OMiLAB-Node Vienna at the Research Group Knowledge Engineering, University of Vienna

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Abstract: This paper presents the OMiLAB-Node Vienna, which supports the educational and research activities undertaken by the Research Group Knowledge Engineering at the University of Vienna, the Node's host. The OMiLAB Vienna Node is part of a larger community which is presented subsequently. Last but not least the OMiLAB community's relevance for the EMISA Special Interest Group is discussed.

Keywords: OMiLAB, open models, domain-specific conceptual modeling, Agile Modeling Method Engineering, digital product design

1   General Orientation

The advent of the Digital Age, wherein the physical and digital converge visibly requires concepts, methods and tools where advanced information systems support emerging and evolving ecosystems. The Research Group Knowledge Engineering focuses on establishing appropriate research approaches as well as enabling the creation of the corresponding artefacts within design-oriented information systems engineering [Ös01]. As such the Agile Modelling Method Engineering (AMME) Framework [Ka15] prescribes an iterative conceptualization lifecycle, which can be applied to create modelling methods [KK02] and tools. AMME considers, amongst others, the requirement of agility, i.e. the idea that nowadays modelling methods might be required to be responsive to emergent or evolving needs for extension, adaptation, hybridization or generally customization [Bo19]. One example domain with such requirements is described in [Hi16]. These circumstances require not only suitable scientific concepts but also appropriate advanced laboratories with experimental spaces, which allow the iterative design, development and deployment of modelling languages.

2   OMiLAB-Node Vienna

The OMiLAB Node Vienna is such an advanced laboratory. Similarly to the other Nodes of the OMiLAB community, it is equipped both with the physical and virtual lab facilities for the conceptualization, development and deployment of modelling methods, tools and the models designed with them.

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The physical lab identifies three different sections – the Creative-, the Evaluation- and the Engineering Space-, whose results and artefacts flow seamlessly together. The Creative Spaces focuses on collaboration and communication for the OMiLAB-Node activities, while the Engineering Space is dedicated to the design/development/extension/adaptation and deployment of soft- and hardware in the OMiLAB-Node.

In the case of the OMiLAB-Node Vienna, the Evaluation Space (cf. Fig. 1) affords the infrastructure and facilities to carry out experiments in relation to the conceptualization and deployment of modelling methods/tools or models and Cyber-Physical Systems. Instances may address for example application domains like Knowledge-based Robotics [WK19] or Smart Environments. It builds on the aforementioned theoretical concepts of AMME [Ka15] and the Generic Modelling Method Framework [KK02].

Each experimentation space is designed in a three-layered architecture. On the top level use cases from the Application Domain (represented through the Business Layer) provide requirements for modelling methods and models to be refined and then modelled on the middle level, i.e. the Conceptual Modelling Layer. On the technology deployment level, i.e. the Proof-of-Concept Layer, technology-specific constructs must be mapped to modelling concepts, possibly imposing constraints and the need for interoperability between the modelling and the run-time environment [Bo19].
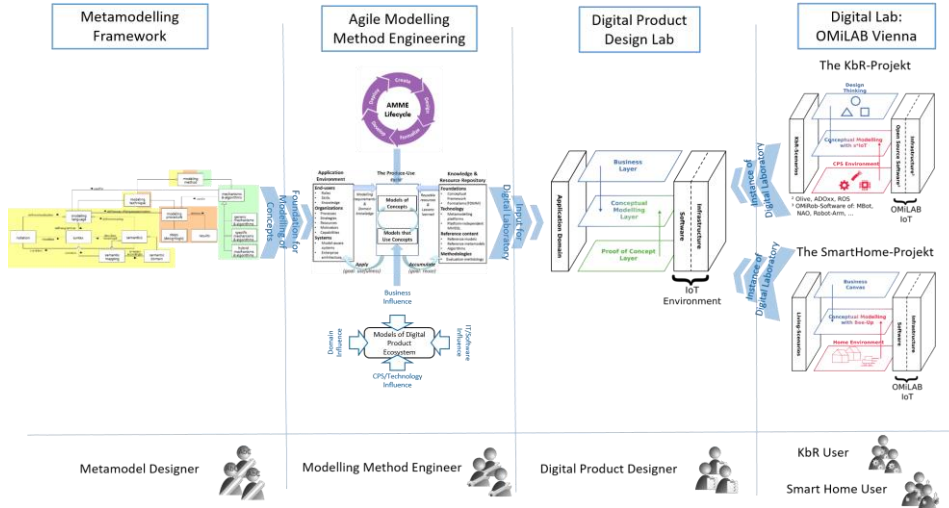

Fig. 1: The OMiLAB Node Vienna: Digital Product Design Framework

The Evaluation Space is used both during the research and educational process of the Research Group. For instance students at graduate level, work within the evaluation space, to define their own modelling methods for domains as different as Smart Cities [Bo16], Cyber-Physical Systems [WK19], and Enterprise Modelling [Sa18] and execute

corresponding experiments. Research projects like DIGITRANS[2] use the OMiLAB-Node Vienna to implement a modelling tool prototype and disseminate the results for exploitation to the community.

The virtual lab facilities replicate the functionalities of the physical lab and add services to them. As such a virtual space can be set-up to execute, document and share experiments, a project space for individual or (student) group-based projects can be created, and access to tools and development services as well as remote access to the CPS-environment in the physical lab is possible.

The virtual lab is also one of the interaction points for the physical lab with the OMiLAB community. Others include activities like publications, events, and common projects.

3   OMiLAB

The concept of OMiLAB was inspired by the open source movement and motivated by the belief that the conceptual modelling community has yet to harness it collaborative innovation potential. Hence, OMiLAB functions as an open community and resource repository, by orchestrating various enablers that deploy together a conceptualization and operationalization process for modelling methods [Bo19]. The community follows a user-driven approach in its understanding of the term "model"; it recognizes that there are useful models in widely different domains and functional areas of enterprises. As such the concept of an OMiLAB-Node can be applied to any domain and application that derives value from conceptual models as OMiLAB is open to all applications and domains.

Organisationally OMiLAB is composed of a network of individual OMiLAB-Nodes – similar to the one presented in Chapter 2. A non-profit organisation, located in Berlin (Germany), provides administrative and organisational support to the community.

OMiLAB's audience is a multi-disciplinary community comprising multiple roles, each bringing its requirements or expertise for common benefits, e.g.:
- experts from different domains, who want to be supported by conceptual modelling methods and tools
- modelling method engineers who need to consult domain expertise in order to understand the requirements and semantics of a specific domain
- modellers seeking agile modelling tools whose degree of domain-specificity may be customized for different goals
- scientists who need an experimentation setup that involves models, either as a means to an end or as an artefact under study [GMS16]

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[2] DIGITRANS Project, http://www.interreg-danube.eu/approved-projects/digitrans

Collaboration between the different user roles and OMiLAB-Nodes is enacted in different activities, which are either (1) educational, (2) research- or innovation-oriented, or (3) community-oriented in nature. Some sample activities are presented hereinafter.

a)   Modelling tools for education: Bee-Up[3]

Bee-Up is an implementation of a hybrid modelling method which incorporates and extends the following modelling languages: Business Process Modelling Notation (BPMN), Event-driven Process Chains (EPC), Entity-Relationship Diagrams (ER), the Unified Modelling Language (UML) and Petri-Nets [Ka16].

Bee-Up is a ready-to use open educational tool, implemented on the ADOxx® meta-modelling platform. It enables model design, processing (e.g. simulation, semantic transformation and SQL-code generation) and settings for the application of models together with Cyber-Physical Systems.

b)   Collaboration Project: The DigiFoF Example

The Erasmus+ Knowledge Alliance project "DigiFoF: Digital Design Skills for Factories of the Future" applies concepts and methods from different disciplines to provide a holistic education on Factory of the Future (FoF) design for students and professionals. 5 OMiLAB-Nodes, customized for FoF needs, will be created in Romania, France, Italy, Poland and Finland. These quasi-industrial spaces will aid trainees to develop creativity and knowledge suitable for digital workplace requirements by giving them access to state-of-the-art design tools as well as open-source platforms and communities.

c)   The NEMO Summer School[4]

NEMO stands for "Next-Generation Enterprise Modelling". It is an intensive short programme which takes place yearly since 2014 and which has established an international academic collaboration forum. Students have the unique opportunity to interact with a large number of professors addressing different foci of enterprise modelling, while the community has a meeting place to share experiences and discuss future collaboration opportunities.

4   Relevance for the EMISA Special Interest Group

Both the activities as well as the OMiLAB-Node infrastructures contribute to the development of modelling methods and models for enterprises. They enable academics

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[3] Bee-Up Tool: http://austria.omilab.org/psm/content/bee-up/info?view=home
[4] NEMO Summer School: http://nemo.omilab.org/nemo/

and researchers to address the societal challenge of Digital Transformation with regard to conceptual models and their use in and for information systems.

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