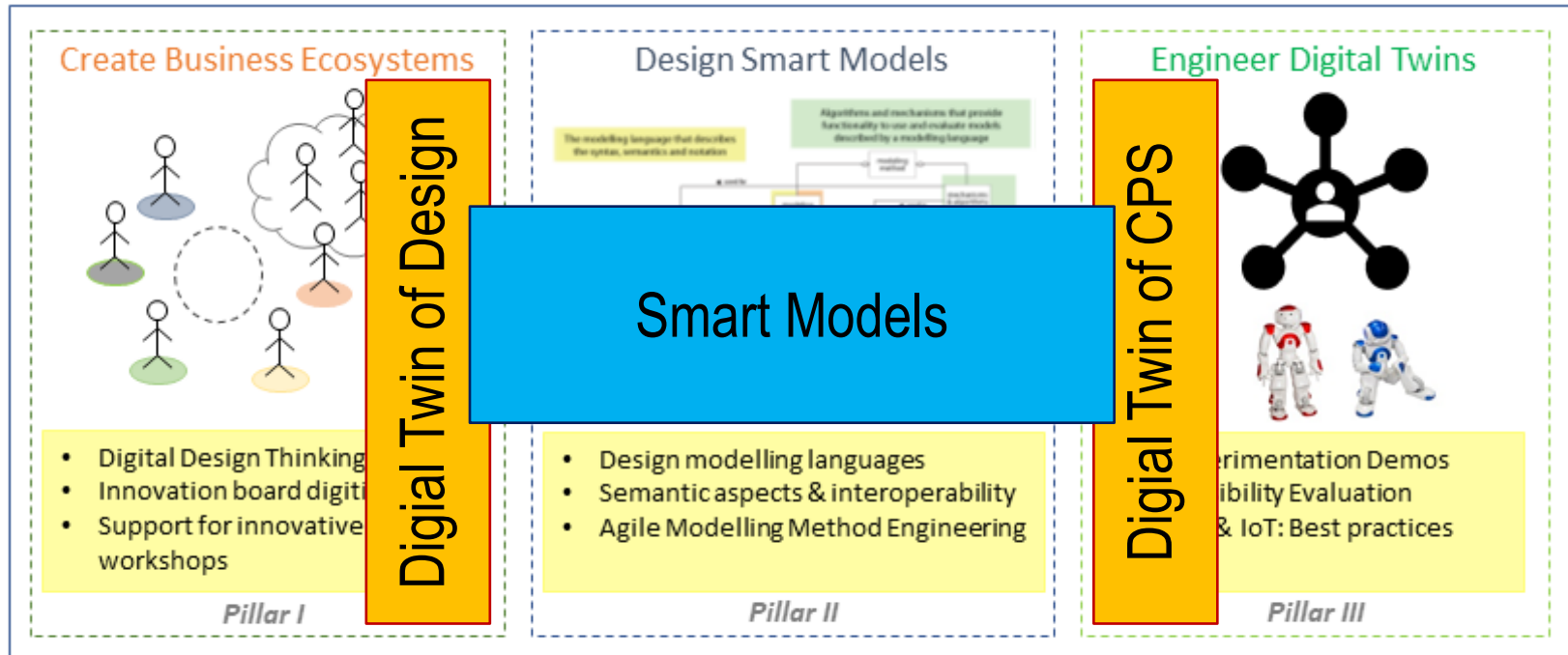
Actual Model Types:

- Business Process Diagram (BPMN 2.0)
- EPC Model
- ER Model
- Activity Diagram
- Class / Object Diagram
- Classifier Pool
- Communication Diagram
- Component Diagram
- Composite Structure Diagram
- Deployment Diagram
- Interaction Overview Diagram
- Package Diagram
- Sequence Diagram
- State Machine Diagram
- Timing Diagram
- Use Case Diagram
- Petri Net
- Company Map
- Document Model
- Flowchart
- Decision Requirements Diagram
- Working Environment Model

Operationalisation

OMILAB DIGITAL INNOVATION ENVIRONMENT

OMiLAB DIEn



Approach

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

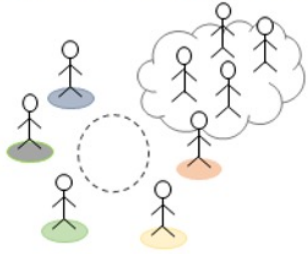
Technology



ROS Robot Operating System, Raspberry Pi, W3C Semantic Web, Microservices

CREATE BUSINESS ECOSYSTEMS

Create Business Ecosystems



- Digital Design Thinking
- Innovation board digitization
- Support for innovative workshops

Pillar 1

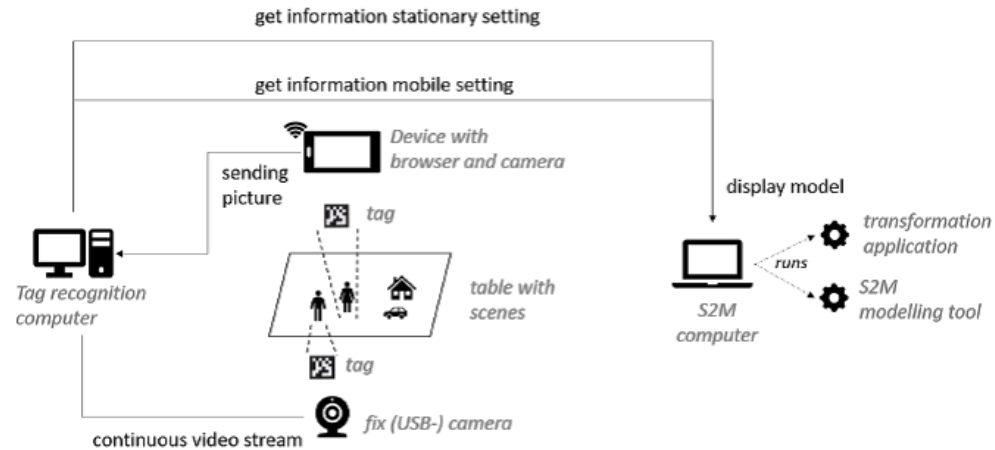
Selected Approach

Design Thinking

Selected Technology

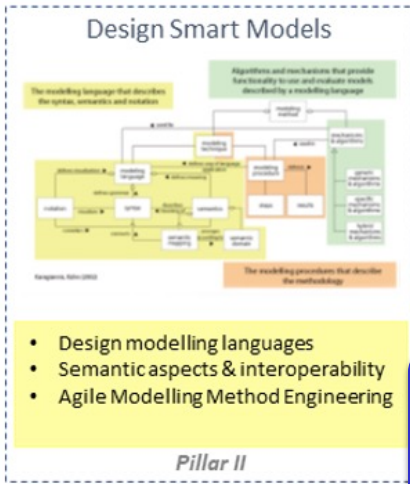


(using Raspberry Pi
MicroServices
OLIVE)



FOCUS: SUPPORT INNOVATION PROCESSES

DESIGN SMART MODELS



What we get.

Selected Approach

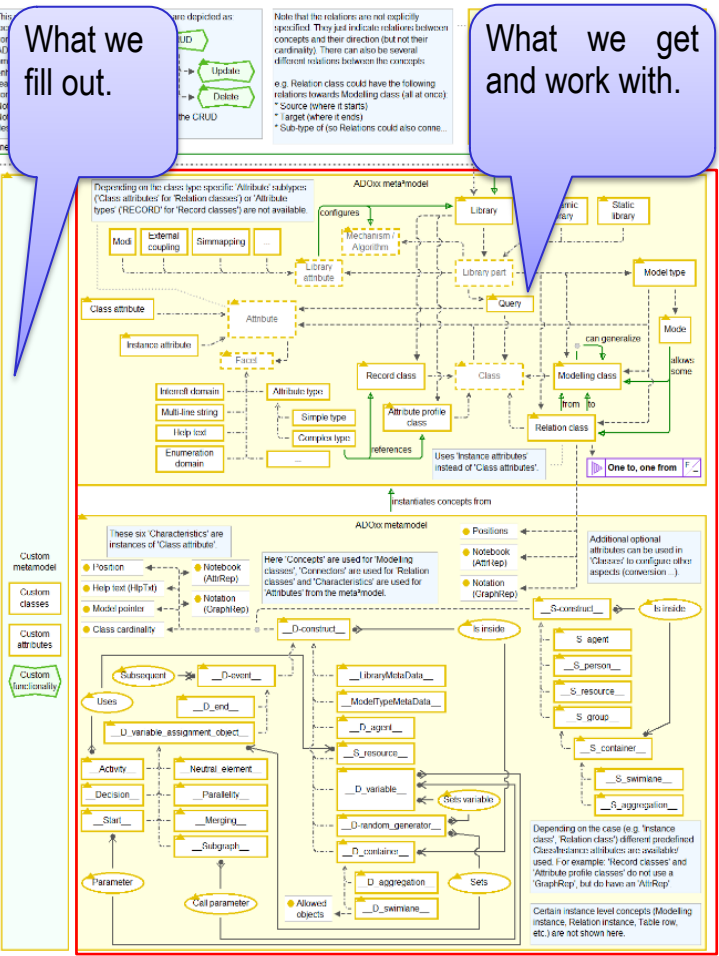
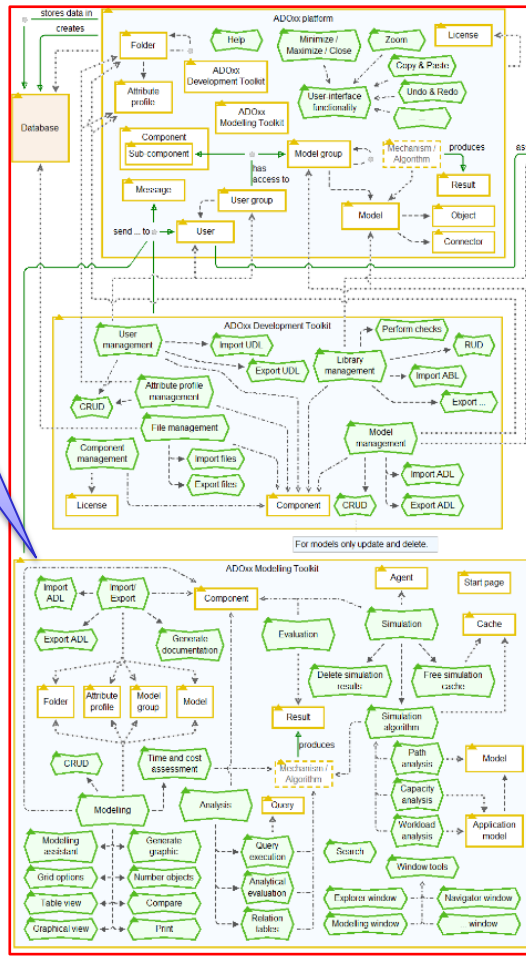
Conceptual Modelling

Selected Technology

CoChaCo

ADOxx

(using MicroServices OLIVE)



What we fill out.

What we get and work with.

The OMLAB Community. (2022). Development of Conceptual Models and Realization of Modelling Tools Within the ADOxx Meta-Modelling Environment: A Living Paper. In: Karagiannis, D., Lee, M., Hinkelmann, K., Utz, W. (eds) Domain-Specific Conceptual Modeling. Springer, Cham. <https://doi.org/10.1007/978-3-030-93547-4> 2DOI: https://doi.org/10.1007/978-3-030-93547-4_2

FOCUS: REALIZE MODELLING METHODS

ENGINEER DIGITAL TWINS

Engineer Digital Twins



- Experimentation Demos
- Feasibility Evaluation
- CPS & IoT: Best practices

Pillar III

Selected Approach

Digital Twins / AI

Selected Technology

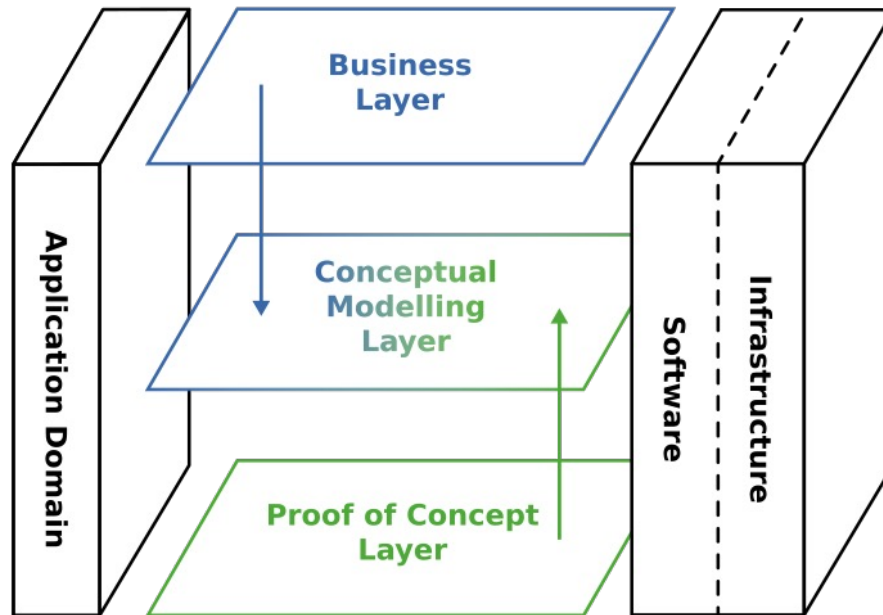
ROS, RPi
MicroServices
OLIVE



FOCUS: ASSESS FEASIBILITY

DIGITAL INNOVATION LABORATORY

- A research and experimental spaces for the conceptualization, development and deployment of digital innovation experiments utilizing next generation enterprise modelling.
- Project space for engineering these ideas from design to assessment/evaluation. A project is a collaborative space where individuals and teams can work together. It includes all contributions required to develop business scenarios.



Instantiation: OMiLAB Innovation Corner

Academic

OMiLAB Innovation Corner



Industrial

OMiLAB Innovation Corner



INDUSTRIAL OMILAB INNOVATION CORNER



https://youtu.be/608o2-l_J34

EVALUATION


COMMUNITY OF PRACTICE

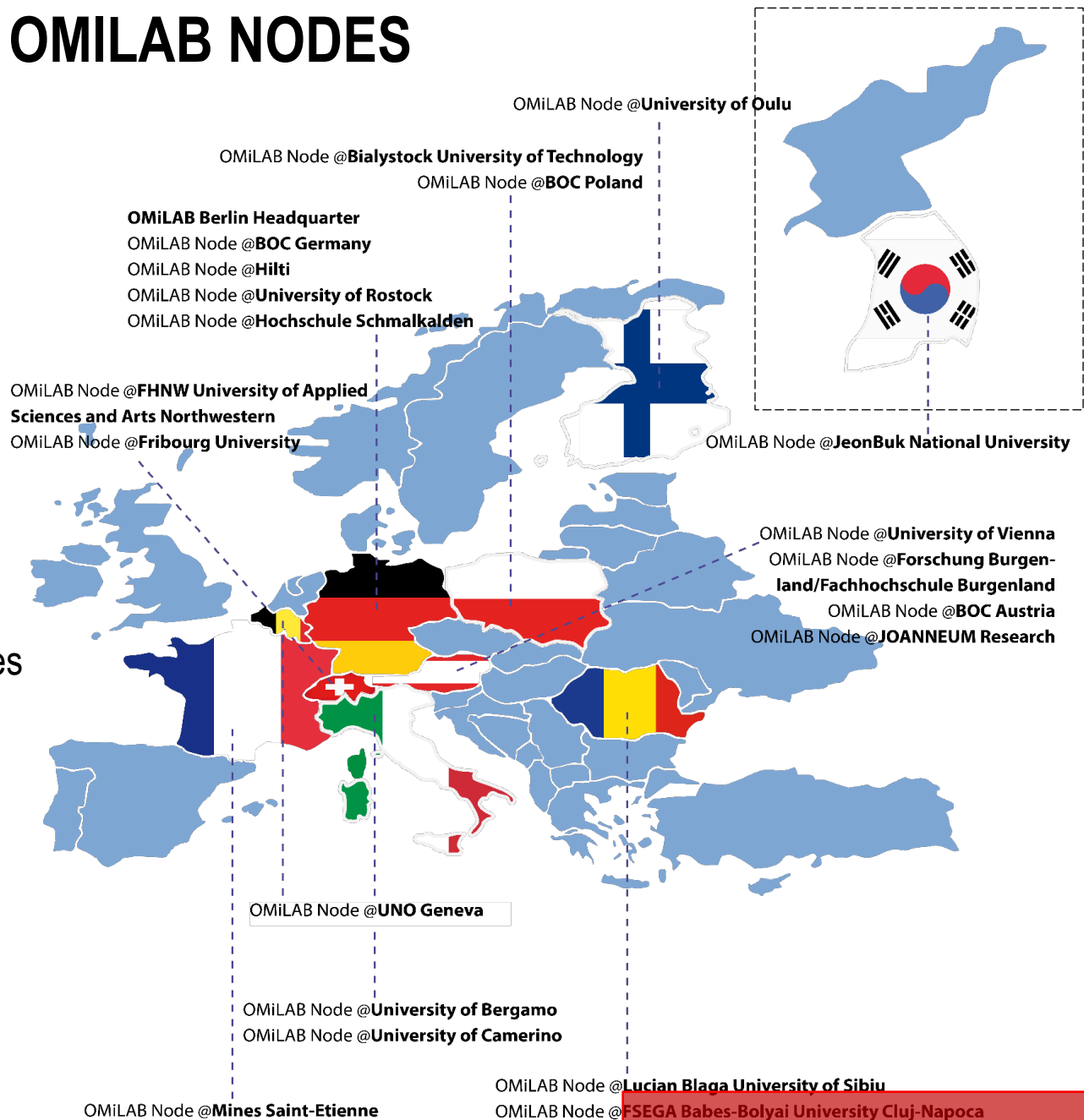
NETWORK OF OMILAB NODES

As of April 2024

 25 OMiLAB Nodes

 10 countries

 2 continents



OMiLAB: A Community of Practice

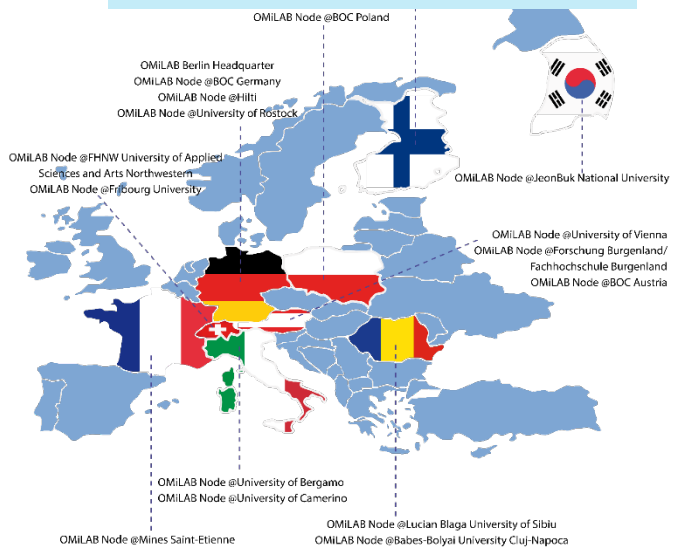
Research Projects
(EU-funded, international, bilateral)



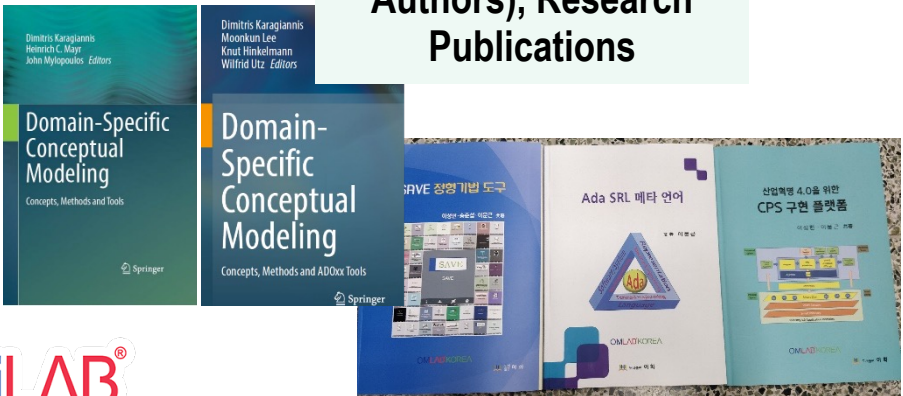
ADOxx-based Tools Developers



Global Network of Nodes (Academia and Industry)



Book Series (Editors & Authors), Research Publications



NEMO ALUMNI
Participants and Speakers



JOINT KNOWLEDGE TRANSFER:

EDUCATE DIGITAL ENGINEERS

OMILAB: a Smart Innovation Environment for Digital Engineers¹

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Abstract. This position paper introduces a Smart Innovation Environment for experimentation related to digital transformation projects, for the consolidation of a proposed "Digital Engineer" skill profile (with a business-oriented facet labelled as "Digital Innovator"). In the Internet of Things era, this profile implies the ability to perform both digital design and engineering activities, to semantically bridge multiple layers of abstraction and specificity – from business analysis down to cyber-physical engineering. In the paper's proposal, this integration is enabled by conceptual modelling methods and interoperable modelling tools, tailored to support the creation of Digital Twins for innovative digital business models. The architecture of the proposed environment is guided by a Design Research perspective – i.e., it is a treatment to an education "design problem" regarding the Digital Engineer skill profile in the IoT era. The proposed environment encompasses workspaces and toolkits are currently evaluated in "innovation corners" deployed across the OMILAB ecosystem.

Keywords: OMILAB, Digital Twin, Digital Engineer, Digital Innovator, Agile Modelling Method Engineering, Cyber-Physical Systems.

^{*} The paper was accepted at PRO-VE 2020 – the 21st IFIP/SOCOLNET Working Conference on Virtual Enterprises.

[†] Corresponding author

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https://doi.org/10.1007/978-3-030-62412-5_23

DIGITAL AND PHYSICAL TWINS



The OMILAB Digital Innovation environment: Agile conceptual models to bridge business value with Digital and Physical Twins for Product-Service Systems development

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Agile modeling method-engineering
OMILAB
Domain-specific conceptual modeling

ABSTRACT

OMILAB is a community of practice which offers a digital ecosystem bridging together open technologies to investigate and apply conceptual modeling methods for varying purposes and domains. One of the core value propositions is a dedicated Digital Innovation environment comprising several toolkits and workspaces designed to support Product-Service Systems (PSS) prototyping – a key ingredient for PSS strategic management. In the core of this environment is a notion of Agile Digital Twins – a conceptual representation that can be tailored with knowledge engineering means to bridge the semantic and functional gap between a business perspective (focusing on value creation) and an engineering perspective (focusing on cyber-physical proofs of concept). To facilitate this bridging, the hereby proposed environment subsumes, across three abstraction layers, methods such as Design Thinking, Agile-Writing, Method Engineering and Model-driven Engineering to turn literature into smart Product-Service Systems experiences, in a laboratory setting. The proposed environment was built following Design Science principles. It addresses the problem of tacit, city-disconnected skills required for Digital Innovation projects and it provides a method for feasibility experimentation. For design-oriented, artificial building research, a higher Technology Readiness Level can thus be achieved (compared to the level that idea development methods typically attain).

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1. Introduction

Product-Service Systems (PSS) are integrated offerings of products and services addressing individual customer expectations (Dimitris and Buchmann, 2020). Their adoption has been widely reported and operational guidelines have been derived from various cases, e.g. in Cohen and Ledwith (2002), but less insight is available with respect to the engineering and simulation of such systems, or the interdisciplinary skill profile required for that. PSS engineers meet challenges regarding complexity (service levels and their behavior, non-dependent with physical product constraints) or agility (changing requirements and customer preferences must be met with flexible and responsive re-configuration of the offer). The work of Hubbert et al. (2009) specifically looked into the required competences and concluded that

"understanding and evaluating impact due to its service use [...] require the entire PSS to be modeled and simulated already in the earliest phases of product development [...] Models for product development need to be enriched with a pronounced customer-centric perspective, while models for service development need to account for dependencies to the artifact".

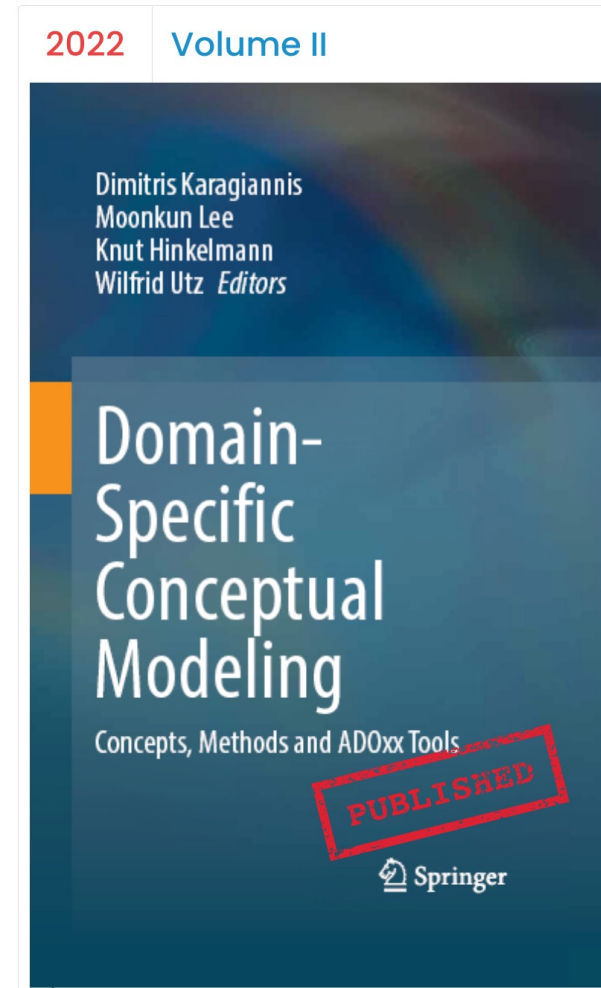
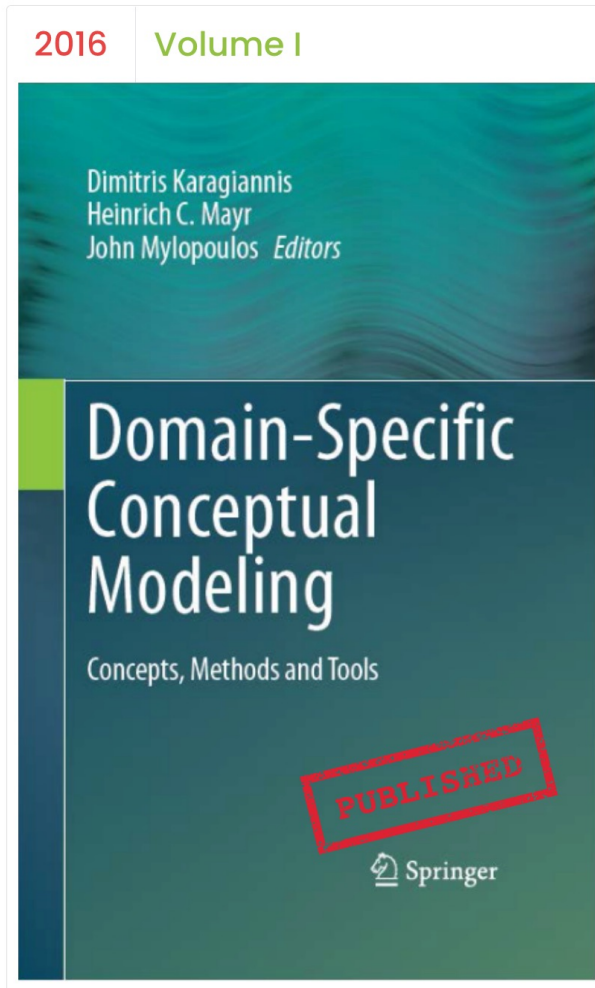
Diagrammatic modeling is a traditional way of reducing complexity through abstraction and visual structuring (Karagiannis et al., 2020). Additionally, the "Model-driven-view" paradigm (Dimitris et al., 2020) proposed a tighter coupling between design time and run-time manifestations of conceptual models, a proposal that ensures the Digital Twin-Physical Twin coupling that originates in industrial engineering (Cohen, 2005). Coming from a different direction, the customer-centric solution development approach of Design Thinking became an established approach for value co-creation and "prototyping" and can be adopted in PSS designing (Cohen et al., 2010). Knowledge and research applied in the field of PSS indicate a need to "overcome the silos between the various disciplines involved in service design and development" (Cohen,

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E-mail addresses: dimitris.karagiannis@univie.ac.at (D. Karagiannis), robert.buchmann@econ.ubbcluj.ro (R. Buchmann), wilfrid.utz@uni-due.de (W. Utz).

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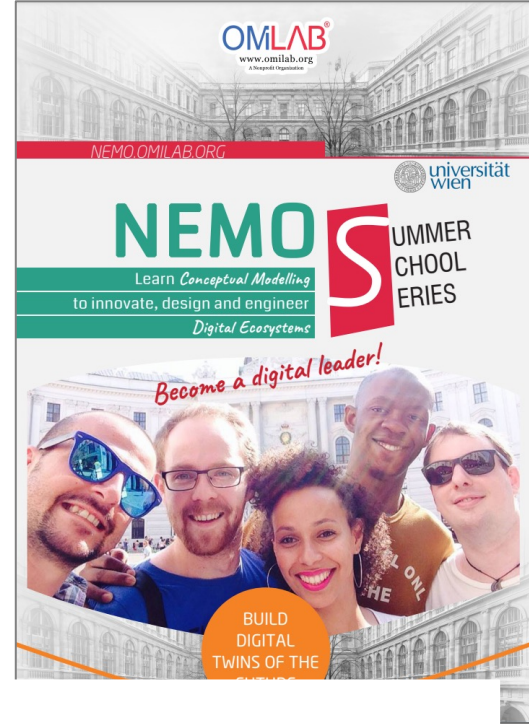
<https://authors.elsevier.com/c/1efwabquFR568>

COMMUNITY RESULTS: PUBLICATION



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

KNOWLEDGE TRANSFER: NEMO SUMMER SCHOOL



July 15 – 26, 2024

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COMMUNITY RESULTS: EVENTS

2023



Oct
19
2023

virtual
ADOxx Crash Course – October 2023
OMILAB NPO




Jul
17
2023

on-site
NEMO 2023 Summer School – Become a Digital Leader!
OMILAB NPO



Jul
13
2023

virtual
ADOxx Crash Course – July 2023
OMILAB NPO



Jun
12
2023

on-site
Knowledge Graphs for Semantics-driven Systems Engineering (Workshop@CAISE23)
CAISE2023




Jun
05
2023

on-site
Society 5.0 – Human centeredness in a cyber-physical society
Society 5.0 Conference



May
30
2023

virtual
Big Data and Cognitive Computing Special Issue: Digital Twins for Complex Systems
Dr. Fabrizio Farnal, OMILAB@UNICAM, Dr. Pedro Valderas



Mar
30
2023

virtual
ADOxx Crash Course – March 2023
OMILAB NPO



Mar
26
2023

on-site
AAAI-MAKE 2023: Challenges Requiring the Combination of Machine Learning and Knowledge Engineering
Association for the Advancement of Artificial Intelligence (AAAI)



Feb
10
2023

virtual
Developing Digital Landscapes in the Production Industry using Design Thinking – The FLEX and CRF Scenarios
FAIRWork EU-Project

2022




Sep
21
2022

on-site
CECIIS 2022 Tutorial: Digital Design Thinking using Scene2Model
OMILAB NPO




Aug
31
2022

hybrid
ISD2022 Tutorial: How to develop and use conceptual models? The BEE-UP case
OMILAB@Babeş-Bolyai University/Cluj



Jul
11
2022

on-site
NEMO 2022 Summer School
OMILAB NPO



Jul
07
2022

virtual
ADOxx Crash Course – NEMO 2022
OMILAB NPO




Jun
21
2022

on-site
International Scientific Conference Challenges in management in the face of Economy 4.0
Management Institute of the University of Bialystok




Jun
21
2022

on-site
ECIS2022 Tutorial: How to develop and use conceptual models? The BEE-UP case
OMILAB@Babeş-Bolyai University/Cluj



Jun
20
2022

on-site
Society 5.0 2022 Tutorial: Digital Design Thinking using Scene2Model
OMILAB NPO



Apr
25
2022

virtual
ICEIS2022 Tutorial: How to develop and use conceptual models? The BEE-UP case
OMILAB NPO



Mar
14
2022

virtual
ADOxx Crash Course – March 2022
OMILAB NPO

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

OMILAB[®] @ WORK

THE EU PROJECT:

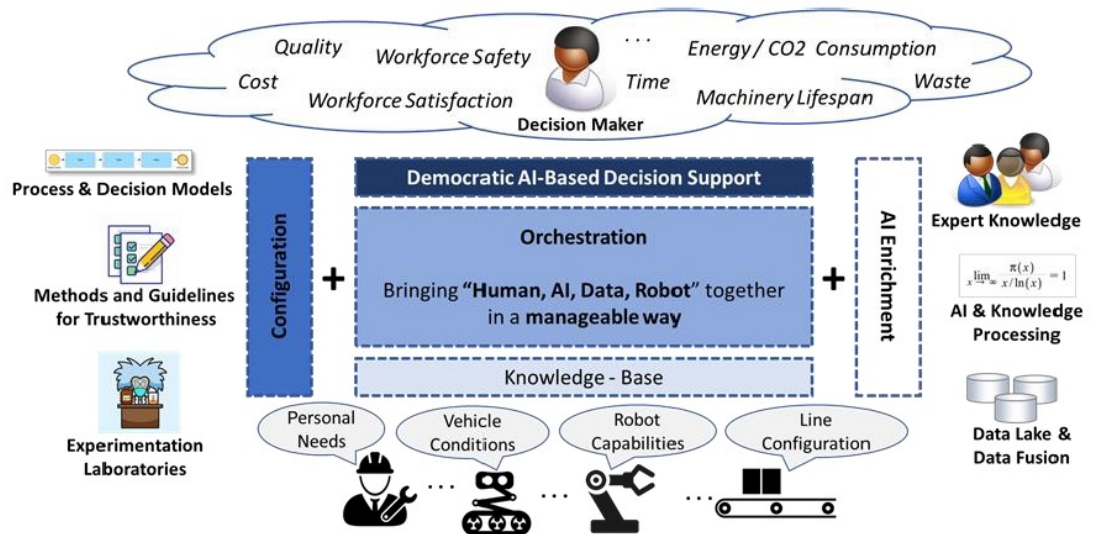


STARTED 09/2022

9 Partners

6 Countries

<https://fairwork-project.eu/>



THE EU PROJECT:

CoDEMO: Co-Creative Decision Makers for 5.0 Organizations

START 10/2023

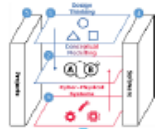
13 Partners

6 Countries

<https://codemo-project.eu/>

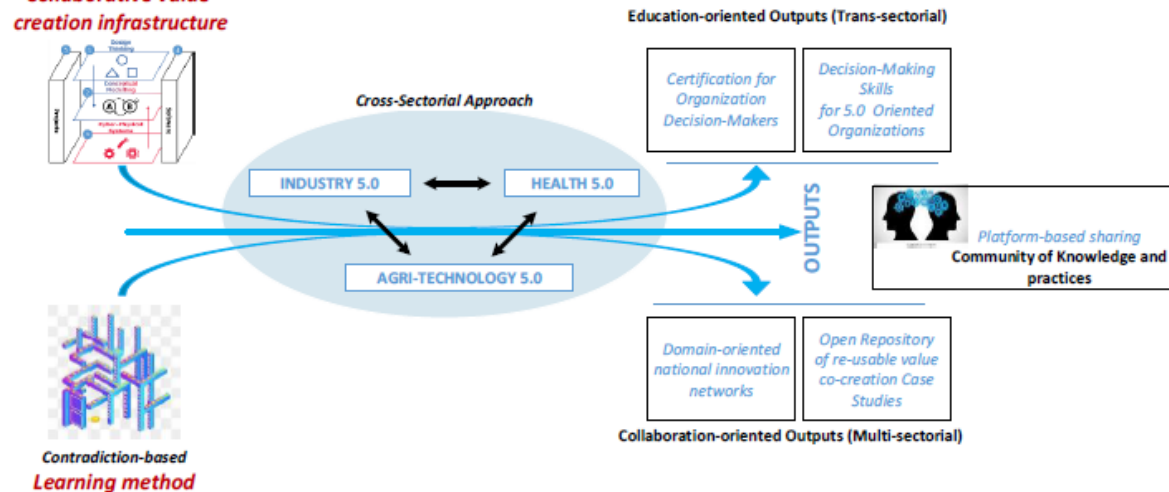
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Implementation of a Collaborative value-creation infrastructure



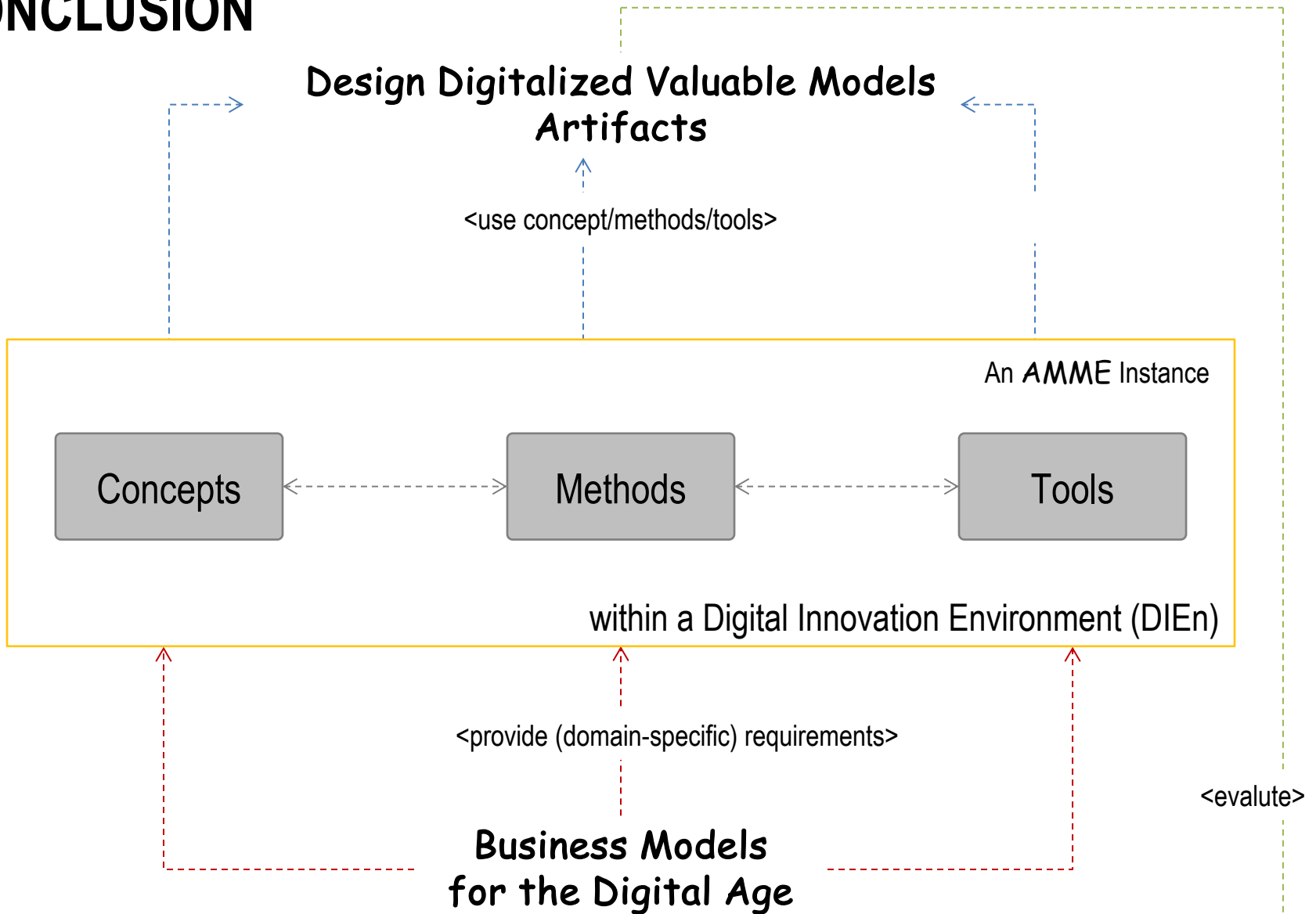
Contradiction-based Learning method

Organisation Decision-Makers at the heart of 5.0 innovation



CONCLUSION

CONCLUSION



D., Buchmann, R. A., & Utz, W. (2022). The OMILAB Digital Innovation environment: Agile conceptual models to bridge business value with Digital and Physical Twins for Product-Service Systems development. Computers in Industry, 138. <https://doi.org/10.1016/j.compind.2022.103631>

Karagiannis D. (2018) Conceptual Modelling Methods: The AMME Agile Engineering Approach. In: Karagiannis D., Lee M., Hinkelmann K., Utz W. (eds) Domain-Specific Conceptual Modeling. Springer, Cham. https://doi.org/10.1007/978-3-030-93547-4_1

WORKSHOP SETTING: NEMO 2023



WHAT DO YOU NEED?

- 1. A methodology** (iterative modeling method engineering process)
=> Agile Modelling Method Engineering (Karagiannis, 2015*)
- 2. A platform** (for agile prototyping & deployment) and **experimentation space**
=> ADOxx (adoxx.org) + OMiLAB Digital Innovation Environment
- 3. A community** (users, feedback, requirements)
=> OMiLAB + NEMO Summer School series (omilab.org)

* Karagiannis, D. (2015) Agile Modeling Method Engineering, Proceedings of PCI 2015, ACM, pp. 5

THANK YOU FOR YOUR ATTENTION!
QUESTIONS?

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