Next Generation Enterprise Modelling in the Age of Internet of Things

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4th Edition in the NEMO Summer School Series

NEXT GENERATION ENTERPRISE MODELLING
IN THE AGE OF INTERNET OF THINGS

July 17th – July 28th 2017 - University of Vienna, Austria

http://nemo.omilab.org/

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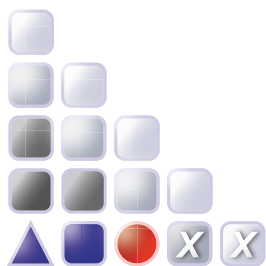
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Welcome

The "Next Generation Enterprise Modelling" (NEMO) Summer School welcomes you to its 4th Edition, hosted by the University of Vienna.

As in the previous editions, this year's summer school will bring together a wide international community of academics and students with interests in various aspects of modelling. Since in today's enterprises modelling methods are widely used on every level and for numerous purposes, NEMO 2017 will cover different domains and approaches of modelling, addressing especially:

- Foundations of Conceptual Modelling, e.g. formal methods and tools for the creation, transformation, and application of modelling methods.

- Technologies for Conceptual Modelling, e.g. model execution technologies, meta-modelling platforms, model compilers, adaption to diverse devices and multi-client applications.

- Application Domains, e.g. Enterprise Information Systems, e-Government, and Ambient Assisted Living.

- Cross-cutting Issues, e.g. information security, privacy, risk management and governance, and quality assurance of models and methods.

Participating students have the opportunity to acquire knowledge by listening to more than 40 speakers from all over the world, covering current topical developments. And in order to consolidate it, practical courses will take place. There, students will develop prototyping solutions to different kinds of problems and will discuss issues encountered in enterprises and practice. But to form a community, common experiences to bond are needed as well. Different cultural activities and social events will assure the start of a closely linked international community of young specialists.

We would like to thank all the speakers and their teams, who supported us with their commitment and work along the way in order to create this event.

The summer school could not have been realized without the work of the organisational team at the Research Group Knowledge Engineering and the support of the Faculty of Computer Science at the University of Vienna.

And last but not least we would like to thank Erasmus+ and the Austrian National Agency for Lifelong Learning, who supported our endeavor with European Commission funds. Our special thanks go to Mr. Gerhard Volz and Mrs. Sabine Müller, who provided us with guidance and support during the project implementation.

We hope that you all will have an extraordinary time, learning and enjoying your time at the NEMO Summer School.

Dimitris Karagiannis

Heinrich C. Mayr

Vienna and Klagenfurt, June 2017

Open Models Laboratory
University of Vienna

The Open Models Laboratory (OMiLAB) is a dedicated research and experimentation space for modelling method engineering. Both a physical and virtual place, it is equipped with tools to explore method creation and design, experiment with method engineering and deploy software tools for modelling.

Open to all those interested, the laboratory is a platform where all participants can bring in ideas related to modelling and engage in the exploration process.

The lab follows a user-driven approach in its understanding of the term „model". Experts and novices are equally invited to contribute and extract knowledge. The lab's idea is to act as a facilitator to the development and application of scientific methods to communities who value models, and implicitly modelling methods. Users are not limited to certain domains or functional areas of organisations. There are useful models in widely different domains like information technology, biology, chemistry, or medicine as well as various models for functional areas like procurement, marketing, logistics or engineering.

As the construction of modelling methods is a complex task, the OMiLAB introduces the OMiLAB Lifecycle which uses the "Conceptualization Process" as a framework for developing modelling methods. Starting with the "Creation" step and ranging until the "Deployment" of the modelling method as an IT-tool, the laboratory provides the conceptual steps, the collaborative environment and the necessary working resources. For the "Design", "Formalization" and "Development" steps the OMiLAB makes an open use of the ADOxx meta-modelling platform. Such a platform allows the use of concepts that support the modelling method engineering process (e.g. patterns, DSML) and formalisms which favour the re-use/evolution/variants of modelling methods. It also grants openness to other tools and open source add-ons.

The main vision carrying the idea of the OMiLAB is: Models for Everyone!
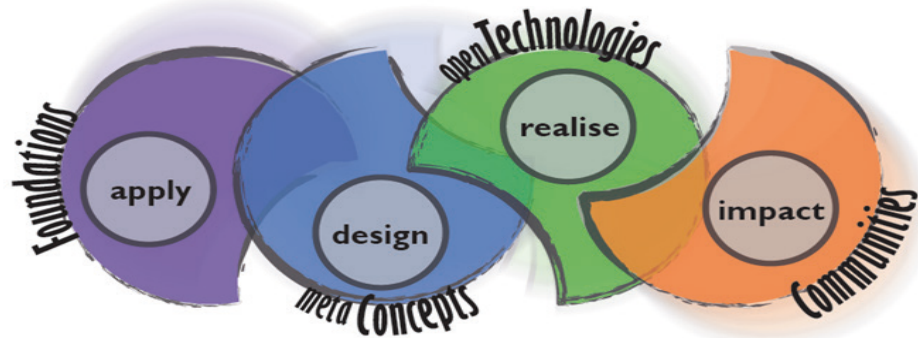
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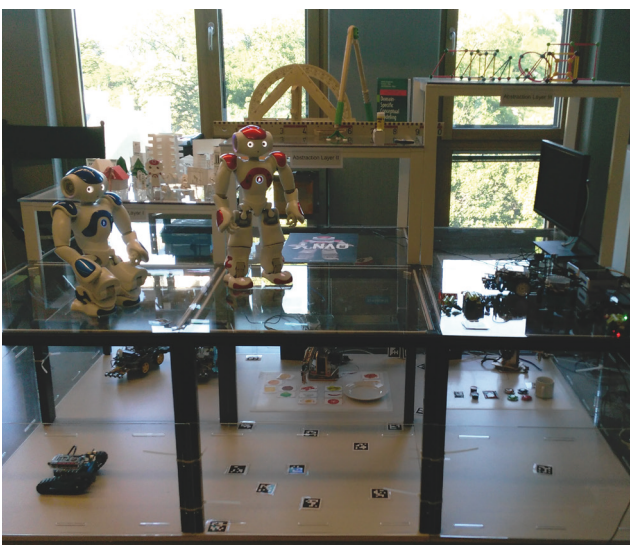
The lab promotes openness of community projects and encourages communities
to share their projects to the extent feasible.

Research Group Knowledge Engineering

University of Vienna

To provide transparent, ubiquitous knowledge that can be semantically processed by IT systems is the main research goal of the Research Group Knowledge Engineering. The group develops concepts for modelling languages and methods as well as step models and realizes concrete models. The contributions herewith advert to the research paradigm of design science in business informatics. Thereby realized results are deployed primarily within the research field of modelling methods and find their applicability in the form of information systems in the economy.

According to the development plan of the University of Vienna and the Faculty of Computer Science the scientific work of the research group is associated to the overall defined research focus "Knowledge-based Methods and Technologies for Digitalisation". Within this core area the work accomplished by the group provides novel research results in the areas of Meta-Modelling, Semantic Technologies, Hybrid Method Engineering and Intelligent and Agile Agents.

Based on mathematical and statistical foundations, theoretical approaches are adapted and applied. The fundamental research paradigm relies on concepts of meta-modelling that are further developed and deployed to derive knowledge out of (un)structured data on the one side and to provide transparent knowledge with formal and semi-formal modelling methods on the other side. The developed meta-models are realized with open

technologies in form of web based user and context specific applications and made available to the community.

In order to promote the exchange in regards to content and technological advancements in the method engineering community, the group has established the Open Model Laboratory. The dissemination of established know how, the exploitation of recent research results and their further development assure a sustainable impact on the community. The strategic goal of the initiative is to offer modelling methods and their applications freely available for subject matter experts. Technologically the Open Models Laboratory is supported by the ADOxx Platform, that provides open interaction and discussion for its users, as well as the exchange and advancements of modelling methods (www.omilab.org).

In the context of international cooperation the group provides research-guided teaching on an advanced scientific level with practical relevance mainly in the area of business informatics.

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The Application Engineering Institute

Alpen-Adria-Universität Klagenfurt

We are committed to human-centred informatics: our research and teaching activities address the design, architecture and implementation of human-centred application systems. We conduct both, fundamental and applied/experimental research with an emphasis on modelling, machine learning, and quality. Currently, we are working at research projects in the areas of Active and Assisted Living (AAL), Quality Management, and fundamentals of Conceptual Modeling.
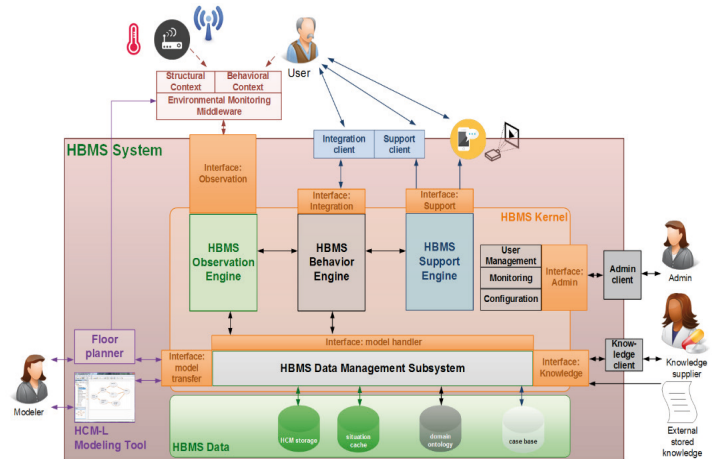
AAL research aims at IT methods that enable people to live as autonomously and for long as possible in their domestic environment. In our project HBMS (Human Behavior Monitoring and Support) we use conceptual modelling and machine learning for deriving an individual cognitive model from the observed behaviour of a particular person. For that purpose, the Human Cognitive Modeling Language HCM-L has been developed, and underpinned by a tool using the meta-modelling platform ADOxx®. In the productive support phase, reasoning procedures exploit a person's HCM-L model for deriving the best-suited ambient support when needed. Thus, the HBMS system is to support persons based on their own prior episodic knowledge.
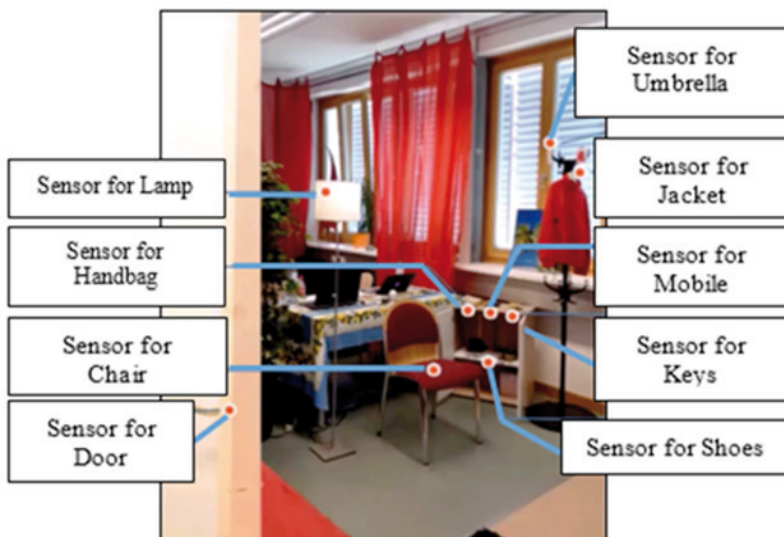
Models are the fundamental human instruments for managing complexity and understanding. As such they play a key role in any scientific and engineering discipline as well as in everyday life. This in particular is true for Informatics, which is a modeling discipline per se, and since long tries to systematize the realm of modeling by (1) clarifying the hierarchy of model layers like e.g. in MOF (meta object framework), (2) introducing ontological commitments into model hierarchies for a better semantical grounding, (3) harmonizing various modeling approaches to unified/universal ones, and (4) providing a framework for a sys-tematic domain specific modeling method (DSMM) design where universal approaches fail. We currently are focusing on (4).

Contact

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SOCIAL Events

The NEMO Summer School comes with a programme chock-full of lectures and working group sessions: the participants, students and lecturers thus will experience two intensive weeks of insights into the present state of research, theory and practice of modelling.

However, this is only one side of the coin: the other side is the opportunity to meet student colleagues and renowned professors from all over the world, to discuss with them, to exchange ideas, to learn from each other, and to make new friends - all that in the beautiful and exciting capital of Austria, Vienna.

A couple of social events and excursions will be offered, for example:

- a guided tour of the University of Vienna, a 650 years old university with remarkable history and architecture
- an exciting and challenging day in Prater, the oldest amusement park in the world with lunch at Schweizerhaus, a renowned beer garden and restaurant offering delicious traditional specialties

Detailed information will be provided at the summer school.

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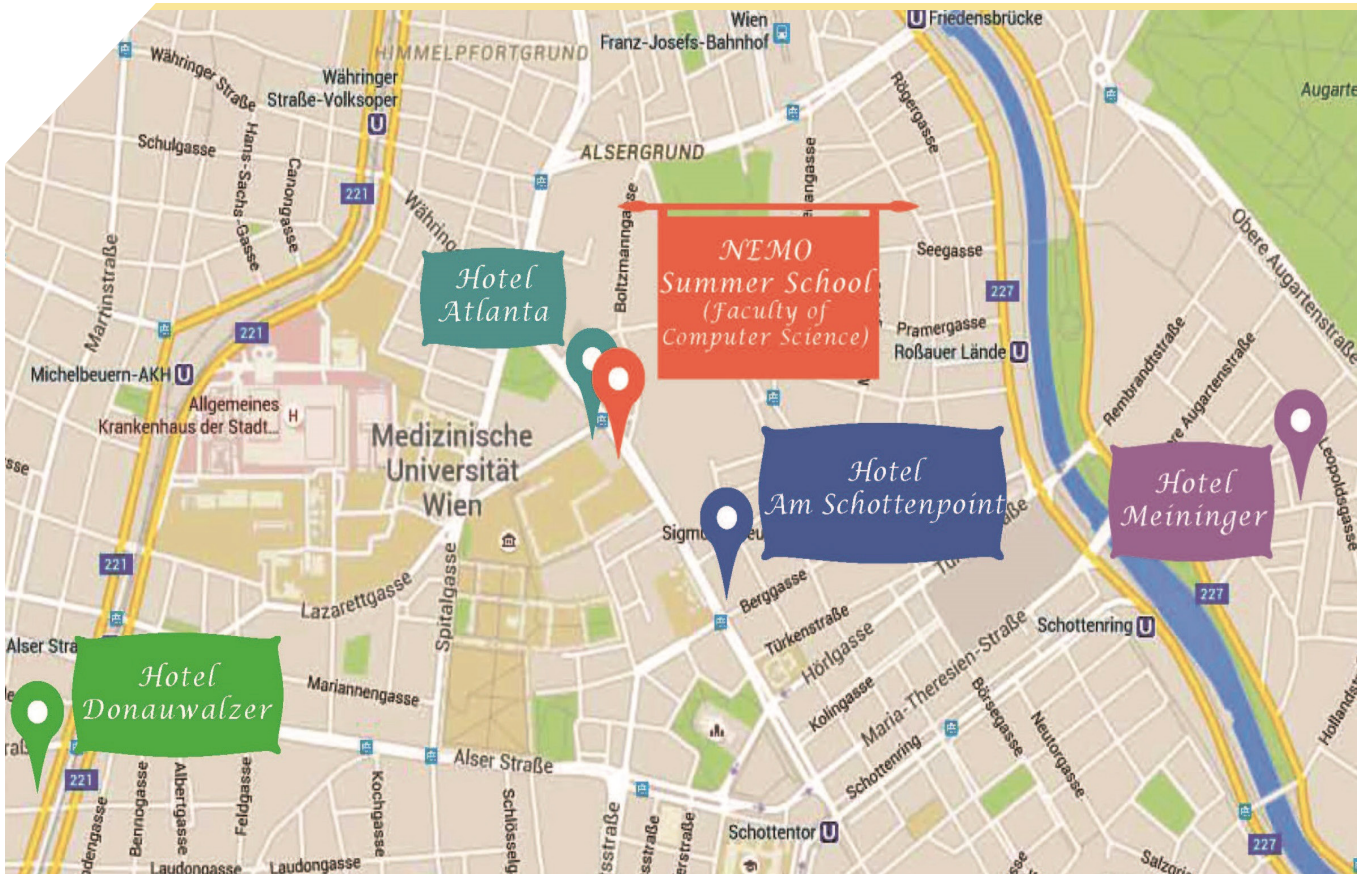
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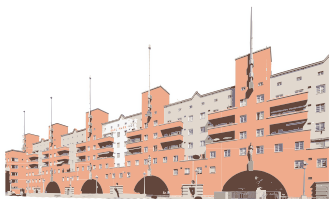
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Lectures in HS 1
Streaming in PC1
Coffee Break in the Basement Lobby

1st Floor & 2nd Floor:

Working-Groups in:
PC2, PC3, PC5, PC6

Ground Floor:

Registration

4th Floor:

Organisation Team
OMiLAB

LECTURE

DESCRIPTIONS

Overview

Lectures

Overview

Lectures (continued)

Exercises with ADOxx

FOUNDATIONS AND PRINCIPLES OF CONCEPTUAL MODELLING

Prof. Dr. Wolfgang Reisig, Humboldt-Universität zu Berlin, Germany

ABSTRACT

BIO

The basic notions of the NEMO summer school include the terms of enterprise modelling, modelling methods, etc. We start with some general observations about those notions and their role in (business) informatics. The second part of this contribution is dedicated to foundations of conceptual modelling. Here we pose the question of what the very basics of (discrete) models are, and how a systematic setting of modeling techniques, in particular for enterprise models, may be achieved. A business process is usually composed of workflow. A reasonable workflow is sound: a sound workflow can always reach its terminal state, and upon termination, no "garbage" remains. We present methods to adequately model and analyze workflows, in particular a most liberal composition operator for workflows that preserves soundness (i.e. composition of two sound workflows is a sound workflow again). This allows to stay in the world of sound workflows during the construction of large workflows and business processes.

Wolfgang Reisig is a full professor at the Computer Science Institute of Humboldt-Universität zu Berlin, Germany. Prof. Reisig is the speaker of the PhD school Service-oriented Architectures for the Integration of Software-based Processes, exemplified by Health Care Systems and Medical Technology (SOAMED). Prof. Reisig is a member of the European Academy of Sciences, Academia Europaea. He published and edited numerous books and articles on Petri Net Theory and Applications. He is a Member of the Petri Net Conference Steering Committee since 1982 and a co-editor of the journal „Software and Systems Modeling".

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AGILE MODELLING METHOD ENGINEERING AMME

Prof. Dr. Dimitris Karagiannis, University of Vienna, Austria

BIO

Dimitris Karagiannis is head of the Research Group Knowledge Engineering at the University of Vienna. His main research interests include knowledge management, modelling methods and meta-modelling. Besides his engagement in national and EU-funded research projects Dimitris Karagiannis is the author of research papers and books on Knowledge Databases, Business Process Management, Workflow-Systems and Knowledge Management. He serves as expert in various international conferences and is on the editorial board of several international journals. He is member of IEEE and ACM and on the Special Interest Group on IT Governance of the Austrian Computer Society. He is the founder of the Open Models Laboratory, www.omilab.org.

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ABSTRACT

As the paradigm of enterprise modelling originally envisioned, a hybridization of modelling approaches is needed in order to cover the multiple facets of a business view, its context and requirements for different types of resources - including IT services and infrastructure. The "modelling method framework" [Karagiannis/Kühn, 2002] establishes key building blocks to enable the required hybrid modelling and to increase the value of models beyond their traditional functions. As the importance of Next Generation Enterprise Modelling in the age of the Internet of Things, Industry 4.0, Industrial 3-D printing etc. increases, new modelling capabilities, semantically enriched design concepts and adapted operational functionality must satisfy evolving needs, in order to successfully manage not only the transformation in the digital enterprise stage, but also the adaptation and extension of existing services. In this context, the foundations of a „conceptual-model"-awareness approach for next generation enterprise information systems will be presented. This novel approach makes use of semantic networks to extend model-awareness towards arbitrary types of models that are developed for specialized communities aiming for domain-specificity in their modelling language, therefore favoring productivity at the expense of reusability across domains. Two categories of models are employed in this context: (1) Models of Concepts and (2) Models that use Concepts. The hereby introduced life cycle of Agile Modeling Method Engineering - AMME [PCI2015] aims to apply the principle of agility established in Software Engineering to the practice of Modelling Method Engineering. The main assumption is that a modelling method may evolve iteratively based on changing modelling requirements and feedback loops. Within the context of AMME, a full methodological approach is established by the OMiLAB (http://www.omilab.org), with a life cycle encompassing five phases: (1) create, (2) design, (3) formalize, (4), develop and (5) deploy/validate. The approach is supported, in its fast prototyping stage, by the metamodeling domain-specific language MM-DSL and the meta-modelling platform ADOxx (http://www.adoxx.org).

JAPANESE CREATIVE SERVICE AS A NEXT GENERATION ENTERPRISE MODELLING

Prof. Dr. Yoshinori Hara, Kyoto University, Japan
Dr. Hisashi Masuda, Japan Advanced Institute of Science and Technology, Japan

ABSTRACT

We define Japanese creative services and discuss how they have been sustained successfully and their application to global service enhancement. There are many ``Shinise" (shops of long standing) service companies in Japan that are quite unique compared to the companies located in any other geographical region. They typically have anecdotal values based on nature and seasons, various types of culture, histories, and/or lifestyles. Several Japanese creative services are expanding their activities toward global markets. We explain the mechanisms of the sustainability and scalability of advanced cases of Japanese Creative Services. A key aspect of the mechanism is the communication between service providers and consumers based on sharing/interpreting/utilizing of tacit context in a community. For analyzing the key aspect, we propose the combined approach of sociology/anthropology, psychology, engineering and design thinking. We developed a meta-modeling platform for handling the combined analysis of the Japanese Creative Services. We believe that this kind of approach will contribute to creating new values within the field of service science and for value-added global services.

BIO

Dr. Yoshinori Hara serves as professor at the Graduate School of Management, Kyoto University. His current research focus includes innovation management, service and design management, and open innovation with IT frameworks. Prior to joining Kyoto University, he held various research and key management positions at R&D organizations in NEC Corporation. He was responsible for conducting research and development on advanced ubiquitous computing including Web/Hypermedia systems, embedded systems, adaptive user interfaces, advanced information retrieval technologies. From 1990 to 1991, he was a Visiting Researcher at the Department of Computer Science, Stanford University. He received his B.E. and M.E. from University of Tokyo, and his Ph.D. from Kyoto University.

Dr. Hisashi Masuda serves as assistant professor at the School of Knowledge Science, JAIST. He received his B.S. from Chiba University in 2008, his MBA and his Ph.D. from Kyoto University in 2010 and in 2013. His research focuses on service engineering, applied microeconomics, and knowledge engineering. Some of his publications are: (1) H. Masuda and W. Utz, "The Development of Web Questionnaire with Business Process Modeling for Service Evaluation", The Second Asian Conf. on Information Systems (ACIS), 2013, (2) H. Masuda and Y. Hara, "Using Value-in-Use: A Dynamic Model for Value-in-Exchange and Value-in-Use", 1st Int. Conf. on Human Side of Service Engineering (HSSE) pp. 5972-5980, 2012.

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BUILDING ONTOLOGIES FOR INDUSTRIAL APPLICATIONS

Prof. Dr. Dimitris Kiritsis, École polytechnique fédérale de Lausanne, Switzerland

BIO

Prof. Dr. Dimitris Kiritsis is Faculty Member at the Institute of Mechanical Engineering of the School of Engineering of EPFL, Switzerland, where he is leading a research group on ICT for Sustainable Manufacturing. He served also as Guest Professor at the Intelligent Maintenance Systems Center of the University of Cincinnati, and Invited Professor at the University of Technology of Compiègne, the University of Technology of Belfort-Montbéliard and at ParisTech ENSAM Paris. Prof. Kiritsis is actively involved in EU research programs in the area of Factories of the Future and Enabling ICT for Sustainable Manufacturing. He has more than 180 publications. He is founding fellow member of the International Society for Engineering Asset Management (ISEAM) and of various international scientific communities in his area of interests including EFFRA. Since September 2013 Dimitris is Chair of IFIP WG5.7 – Advanced Production Management Systems and member of the Advisory Group of the European Council on Leadership on Enabling Industrial Technologies – AG LEIT-NMBP.

ABSTRACT

Ontologies and associated semantic technologies are rapidly becoming popular in various research fields. There is a tendency both in converting existing models into ontology-based models, and in creating new ontology-based models from scratch. The aim of this talk is to present the advantages and features provided by the ontologies towards achieving Closed-Loop Lifecycle Management or product-process systems. The essentials of building ontologies for Product Life Cycle (PLC) applications following the BFO (Basic Formal Ontology) principles will be presented together with examples of using ontologies in industrial cases.

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CAPABILITY-ORIENTED ENTERPRISE MODELLING FOR ENABLING CONGRUENT BUSINESS AND INFORMATION SYSTEMS ENGINEERING

Prof. Dr. Jelena Zdravkovic, Stockholm University, Sweden

ABSTRACT

A significant objective of today's enterprise Information Systems (IS) is to be congruent with the business environments which they are meant to support. A major concern is how Information Systems can successfully adapt to support frequent variations in business conditions originating, for instance, from changes in customers' demand, environmental aspects, regulations, and many others. The need for enterprises to operate in changing environments has been addressed by proposing a capability-oriented approach that integrates organizational development with IS development taking into account changes in the application context of the solution. It requires a number of organizational concepts to be modelled, such as business goals, processes, resources, Key Performance Indicators (KPIs), as well as the parameters for describing business environmental contexts for organizations capabilities. In the lecture, I intend to outline the capability-oriented approach for supporting model-driven organisations, as well as to present the current experiences of developing capability-oriented enterprise models in industrial cases.

BIO

Jelena Zdravkovic is the head of the Information Systems unit of the Department of Computer and Systems Sciences at Stockholm University. She has PhD in Computer and Systems Sciences at Royal Institute of Technology (KTH) from 2006, as well as the MBA in E-commerce. Jelena has published more than 80 refereed papers in international conferences and scientific journals on the topics of enterprise modeling, business/IT alignment and requirements engineering. She has participated in several national and international projects on the interoperability, service modeling, and model-driven engineering. In her department Jelena is the head of the study program „Enterprise Systems and Service Design", and the main responsible for the subjects Requirements Engineering and System Integration. She is in the Editorial Board of Springer BISE and RE Journals, as well as a regular reviewer for a number of other international journals including several of Springer, Elsevier's Journal of Systems and Software and Information & Software Technology Journal, as well as IEEE Computing Journal. Jelena has organized a number of international conferences and workshops in the IS Engineering discipline, and she serves in the program committees of many of them.

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AN INTRODUCTION TO MULTI-PERSPECTIVE ENTERPRISE MODELLING AND THE MEMO4ADO MODELLING ENVIRONMENT

Prof. Dr. Ulrich Frank, University of Duisburg-Essen, Germany

BIO

Ulrich Frank holds the chair of Information Systems and Enterprise Modelling at the Institute of Computer Science and Business Information Systems at the University of Duisburg-Essen. His main research topic is enterprise modelling. "Multi-Perspective Enterprise Modelling" (MEMO), a method for enterprise modelling that was developed under his supervision is among the most elaborate methods available today. In recent years, he focused especially on multilevel DSMLs and corresponding tools. Further areas of research include method engineering, models at run time, methods for IT management and research methods. Together with Tony Clark from Sheffield University, he conducts the project "Language Engineering for Multilevel Modeling" (LE4MM). The project aims at further developing an integrated meta-modeling and meta-programming environment and, based on that, at the development of new self-referential enterprise systems that integrate enterprise software with conceptual models of themselves and the context they operate in at run time. Ulrich Frank is on the editorial board of the journals "Enterprise Modelling and Information Systems Architectures", "Business & Information Systems Engineering", "Software and Systems Modeling", "Information Systems and E-Business Management", and the "Journal of Information System Modeling and Design". He has been actively involved in numerous conferences and various major research projects. He had assignments as visiting researcher/professor in various countries. Ulrich Frank was the spokesman of the German Business Informatics Community within the German Informatics Society. He is a review board member of the German National Science Foundation and the founding director of the international student exchange network IS:link.

ABSTRACT

In most industries, IT has become the backbone of the business. Therefore, the ability to conjointly analyze and design the action system of an enterprise and its information system has become a pivotal success factor or even a prerequisite for survival. Enterprise modelling aims at supporting organizations with this task. An enterprise model integrates models of the actions system (such as goal models or business process models) with models of the information system. This lecture gives an introduction to MEMO, a method for multi-perspective enterprise modelling. MEMO includes a high level framework of the enterprise together with a set of integrated domain-specific modelling languages. Among others, MEMO provides DSMLs for modelling organizational structures and processes, for goal modelling, and for modelling IT infrastructures. The introduction will include an overview of core languages and an outline of a method to use them for certain purposes. In addition, it is demonstrated how a modelling environment supports the construction and analysis of enterprise models. The participants are encouraged to use the tool, MEMO4ADO, which is available in the Open Models Laboratory.

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MODELING AND VERIFICATION FOR SYSTEM OF SYSTEMS

Prof. Dr. Doo-Hwan Bae, Korea Advanced Institute of Science and Technology, Korea

ABSTRACT

As software systems are used widely in every corner of our society, each software system to be developed and maintained gets larger and more complex than ever. Developing such software systems in a timely and cost-effective manner requires more careful analysis and modeling effort in order to reduce the total software life cycle cost. In addition to developing and maintaining such software systems, those large and complex systems developed separately need to be connected and work together to satisfy a common goal. We call such a system as System of Systems(SoS). A SoS consists of constituent systems, each of which is developed separately, but connected together to become a larger and more complex system. Some SoS examples are unmanned vehicles, military defense systems, health care systems, etc. In this talk, we would like to share with the audience, the concept of the SoS, its characteristics, and modeling and verification issues for it. Depending on the type of the SoS, we try to model behavior of each and verify whether each can achieve the SoS goal quantitatively. We also introduce an attempt to model selfishness of each constituent system which abstracts behaviors of systems and verify the SoS level goal achievement.

BIO

Doo-Hwan Bae is a Professor, in the School of Computing, KAIST, South Korea. He had served as the Head of the School of Computing from 2012 to 2016. Now he is leading Software Engineering group at KAIST. He received his BS degree in the Seoul National University, Korea in 1980 and his Ph.D. degree in Computer and Information Sciences in the University of Florida in 1992. Since 1995, he has been with the School of Computing (formerly Department of Computer Science until 2014), KAIST. His research interests include software modeling and analysis, process improvement, and quality-driven software development. Since 2002, he has directed the ITRC (Information Technology Research Center) Software Process Improvement Center, sponsored by the Korean Ministry of Economy Knowledge. Recently, he has been awarded with a "Star Lab", a multi-year research project on Modeling and Verification of System of Systems, sponsored by the Ministry of Science, ICT, and Future Planning. He published over 150 journal and conference papers in Software Engineering. Now, he is serving as an Area Editor in the Journal of Systems and Software, and a General Co-Chair of ICSE2020 in Seoul, Korea.

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METHOD ENGINEERING FOR DESIGN, ENGINEERING AND MANAGEMENT

Prof. Dr. Robert Winter, University of St. Gallen, Switzerland

BIO

Robert Winter is full Professor of Business & Information Systems Engineering at the University of St. Gallen (HSG), Director of HSG's Institute of Information Management, founding Academic Director of HSG's Executive Master of Business Engineering programme, and Academic Director of HSG's Ph.D. in Management programme. He received Master degrees in business administration and business education as well as a doctorate in social sciences from Goethe University, Frankfurt, Germany. He was vice Editor-in-chief of the „Business & Information Systems Engineering" journal and currently serves as Senior Associate Editor of „European Journal of Information Systems" and member of the editorial boards of several journals including „Enterprise Modelling and Information Systems Architectures" and „MIS Quarterly Executive". His research interests include design science research methodology, enterprise architecture management, and the management of very large IT projects/programmes.

ABSTRACT

Method Engineering is one of the classical topics of information systems research. It is however often researched and applied only in the context of software development. From a broader (design science) perspective, Method Engineering deals with the systematic construction of generic and/or situated processes for designing, engineering and managing organizations and their supporting IT artifacts. From this perspective, Method Engineering will be revisited, and exemplary applications for Business Engineering and Enterprise Architecture Management will be presented.

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GROUNDED ENTERPRISE MODELLING

Prof. Dr. Erik Proper, Luxembourg Institute of Science and Technology, Luxembourg

ABSTRACT

Enterprise models are used to represent different aspects of / related-to an organisation / enterprise. Such enterprise models typically take the form of conceptual models expressed in terms of a more specialised, purpose specific, modelling language. For example, in terms of a goal modelling language, a value exchange modelling language, a business process modelling language, or an architecture modelling language, etc. In general, such modelling languages, force modellers to "reduce" the models to mere boxes-and-lines diagrams, where it is left to the names in / on the boxes to provide a linkage to semantically richness, and nuances, of the domain being modelled. In this lecture, we discuss the strategy to ground enterprise models in purpose / domain specific languages on top of a conceptual model expressed in a more generic domain modelling language, where the latter allows modellers to include richer verbalisations of the concepts and their relationships. This will be illustrated in terms of example models in the ArchiMate language, while grounding these on models expressed in the well known fact-based modelling language ORM.

BIO

Prof. Dr. Henderik A. Proper is Head of Academic Affairs of at the Luxembourg Institute of Science and Technology in Luxembourg, and senior research manager for Innovative Services department. He also holds a chair in Information Systems at the Radboud University Nijmegen. Furthermore, he chairs the Enterprise Engineering research network involving researchers from these two institutions. He is interested in the further development of the field of enterprise engineering, and enterprise modelling in particular. He has co-authored several journal papers, conference publications and books. His main research interests include enterprise architecture, systems theory, business/IT alignment and conceptual modelling. Erik received his Master's degree from the University of Nijmegen, The Netherlands in May 1990, and received his PhD (with distinction) from the same University in April 1994. In his Doctoral thesis he developed a theory for conceptual modelling of evolving application domains, yielding a formal specification of evolving information systems.

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MODEL-DRIVEN ENGINEERING FOR DATA INTENSIVE APPLICATIONS

Prof. Dr. Elisabetta di Nitto, Politecnico di Milano, Italy
Dr. Damian Tamburri, Politecnico di Milano, Italy

BIO

Elisabetta Di Nitto is a Full Professor at DEIB at Politecnico di Milano, where she also earned her Ph.D. in Computer Science. She is teaching Software Engineering for graduate students and Foundations of computer science for undergraduate students. Her current research interests are mainly on software engineering, and in particular, on process support systems, service-centric applications, dynamic software architectures, and self-adaptive systems. She was researcher at CEFRIEL and visiting professor at University of California. She has published and presented various papers on the most important international journals and conferences and is regularly serving in the program committee of various international conferences. She is the scientific director of the H2020 project DICE .

Dr. Damian Tamburri assumed the role of deputy WP leader of the DICE project, During his Post-Doc at Politecnico di Milano. Dr. Tamburri is currently writing a handbook on Qualitative Empirical Software Engineering and plans to expand his knowledge on quantitative methods. His research aims are to understand and support the social and organisational side of software engineering though empirical research, predicating on the equilibrium between qualitative and quantitative research in pursuit of causality.

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ABSTRACT

Big Data technologies have rapidly achieved widespread adoption for many reasons, e.g., thanks to the versatility with which they foster innovative products by direct analysis of various user contents (e.g., tweets, blogposts, likes, pictures, etc.). However, designing and developing Big Data applications is still a considerable problem since: (a) it involves many side-costs the time spent on learning about and designing with the many big data frameworks; (b) it requires to balance out infrastructural and corporate governance costs with (non-trivial) development and deployment costs; (c) it most likely requires additional costs for the various trial-and-error experiments needed to match desired performance. We argue that a relevant part of said costs can be saved by tackling the design, development and deployment of Data Intensive Applications (DIAs) with Model-Driven Engineering (MDE) framed into a DevOps process. The purpose of this course/presentation is to show how MDE and DevOps have been applied to the design of Data Intensive Applications and to identify new research areas and issues.

MODELLING FOR AMBIENT ASSISTANCE

Prof. Dr. Heinrich C. Mayr, Dr. Judith Michael, Suneth Ranasinghe
Alpen-Adria Universität Klagenfurt, Austria

ABSTRACT

Ambient Assistance is a growing field in ICT: Based on smart sensors, life video analysis techniques as well as speech recognition human centred assistance becomes feasible and affordable. The range of applications is broad and covers everyday situations in private and business environments as well as support for people with special needs. Consequently, Ambient Assistance is a challenging field for computer scientists, software engineers and information technicians in both, research and application, with lots of questions to answer and technical solutions to find. Dealing with the support of humans, it is an interdisciplinary field affecting Psychology, Neurology, Medicine, Law, Philosophy, and others more. Models play a key role in ambient assistance systems as they act as the integral means for data and knowledge acquisition, representation, evaluation and exchange for the various system components. We will start our lecture with a short overview of already existing best practice examples and then work out the key notions and concepts that form the basis for domain specific modelling in this field. Based here on, we will discuss the objectives, concepts and elements of the "Human Cognitive Modelling Language" HCM-L, which was developed in the "Human Behavior Monitoring and Support" project HBMS. Deeper insight will be gained in the afternoon Parallel Working Groups that are headed by members of the Application Engineering Research Group: Dr. Judith Michael and Suneth Ranasinghe MSc.

BIO

Heinrich C. Mayr has been a full professor of Informatics at Universität Klagenfurt since 1990, leading the Application Engineering Research Group. Until then he was an assistant professor at the University of Karlsruhe (today: KIT), visiting professor at several universities, and CEO of a German software company. His research is documented in over 200 publications and includes information system design methodologies, requirements and model engineering, and knowledge management. He has held, amongst other functions, that of President of the Gesellschaft für Informatik (GI). For 6 years he served as Rector of the University. Currently he is editor in chief of the "Lecture Notes in Informatics", vice-chair of the ER steering committee, chairperson of the council of the Software Internet Cluster SIC, and Member of the TC "Wirtschaftsinformatik" of the German Accreditation Organisation ASIIN.

Judith Michael received her doctorate in Informatics from the Universität Klagenfurt in 2014. From 2006 on, she has worked as a software engineer and consultant in IT-companies. Currently she is senior scientist at the Application Engineering Research Group, head of the Supervisory Board of Lakeside Science & Technology Park GmbH, and Junior Fellow of Gesellschaft für Informatik GI. Her research focuses on Conceptual Modelling, Knowledge Management, Model Driven Architecture, Human Centred Computing, and Active and Ambient Living.

Suneth Ranasinghe received his BSc from the University of Colombo (Sri Lanka) and his MSc in Software Engineering from the University of Hertfordshire (UK). Currently he works as a university assistant and PhD student at the Application Engineering Research Group. His research focuses on the integration of activity recognition systems into ambient assistance systems.

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STRATEGIC ENTERPRISE MODELING IN THE AGE OF DIGITAL DISRUPTION

Prof. Dr. Eric Yu, University of Toronto, Canada

BIO

Eric Yu is Professor at the University of Toronto, Canada. His research interests are in the areas of information systems modeling and design, requirements engineering, knowledge management, and software engineering. Books he has co-authored or co-edited include: Social Modeling for Requirements Engineering (MIT Press, 2011); Conceptual Modeling: Foundations and Applications (Springer, 2009); and Non-Functional Requirements in Software Engineering (Springer, 2000). He is co-editor for the MIT Press book series on Information Systems. He is an associate editor for the Int. Journal of Information Systems Modeling and Design, and serves on the editorial boards of the Int. J. of Agent Oriented Software Engineering, IET Software, and the Journal of Data Semantics. He was Program Co-chair for the 27th and 33rd Int. Conference on Conceptual Modeling (ER'08, ER'14).

ABSTRACT

The Internet of Things, together with a whole host of recent and emerging technologies such as big data analytics, social, mobile, and cloud, are creating disruptions in many organizations and even entire industries. Current enterprise modeling frameworks and techniques, conceived and developed for a more stable environment, will need to be extended to support analysis and design of the complex dynamics of today's increasingly fast-paced world. I will outline requirements for next-generation enterprise modeling in light of the digital transformations taking place across almost every sector, and will suggest possible paths ahead. The i* (iStar) strategic actors relationships modeling language will be briefly reviewed.

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Prof. Dr. Eric Yu

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time	Week 1 16 July	17 July	18 July
09:00 - 10:00		**Opening Ceremony** S. Rinderle-Ma S. Müller **NEMO Summer School Series** E. Miron	**Japanese Creative Service as a Next Generation Enterprise Modelling** Y. Hara, H. Masuda
10:00 - 11:00		**Foundations and Principles of Conceptual Modelling** W. Reisig	**Building Ontologies for Industrial Applications** D. Kiritsis
11:00 - 11:30		B R E A K	B
11:30 - 13:00		**Agile Modelling Method Engineering - AMME** D. Karagiannis	**Capability-oriented Enterprise Modelling for Enabling Congruent Business and Informations Systems Engineering** J. Zdravkovic
13:00 - 14:30		L U N C H	L
14:30 - 15:30		**Fundamental Conceptual Modelling Languages within the BEE-UP Tool** *Download: http://www.omilab.org/bee-up* E. Miron, P. Burzynski	**An Introduction to Multi-Perspective Enterprise Modelling and the MEMO4ADO Modelling Environment** U. Frank
15:30 - 16:00		B R E A K	B
16:00 - 17:30		**Modelling Method Conceptualisation based on ADOxx** D. Bork, V. Kunnummel	**Modeling and Verification for System of Systems** D.-H. Bae

ARRIVAL · PARTICIPANTS

time	Week 2 23 July	24 July	25 July
09:00 - 10:00		**From Model-Based to Model-Integrating Software** J. Ebert	**Modelling Knowledge Action and Time: Action Theories and their Application in Dynamic Uncertain Domains** D. Plexousakis, T. Patkos
10:00 - 11:00		**The Semantic Interoperability between Domain-Specific Conceptual Models and Ontologies** R. Buchmann, A.M. Ghiran	**The Industrial Transition towards PSS: Needs and Advances in Enterprise Modelling and Engineering** X. Boucher, K. Medini
11:00 - 11:30		B R E A K	B
11:30 - 13:00		**Exercise with the ComVantage Tool** *Download: http://www.omilab.org/comvantage* R. Buchmann, A. M. Ghiran	**Exercise with the PSS Tool** *Download: http://www.omilab.org/pss* X. Boucher, K. Medini
13:00 - 14:30		L U N C H	L
14:30 - 15:30		**Process Modelling and Business Intelligence** W. Grossmann, C. Moser	**Security Requirements Engineering: A Modelling Perspective** H. Mouratidis
15:30 - 16:00		B R E A K	B
16:00 - 17:30		**Exercise with ADOxx** Metamodelling: A Smart City Case M. Walch	**Exercise with ADOxx** Metamodelling: A Smart City Case N. Tantouris

LEISURE · DAY

19 July	20 July	21 July	22 July
Method Engineering for Design, Engineering and Management R. Winter	**Strategic Enterprise Modelling in the Age of Digital Disruption** E. Yu	**Business Decision Models and their Relation with Process Models** J. Vanthienen	
Grounded Enterprise Modelling E. Proper	**Designing networked value constellations with e3value** J. Gordijn	**From Requirements to Code: Conceptual Model-based Software Design** O. Pastor	
B R E A K		B R E A K	
Model-Driven Engineering for Data Intensive Applications E. di Nitto, D. Tamburri	**Constraints between Modeling Perspectives** Download: http://www.omilab.org/semcheck M. Jeusfeld	**Domain Storytelling: A Modelling Approach for Business Processes** H. Züllighoven H. Breitling	
L U N C H		L U N C H	
Modelling for Ambient Assistance H.C. Mayr	**Modelling of Port Information Infrastructure Systems Security** C. Douligeris	**Software Copyright and Data Privacy: Brakes or Accelerators for the Digitalization?** L. Kerschhofer-Wallner	
B R E A K		B R E A K	
Exercise with the HCM-L Tool Download: http://www.omilab.org/hcml J. Michael, S. Ranasinghe	**Industrial Presentation** *HILTI*	**Semantic-based Modelling for Information Systems using the SeMFIS Platform** H.-G. Fill	

CULTURAL ACTIVITIES

26 July	27 July	28 July	29 July
Enterprise Modelling and Information Security M. Kirikova	**Domain Specific Modelling** M. Rossi	**STUDENT PRESENTATIONS**	
Mathematical Structures to Model Behavior Ontology for IoT M.K. Lee	**Collaborative and Well-Behaved Outdoor Robots in Harsh Environment** J. Röning	**STUDENT PRESENTATIONS**	
B R E A K		B R E A K	
Exercise with the SAVE Tool Download: http://www.omilab.org/save M. K. Lee	**Modelling Knowledge Work: Case Management and Decision-aware Business Processes** K. Hinkelmann	**STUDENT PRESENTATIONS**	
L U N C H		L U N C H	
Business Processes for Business Communities A. Oberweis	**Conceptual Modeling and Learning for Enterprise Big Data** K. Tanaka	**STUDENT PRESENTATIONS**	
B R E A K		B R E A K	
Exercise with the HORUS Tool Download: http://www.omilab.org/adoxx-horus A. Koschmider	**Exercise with ADOxx** Metamodelling: A Smart City Case B. Pittl	**Closing Ceremony** Awarding the Participation Certificates D. Karagiannis, H.-C. Mayr	

DEPARTURE PARTICIPANTS

DESIGNING NETWORKED VALUE CONSTELLATIONS WITH E3VALUE

Prof. Dr. Jaap Gordijn, VU University, The Netherlands

ABSTRACT

Many businesses are actually networks rather than single enterprises. Examples include Netflix, Spotity, and Cisco Systems. All these companies operate an eco system that as a whole satisfy complex customer needs. Usually, the customer itself is also part of the network, as the customer co-creates some of the economic value itself. All the mentioned examples have in common that they employ rather complex information technology to employ their services and products. With e3value, we propose a business design approach that is model-based, and therefore assumes the same way-of-working common for information system, with the purpose to close the gap between business and IT development. In this presentation, we introduce the e3value method, along with case studies from industry. In addition, we will focus on the notion of ‚value co-creation'; the idea that customers and suppliers jointly create economic value.

BIO

Jaap Gordijn is Associate Professor at VU Amsterdam, with an interest in business model development, and as such he is the founding father of the e3value methodology (www.e3value.com). He holds a Phd. degree from the VU Amsterdam and a MSc from the University of Tilburg. He (co)authored about 120 scientific papers in the field of business modelling. Gordijn also has significant industrial experience, as he worked for Cisco's Internet Business Solution Group and Deloitte&Touche.

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CONSTRAINTS BETWEEN MODELING PERSPECTIVES

Dr. Manfred Jeusfeld, University of Skövde, Sweden

BIO

Manfred Jeusfeld studied computer science from 1980 to 1986 at the University of Technology Aachen (RWTH), Germany. In 1992 he received his Doctoral degree in Natural Sciences from the University of Passau. In 1992 he returned to the RWTH Aachen as a senior researcher of the Information Systems Institute (Informatik V). He is the principal developer of the ConceptBase system (http://conceptbase.cc), which is now used by more than a thousand institutes and companies world-wide for designing information systems and meta-modeling. From 1997 to 2013, he was assistant professor in the department Information Management (IM) of the Tilburg University, The Netherlands. Since 2013 he is senior lecturer at the department of information technology, University of Skövde, Sweden. His research covers cooperative conceptual modeling, data warehouse quality management, metamodeling, method engineering, and repository systems. He is associate information director for ACM SIGMOD and the founder of CEUR Workshop Proceedings, a publication service for open-access proceedings of scientific workshops and conferences.

ABSTRACT

Enterprise models span all levels and perspectives of objects relevant to an enterprise, such as goal models, process models, data models, product models, network structures, interfaces, and so forth. Such models must be kept consistent with each other. The lecture proposes a constraint language that allows to formulate rules at an abstraction level that facilitates their automated re-use. We also discuss the mechanism that makes the elements of heterogeneous modeling languages related to each other and how we can use this view to plan the links between such modeling languages. The technique is applied to existing enterprise modeling approaches such as 4EM and Archimate to demonstrate the required effort. Practical examples and case studies use the ConceptBase metamodeling system.

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MODELLING OF PORT INFORMATION INFRASTRUCTURE SYSTEMS' SECURITY

Prof. Dr. Christos Douligeris, University of Piraeus, Greece

ABSTRACT

A Supply Chain Service is a complex network of interconnected business partners, including all the information, processes and assets required for the movement of goods and the performance of services. Maritime Logistics and Supply Chain Services (MLoSCs) are typical industry SCS examples. However, the smooth operation of an SCS could suffer from interruptions and delays due to a variety of reasons ranging from acknowledged business and financial factors to the exploitation of physical threats and/or cyber threats. Cyber threat exploitation results from the lack of implemented security controls, making the assets vulnerable to these threats. By visualizing the processes of a SCS, one can identify the assets involved and their relationships and could help the various SCS business partners to better analyze the threats and their cascading effects within the SCS, thus preventing security incidents and making the right decisions to protect the SCS assets and properly provision the expected services. This lecture introduces a process-centric approach for modelling security concepts in MLoSCs in order to improve Supply Chain sustainability. We focus on the MLoSC Vehicle Transport Service (VTS). We present as a demonstration scenario, a business-process oriented model, which is developed via the ADOxx platform using the BPMN 2.0 specification. In order to show how security issues can be visualized in a MLoSC environment we apply simulation techniques on the developed process models.

BIO

Christos Douligeris, currently a professor at the Department of Informatics, University of Piraeus, Greece held positions with the Department of Electrical and Computer Engineering at the University of Miami. He was an associate member of the Hellenic Authority for Information and Communication Assurance and Privacy and the President and CEO Hellenic Electronic Governance for Social Security SA. Dr. Douligeris has published extensively in the networking scientific literature and he has participated in many research and development projects. His recent involvement in EU funded research includes ImmigrationPolicy2.0 which addresses the issues of immigrants and their integration through ICT and CYSM, MEDUSA and MITIGATE which address the various aspects (including cyberterrorism) of security in Port information systems. His main research interests lie in the areas of communications, networking security, cybersecurity, immigration policies and the use of technology in all aspects of addressing immigration issues, web science, data analytics, and emergency response operations.

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HILTI
INDUSTRIAL PRESENTATION

Dr. Martin Petry, Hilti, Liechtenstein
Dr. Martin Nemetz, Hilti Asia IT, Malaysia

BIO

Dr. Martin Petry became Hilti's CIO in 2005. He is responsible for Hilti's 400 IT employees based in Switzerland, US and Malaysia. Since 2009 he is also in charge of Hilti's Business Excellence initiatives and EVP. Since 1993 Martin has held various leadership roles in Liechtenstein, Switzerland, Great Britain and Japan. He has developed Hilti's ground-breaking IT Strategy and has lead its implementation, in particular Hilti's standard global data structures and business processes supported by a global SAP system with ERP, BI, CRM and SCM which is now being used by 20,000 Hilti employees in more than 50 countries. Recently Martin has initiated various cloud computing / SaaS initiatives at Hilti and he has lead the development of the comprehensive Information Technology at Hilti strategy which is now the foundation of all digital and software initiatives in the Hilti group. Martin earned his PhD in applied mathematics from Georg-August University in Goettingen, Germany.

Dr. Martin Nemetz holds a PhD in Business Informatics from the University of Vienna and has worked for the Hilti Corporation since 2008. Initially, he was a Project Manager for diverse ERP-driven projects. In 2012, Martin was appointed the Head of the Competence Center for on Demand and on Device Services. Martin led his team in defining the way forward for IT in Hilti by evaluating the latest technologies and IT trends such as mobility, cloud services, and social media while checking their applicability for business support and usage. Since 2012, Martin became part of the Hilti IT Leadership Board. In 2015, Martin relocated to Malaysia to further expand and develop the Asia talent hub in Kuala Lumpur - Hilti Asia IT Services as one of the three strategic Global IT locations in Hilti. In this role, his portfolio covers the people, landscape, applications, technologies and the resulting digital transformation. Together with his team, Martin focuses hereby on two-dimensional growth - team size as well as technological and business competence.

ABSTRACT

Nowadays, when reading management and IT journals, one inevitably crosses the terms of digitalization of businesses. The increasing digitalization of business processes as well as its penetration into IT-based service processes is in full motion. The afore-mentioned journals sometimes fall all over themselves by presenting news and business ideas, which seem to be enabled by digitalization. One should consider though that the wave of digitalization did not descend on us overnight. Rather, it is a process that is already on its way since years and it is keeping the IT departments of corporations busy. It is vital – especially for pioneering IT departments – to transform the corporations' IT architectures and landscapes to allow for digitalizing business. Oftentimes, this is a long and painful process as the historically grown IT applications – such as e.g. ERP applications – have mostly not been designed for digitalizing a corporation's business. Hence, a lot of conceptual and process work is needed before one should embark onto the journey of making a corporation's IT architecture and landscape ready for digitalizing its business.

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BUSINESS DECISION MODELS AND THEIR RELATION WITH PROCESS MODELS

Prof. Dr. Jan Vanthienen, KU Leuven, Belgium

ABSTRACT

Business processes incorporate lots of decisions. Business decisions are important, but are often hidden in process flows or activities. It is not considered good practice to model the detailed decision paths in the business process model, because hardcoding (decision) rules in processes leads to complex and inflexible process models. Separating rules and decisions from the process simplifies the process model (separation of concerns). In analogy with the Business Process Modelling & Notation Standard (BPMN), a Decision Model & Notation standard (DMN) was developed. Decision modelling describes business decisions to be made, with their interrelationships and requirements, together with the detailed decision logic used to make the decision. One of the common forms of decision modelling is a structure of decision tables, describing the premises and resulting outcomes of a specific decision situation. This session is about the relations between business rules, decisions, decision tables, and business processes.

BIO

Jan Vanthienen is full professor of information systems at KU Leuven (Belgium), Department of Decision Sciences and Information Management, Information Systems Group, where he is teaching and researching on business intelligence, analytics, business rules & processes, decision modeling, and business information systems. He has published numerous papers in reviewed international journals and conference proceedings. Jan is a founding member and coordinator of the Leuven Institute for Research in Information Systems (LIRIS). He received the Belgian Francqui Chair 2009 at FUNDP and an IBM Faculty Award in 2011. He is co-founder and president-elect of the Benelux Association for Information Systems (BENAIS). Jan is actively involved in the Decision Modeling & Notation standard (DMN) at OMG (Object Management Group). This standard is designed to complement the Business Process Modeling & Notation (BPMN) standard, in order to integrate and distinguish business processes and business decisions. He is also member of the IEEE task force on process mining, and co-author of the Business Process Mining Manifesto.

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FROM REQUIREMENTS TO CODE: CONCEPTUAL MODEL-BASED SOFTWARE DESIGN

Prof. Dr. Oscar Pastor, Universidad Politecnica de Valencia, Spain

BIO

Oscar Pastor is full Professor and Director of the Research Center on „Métodos de Producción de Software (PROS)" at the Universidad Politécnica de Valencia (Spain). He received his Ph.D. in 1992. He was a researcher at HP Labs, Bristol, UK. He has published more than two hundred research papers in conference proceedings, journals and books, received numerous research grants from public institutions and private industry, and been keynote speaker at several conferences and workshops. Chair of the ER Steering Committee, and member of the SC of conferences as CAiSE, ICWE, CIbSE or RCIS. His research activities focus on conceptual modeling, web engineering, requirements engineering, information systems, and model-based software production. He created the object-oriented, formal specification language OASIS and the corresponding software production method OO-METHOD. He led the research and development underlying CARE Technologies that was formed in 1996. CARE Technologies has created an advanced MDA-based Conceptual Model Compiler called IntegraNova, a tool that produces a final software product starting from a conceptual schema that represents system requirements. Winner of the Peter Chen Award on Conceptual Modeling in 2016, he is currently leading a multidisciplinary project linking Information Systems and Bioinformatics notions, oriented to designing and implementing tools for Conceptual Modeling-based interpretation of the Human Genome information.

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ABSTRACT

A crucial success factor in information systems development is the alignment of the final software product with business goals, business semantics and business processes. Developers should be freed from programming concerns and be able to concentrate on these alignment problems. To assess that the right capabilities are used, sound Conceptual Modeling (CM) techniques within a Model-driven System Development (MDD) must be applied in order to provide a structured and systematic approach to systems development, where developers can successfully use model transformation technologies to derive models of a lower abstraction level that can be further refined, even generating software code automatically. From the experience got with the use of advanced MDD platforms, this keynote will show how to use a Capability-driven Development (CDD) strategy in order to integrate business process modelling (BPM), requirements engineering (RE) and object-oriented conceptual modelling with the objective of leveraging MDD capabilities. The current state of the art on modelling methods and code generation tools will be discussed to explore different ways to match an information system with business requirements. Concrete principles, concepts and common practices of MDD will be presented with a special focus on model-driven requirements engineering, meaning by it how BPM and requirements models can be embedded in a complete CM-based software production process.

DOMAIN STORYTELLING: A MODELLING APPROACH FOR BUSINESS PROCESSES

Prof. Dr. Heinz Züllighoven, Universität Hamburg, WPS - Workplace Solutions GmbH, Germany

Holger Breitling, WPS - Workplace Solutions GmbH, Germany

ABSTRACT

Understanding and describing requirements is probably the greatest challenge in a software development project. Even if we select a standard software to support our customers, the right requirements are significant. Requirements engineering is a learning and communication process for us. A precondition for this is feedback – whether in direct dialogue or by informative requirements documents. The field application experts need to validate the requirements documentation so that it is possible to detect mistakes and misunderstandings. With Domain Storytelling we use the principles of learning a new human language. Let experts tell their domain stories. While listening, we record the domain stories using a pictographic language. The domain experts can see immediately whether we understand their story correctly. After very few stories, we are able to talk about the people, tasks, tools, work items, and events in a domain. Domain Storytelling is an example-based approach for modeling selected business processes and their IT-support. The models are easy to understand for people in different departments, business organization and its specialists alike. The method aims at common understanding and communication about the processes which are modelled. Characteristics of the eGPM method are: (a) cooperative business processes are modelled as "cooperation pictures" based on selected scenarios, (b) simple pictograms make models easy to comprehend, (c) processes are structured along the lines of "who makes what with whom". The initial lecture will present the conceptual basis of Domain Storytelling, putting business process modelling into the context of application-oriented software development. It will characterize software development as a learning and communication process with a strong need for feedback among all parties concerned. The basic principles and concepts of Domain Storytelling will be explained. The tutorial will provide hands-on experience with the modelling tool. Examples from different application domains and usage contexts will show the usability of the approach in many professional contexts.

BIO

Heinz Züllighoven held a chair in software architecture at the University of Hamburg, from 1991 until 2015, and was head of the attached Software Technology Centre. He is one of the original designers of the Tools & Materials approach to object-oriented application software and the eGMP approach. Since 2000, Heinz Züllighoven is also one of the managing directors of WPS Workplace Solutions Ltd. He has published a number of papers and books on various software engineering topics. Among his current research interests are a revision of the Tools & Materials approach in the light of new interaction means of current frontend technologies and the architecture of large industrial software systems. In addition, he an his co-researchers are further developing the tool support for Domain Storytelling.

Holger Breitling graduated in Software Engineering and works as a senior software architect and managing consultant at Hamburg-based Workplace Solutions, Ltd. He is one of the designers of the eGPM method and acts as product owner for the Domain Storytelling modelling tool. He has frequently given talks and tutorials on example-based modelling. In his daily work, he uses our method and tooling in projects ranging from off-the-shelve-software evaluation and selection to pure software development, as well as projects that have transformative impact on the structure, processes, IT and business model of a company.

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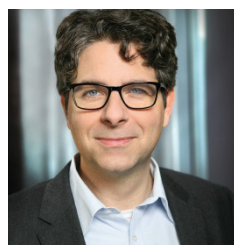
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SOFTWARE COPYRIGHT AND DATA PRIVACY: BRAKES OR ACCELERATORS FOR THE DIGITALIZATION?

Dr. Ljuba Kerschhofer-Wallner, Deloitte, Germany

BIO

Dr. Ljuba Kerschhofer-Wallner is a Senior Manager at Deloitte specialized in software license compliance, data privacy and contract management. Her client focus is on the automotive industry. Before joining Deloitte, Ljuba was the head of the contract, claim and change managements in the BWI, Europe's biggest public-private-partnership and joint venture of Siemens, IBM and the German Federal Army. Ljuba started her career in the IT outsourcing division of Siemens. She has a degree in natural sciences.

ABSTRACT

The digital journey is fueled by software and data. While system developers are enthusiastic about the potentials and ask for as much flexibility and agility as possible to create new processes and solutions, data protection officers and license compliance managers feel quite uncomfortable these days. The reason: Protection laws such as copyright law and data privacy law are to be fulfilled - even in times of digitalization. How can license compliance be achieved, when open source components are built in almost every software? How do cloud services comply with copyright law? Will big software vendors kill the initiatives of digitalization by auditing and suing incompliant software users? And what about the rights of the individuals to keep control over their personal data? Will the new European privacy regulation (EU General Data Privacy Regulation) bring along strategic disadvantages for European developers and IT services providers or will it be just the opposite? All these questions are currently under discussion. In the presentation apply a 360° view on software and data, examine the principles of copyright and data privacy and analyse probable consequences.

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SEMANTIC-BASED MODELING FOR INFORMATION SYSTEMS USING THE SEMFIS PLATFORM

Prof. Dr. Hans Georg Fill, University of Bamberg, Germany

ABSTRACT

In this talk an introduction to semantic-based modeling and the SeMFIS platform will be given. At its core, semantic-based modeling characterizes the use of semi-formal conceptual models together with formal semantic schemata such as ontologies, thesauri or controlled vocabularies. The talk will enable participants to understand the theoretical and practical foundations for applying semantic-based modeling to the design and analysis of information systems. In particular it will be reverted to the ADOxx-based SeMFIS platform that constitutes a flexible engineering platform for realizing semantic annotations of conceptual models and that is provided for free via OMiLAB (http://semfis-platform.org/). The approach will be illustrated with applications in semantic business process management, semantic-based simulation and semantic visualization of enterprise models.

BIO

Dr. Hans-Georg Fill is currently substituting a full professor position for business informatics and development of information systems at the University of Bamberg, Germany. He holds a habilitation and a PhD in business informatics and a master in international business administration from University of Vienna. His research interests are in the areas of meta modeling, enterprise modeling, semantic information systems and visualization. From 2010-2011 he has led an Erwin-Schrödinger research project at Stanford University, which established the foundations for the SeMFIS approach. He has developed and co-developed several modeling tools and platforms including the SeMFIS platform for the semantic annotation of conceptual models, the RUPERT modeling toolkit for business process improvement, the ADOxx Horus modeling toolkit for business process management, and the PSS Scenario Modeller for analyzing product-service systems. He is an active contributor to the OMiLAB.org open source infrastructure where he initiated the development of the GraphRep Generator, the Model Annotator and the REST-API projects.

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FROM MODEL-BASED TO MODEL-INTEGRATING SOFTWARE

Prof. Dr. Jürgen Ebert, University Koblenz-Landau, Germany

BIO

Jürgen Ebert is a professor of software engineering at the University of Koblenz-Landau in Koblenz since 1982. He got his PhD in mathematics from the University of Münster and his habilitation in computer science from the University of Osnabrück, both in Germany. He retired in 2014. He has a long record of work related to modeling in the context of software engineering. His research is focused on design and construction of generic tools, especially using graph-based approaches. In the last two decades, he worked primarily on the foundations of modelling and on the application of modelling in software reengineering, and software architecture.

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ABSTRACT

A strong focus of Software Engineering research in modelling is on software for models (e.g., modeling tools) as well as on models for software (e.g., in tool construction or reverse engineering). This talk gives a personal overview of models in Software Engineering, which started with early visual notations via a plethora of modelling languages and editors and lead to unifying approaches like UML (on the language side) and generic metaCASE software (on the tool side). In this era, foundational work on model representations, meta-modelling, constraint descriptions, and semantics as well as on classification of modelling languages into a few modelling paradigms provided a deeper understanding of the world of modelling in general. Adding the ability for code generation and model transformation, the process of software development was automated further by several environments, some of which even provide additional services like model evolution, model querying, model execution, or model comparison. Integrating these capabilities into a crossplatform and crosslanguage infrastructure may now lead to software components which contain code and models as equal-level and cooperating parts at runtime, making software evolution easier to handle and leveraging, e.g., the development of adaptive software or dynamic product lines.

THE SEMANTIC INTEROPERABILITY BETWEEN DOMAIN-SPECIFIC CONCEPTUAL MODELS AND ONTOLOGIES

Prof. Dr. Robert Buchmann, Babes-Bolyai University of Cluj Napoca, Romania
Dr. Ana-Maria Ghiran, Babes-Bolyai University of Cluj Napoca, Romania

ABSTRACT

The interplay between ontologies and domain-specific conceptual modelling languages is typically concerned with the challenge of „ontological commitment" - i.e., the language is expected to have (or evaluated against) ontological qualities, in order to enforce coherence and consistency in model contents. This is a strong semantic coupling between modelling languages and ontologies. An alternative, weaker coupling will be promoted by this lecture, focusing on pragmatic semantic interoperability aspects: ontologies and modelling languages are treated here as distinct Design Science artefacts that may have some conceptual overlapping which allows applications to bridge the diagrammatic semantics with the ontological ones by resorting to technologies such as graph databases and the Resource Description Framework (RDF). The lecture will present results originally proposed in the context of the ComVantage FP7 research project and further developed in follow-up projects. A minimal yet illustrative implementation example will be discussed, leading towards a proposed vision of „enterprise model"-aware information systems.

BIO

Prof. Dr. Robert Andrei Buchmann received his doctoral degree in the field of E-commerce application models from Babeş Bolyai University of Cluj Napoca, Romania, in 2005. Since then, he has been specializing in Semantic Technologies and Conceptual Modelling, as enablers for Knowledge Management Systems. His post-doctoral efforts focussed on Semantic Technologies and during 2012-2015 he occupied a research position at University of Vienna, specializing in Agile Modelling Method Engineering, while managing metamodelling and requirements engineering tasks for the ComVantage FP7 project. Currently, he occupies an Assoc. Professor position at Babeş Bolyai University and is investigating opportunities of interplay between the Semantic Web and the Enterprise Modelling paradigms.

Dr. Ana-Maria Ghiran is experienced with the core Semantic Web technologies, as she had applied them in her own doctoral research developed at Babes-Bolyai University of Cluj Napoca, in the field of IT Infrastructure Auditing. She has been involved in teaching and developing the „Information Systems Security" and „Semantic Web" disciplines for the Business Information Systems Department at the same university. Currently she is investigating how state-of-the-art semantic technologies can support the practice of Enterprise Architecture Management.

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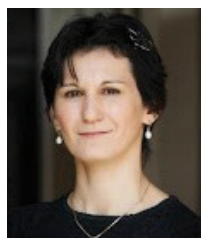
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PROCESS MODELLING AND BUSINESS INTELLIGENCE

Prof. Dr. Wilfried Grossmann, University of Vienna, Austria
Christoph Moser, University of Vienna, Austria

BIO

Wilfried Grossmann is a retired professor at the Faculty of Computer Science at the University Vienna. He got his PhD at the University Vienna in Mathematics and has worked and published in the areas Information Management, Mathematical Statistics, Applied Statistics, Statistical Computing, Operations Research, and Metadata. In connection with his research he has participated in European research programs in Official Statistics (Eurostat) as project coordinator and as work group leader. From 2005-2010 he was chair of the Quality Board of Statistics Austria and vice chair of the Austrian Statistics Council. At the moment his main interests are Business Analytics, Applied Statistics and Information Management.

Christoph Moser is PhD student at the University of Vienna.

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ABSTRACT

Business Process Modelling (BPM) and Business Intelligence (BI) are two important areas in business informatics, which are treated, often rather separated from each other. Looking at the literature and the activities in the two areas shows that process modelling takes a look at the business from a more production and organizational oriented view, whereas business intelligence activities emphasize more the role of the customer in the business process. In this lecture we want to take a unified view onto these two approaches and show how BPM and BI support each other. For demonstration we use the activities of data understanding and data provisioning which are at the beginning of any BI activity. Due to the abundance of data on the Internet integration of traditional data sources and big data is a challenging task. We present a process model for data integration and show how this model can be realized using the ADOxx platform. The basic idea of the model is simultaneous processing of the data workflow and the associated workflow of the metadata which describe the data processing activities. Such a model supports better understanding of the data and extends traditional methods for accessing data quality.

MODELLING KNOWLEDGE ACTION AND TIME: ACTION THEORIES AND THEIR APPLICATION IN DYNAMIC UNCERTAIN DOMAINS

Prof. Dr. Dimitris Plexousakis, University of Crete, Greece
Dr. Theodore Patkos, FORTH-ICS, Greece

ABSTRACT

The modelling of knowledge, action and time is a topic of current research within the broader domain of knowledge representation and reasoning. The course will focus on declarative approaches for modelling and reasoning with change, paying particular attention to the integration of knowledge and action (by means of artificial software agents). As time is inherent in any type of activity and process, the course will also deal with the representation of temporal properties that characterize the occurrence of actions and the knowledge they generate. Practical aspects of reasoning about knowledge, action and time in the context of agent-based systems, ambient intelligence and cognitive robotics will be exposed in addition to the theoretical frameworks. Students will also have the ability to conduct exercises with software implementing non-monotonic and event-based formalisms, in order to address reasoning problems involving aspects, such as constraint-satisfaction, commonsense reasoning and planning, cast in the context of ambient environments and cooperating intelligent agents.

BIO

Dimitris Plexousakis is a Professor of Computer Science at the Univ. of Crete, Director of the Institute of Computer Science, FORTH and Head of the Information Systems Lab. He obtained a PhD in Computer Science from the Univ. of Toronto in 1996. His research interests lie in the areas of Conceptual Modeling, Knowledge Representation and Reasoning; Formal models and query languages for the Semantic Web; process and service modelling. He has extensive experience in coordinating and participating in National and European Projects and over 190 publications in peer-reviewed journals and conferences.

Theodore Patkos is a postdoctoral researcher at FORTH-ICS. He holds a PhD in Computer Science from the University of Crete since 2010 studying formal methods for commonsense reasoning in dynamic environments and their application to Ambient Intelligence domains. His research interests include knowledge representation and non-monotonic reasoning with emphasis on action languages, contextual and commonsense reasoning, multi-agent systems, argumentation and formal knowledge representation models for the Semantic Web.

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THE INDUSTRIAL TRANSITION TOWARDS PRODUCT-SERVICE-SYSTEMS: NEEDS AND ADVANCES IN ENTERPRISE MODELLING

Prof. Dr. Xavier Boucher, Ecole des Mines de Saint Etienne, France
Dr. Khaled Medini, Ecole des Mines de Saint Etienne, France

BIO

Prof. Xavier Boucher is Professor in Industrial Management at the Ecole des Mines de Saint Etienne (France). He is Research Director at FAYOL Institute, a research Center focusing on Sustainable Industrial Performance and Organisations. His current research focuses on Product Service Systems (PSS), service oriented production systems, collaborative-agile networks and decision models to manage the supply chain agility. Prof. X. Boucher is currently leading several collaborative research projects in the field of design and management of PSS with an economic and manufacturing point of view.

Dr. Khaled Medini is currently an Assistant Professor of Industrial Engineering at Ecole des Mines de Saint-Etienne, Fayol Institute. He received his PhD from Ecole Centrale de Nantes in 2013. His research interests relate to decision making support by use of performance evaluation, enterprise modelling and simulation, in the contexts of mass customization, product-service systems (PSS) and sustainable development. Khaled Medini has been involved in European (FP7 and Erasmus+), national and regional research projects about PSS and mass customization.

ABSTRACT

The current industrial transition towards Factories of the Future (FoF) implies strong transformation of enterprise Business Models within the manufacturing sector. Product Service Systems are a key component of this transition, and contribute to renovate both the underlying enterprise models and the needs of enterprise engineering tools. The objective of the lecture is to articulate the overall needs of transition towards FoF with the requirements for innovative conceptual modelling approaches and new modelling methods and tools. The lecture will first give a synthetic insight on PSS within the context of FoF, to make possible for the audience to understand the key concepts of PSS and key industrial needs for developing innovative enterprise modelling and engineering solutions. The second part of the lecture will present an advanced modelling method dedicated to support PSS design and engineering. The meta-modelling procedure followed for these developments will be explained, together with the resulting PSS-oriented meta-model. and a demonstration of the resulting modelling tool PS3M 'PSS Scenarios Modeler'.

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SECURITY REQUIREMENTS ENGINEERING: A MODELLING PERSPECTIVE

Prof. Dr. Haris Mouratidis, University of Brighton, UK

ABSTRACT

BIO

The increasing demand of modern information systems to process and manage sensitive information and the introduction of relevant technological paradigms (e.g. Big Data, Cloud Computing, Internet of Things) has led researchers and industrialists to rethink the way that security (and its related issues such as trust, privacy and risk) is treated during the information systems development process. In the first part of this lecture, I will discuss the security modelling challenges, which are introduced in such complex systems, and I will outline the requirements that security modelling frameworks should fulfil. In the second part, I will present the foundations of a security modelling methodology, called Secure Tropos. From a theoretical perspective, I will describe its concepts, processes, and reasoning capabilities, while from a practical perspective I will present an ADOxx-based tool and some examples of how it can be used in practice.

Haris Mouratidis is Professor of Software Systems Engineering at the School of Computing, Engineering and Mathematics, University of Brighton and Director of the Secure and Dependable Software Systems Research Cluster. He holds a B.Eng. from the University of Wales, Swansea (UK), and a M.Sc. and PhD from the University of Sheffield (UK). He is also Fellow of the Higher Education Academy and Professional Member of the British Computer Society. Haris has been a visiting researcher at the National Institute of Informatics, Japan, and a visiting fellow at the British Telecom, U.K and the University College London, U.K. He is visiting professor at the University of the Aegean, Greece. His research interests lie in the area of secure software systems engineering, requirements engineering, and information systems development. He is interested in developing methodologies, modelling languages, ontologies, tools and platforms to support the analysis, design, monitoring of security, privacy, risk and trust for large-scale complex software systems. He has published more than 140 papers (h-index 25) and he has secured funding as Principal Investigator from national (EPSRC, Royal Academy of Engineering, TSB) and int. (EU, NII) funding bodies as well as industrial funding (British Telecom, FORD) towards his research. He is currently leading the UoB team on EU projects SESAME, VisiOn and MITIGATE. His "Powerchex KTP" project was finalist for the best 2012 UK National Knowledge Transfer Partnership TSB award. He has acted as evaluator for national and int. funding bodies and invited subject expert for organisations. He is on the editorial boards of the Requirements Engineering Journal and the Int. Journal of Information System Modeling and Design and he has been involved in the organization of various events related to his research interests. He was the General co-Chair of CAiSE'14 and the general chair of RCIS'17.

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ENTERPRISE MODELING AND INFORMATION SECURITY

Prof. Dr. Marite Kirikova, Riga Technical University, Latvia

BIO

Dr.sc.ing. Mārīte Kirikova is a Professor in Information Systems Design at the Department of Artificial Intelligence and Systems Engineering, Faculty of Computer Science and Information Technology, Riga Technical University, Latvia. She has more than 150 publications on the topics of requirements engineering, business process modelling, knowledge management, systems development and educational informatics. She is also a co-editor of several scientific proceedings in the area of databases, information systems, information systems engineering, enterprise modelling, systems and business, and business informatics. Marite Kirikova has participated in university research and teaching teams in Sweden, Denmark, Austria, and USA. In her research currently she focuses on continuous information systems engineering in the context of agile and viable systems paradigms.

ABSTRACT

Current business process modeling approaches are well suited for showing the sequence of activities. They are less appropriate for reflecting information flows. However, in the context of information security, the reflection of information flows is an essential instrument for analyzing the way how information shall be organized with respect to the activity flow and enterprise architecture. Taking into consideration that security concerns not only technical devices and access rights in databases, the enterprise models that reflect organizational structure (including roles), technical architecture, information architecture, and relationships between aforementioned models are useful to identify and use different patterns that reflect the need for caring for security. The usage of the enterprise models also helps to identify methods for establishing the requested level of security. To illustrate how enterprise models can be used in caring for information security, several security requirements patterns, represented in BPMN, will be discussed focusing on the relationship between the information flow in the pattern and the corresponding enterprise architecture elements.

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MATHEMATICAL STRUCTURES TO MODEL BEHAVIOR ONTOLOGY FOR IOT

Prof. Dr. Moon Kun Lee, Chonbuk National University, Korea

ABSTRACT

Things in IoT behave like living things in real world. In order to understand the behavior of the things systematically, it is necessary to abstract the behavior in formal and collective patterns. In that perspective, this lecture presents a meta-modeling method to abstract the behavior in the patterns as follows. Firstly, the basic individual actions of the behavior are represented as movement actions in process algebra, called δ-Calculus, in a geo-temporal space, called GTS. Secondly, the actions of the things are grouped together in sequence as behaviours in ontology, called Behaviour Ontology, in an abstraction space, called n:2-lattice. In this way, the behavior of the things can be represented in mathematically structured patterns and be organzied hierachically in the collective patterns of the things. In the method, the requirements for the secure and safe behaviors will be specifed and verified using GTS Logic, and be represented as dynamic contraints in the lattice. Further the relations between the GTS space and the lattice space can be investigated. In order to show the applicability of the approach, an IoT example for Smart EMS (Emergency Medical Systems) Service will be used for demonstration on a tool, called SAVE. SAVE is a ptototype tool to specify, analyze, verify and evaulate distributed mobile real-time systems. It has been developed on ADOxx meta-modelling platform. At the end, the detailed architecture of the tool will be presented to show how effectively and efficiently the tool has been developed by using the basic facilities of ADOxx.

BIO

Prof. Moon Kun Lee is currently teaching in the Division of Computer Science and Engineering in Chonbuk National University, Republic of Korea. Received Bachelor degree in Computer Science, Pennsylvania State University, USA; Master and PhD degrees in Computer & Information Science, The University of Pennsylvania, USA. Worked at CCCC, USA, as Computer Scientist; Developed SRE (SW Re/reverse-engineering Environment); Applied to modernization of legacy OS and SW from NSWC of US Navy to Ada. Main research interests are SW round-trip engineering, ditributed real-time systems, formal methods, ontology, behaviour engineering, etc. Currently focused on collective behaviour engineering for distributed mobile systems with δ-Calculus and Behavior Ontology in SAVE on ADOxx.

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BUSINESS PROCESSES FOR BUSINESS COMMUNITIES

Prof. Dr. Andreas Oberweis, Karlsruhe Institute of Technology, Germany
**Prof. Dr. Agnes Koschmider, Karlsruhe Institute of Technology, Germany**

BIO

Andreas Oberweis is Professor for Applied Informatics at the Karlsruhe Institute of Technology (KIT) since 2003. Since 2004 he is also Director at the Research Center for Information Technology (FZI) Karlsruhe in the Research Group Software Engineering. He received a Doctoral Degree in Informatics from Universität Mannheim in 1990 and a Habilitation Degree in Applied Informatics from Universität Karlsruhe in 1995. From 1995 to 2003 he was Professor for Information Systems Development at Goethe-Universität Frankfurt/Main. His research and teaching interests are in the field of business process engineering and information systems development. He is co-founder of PROMATIS software GmbH (1994) and HORUS software GmbH (2009) in Ettlingen. Since 2004 he is Program Director of the Master Program Service Management and Engineering at the Hector School of Engineering and Management. Since 2014 he is Vice President of the Gesellschaft für Informatik (GI).

Agnes Koschmider is a subsidary professor for Applied Informatics at the Karlsruhe Institute of Technology. Before she was a subsidary professor for Information Systems at the University of Cologne. She finished her dissertation and habilitation in Applied Informatics in 2007 and 2015. After her PhD in 2007 she spent research stays at TU Eindhoven and TU Valencia. From May 2010 till February 2011 Agnes followed her PostDoc fellowship from the Computer Science Department of the University of Pretoria, South Africa. In June 2016 she spent a research stay at the Computer Science department of the University of Klagenfurt. Since 2013 Agnes is involved into the OMiLAB project.

ABSTRACT

Several languages have been suggested for modeling business processes. Practice shows, however, that a powerful modeling language alone is not enough. Users require guidance and assistance in the preparation of models, that is, during application of the language. In this course the students will learn the Horus(R) Method. This method defines various stages of modeling and is a recipe-like guideline that has been proven in practice. In practical exercises to this lecture students will collaborate in a Web 2.0-based social network, to define business objectives, strategies and business processes together and will elaborate a common understanding of an organization.
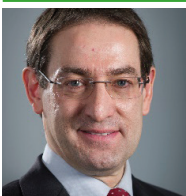
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DOMAIN SPECIFIC MODELLING

Prof. Dr. Matti Rossi, Aalto University, Finland

ABSTRACT

The lecture introduces students to developing new modelling languages through Domain Specific Modelling approach with MetaEdit+ platform. During this lecture the students will get an overview of working with MetaEdit+ when developing DSM's and they can develop a support environment for their own modelling language through an exercise. The tool allows language developers to rapidly build and evolve their methods and then try them out on the fly.

BIO

Matti Rossi is a professor of information systems at Aalto University, School of Business. He is the president elect of Association for Information Systems.He has been the principal investigator in several major research projects funded by the technological development center of Finland and Academy of Finland. He was the winner of the 2013 Millennium Distinction Award of Technology Academy of Finland for open source and data research. His research papers have appeared in journals such as MIS Quarterly, Journal of AIS, Information and Management and Information Systems. He has been a senior editor of JAIS and Database, and he is a past editor in chief of Communications of the Association for Information Systems. He is a member of IEEE, ACM and AIS.

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COLLABORATIVE AND WELL-BEHAVED OUTDOOR ROBOTS IN HARSH ENVIRONMENT

Prof. Dr. Juha Röning, University of Oulu, Finland

BIO

Juha Röning is Professor of Embedded System at the University of Oulu. He serves also as Visiting Professor of Tianjin University of Technology, P. R. China.

He is principal investigator of the Biomimetics and Intelligent Systems Group (BISG). In 1985 he received Asla/Fullbright scholarship. From 1985 to 1986 he was a visiting research scientist in the Center for Robotic Research at the University of Cincinnati. From1986 to1989 he held a Young Researcher Position in the Finnish Academy. In 2000 he was nominated as Fellow of SPIE. He has two patents and has published more than 300 papers in the areas of computer vision, robotics, intelligent signal analysis, and software security. He is currently serving as a Board of Director for euRobotics aisbl.

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ABSTRACT

Collaboration between robots of different domains is necessary in many disaster scenarios, for example by utilizing unmanned aerial vehicles for coarse area mapping and using unmanned ground and surface vehicles to perform environment manipulation. In this talk I will consider challenges with robots operating on harsh environment collaborating with humans and other robots. There are numerous robotics competitions, ranging from those of mainly educational purpose to those whose goal is to inspire and promote new cutting-edge research with significant prizes with numerous competitions being some mixture of the these two goals. ERL Emergency is a competition of this mixed category and its participants range from university students to experienced academic and industry professionals. Amongst all the listed competitions, ERL Emergency is unique in its incorporation of all the three main robotics domains of air, land and water. In ERL Emergency, successful teams must be able to set up and use highly heterogeneous and interconnected robots to complete highly complex search-and-rescue (SAR) and other emergency related tasks in varied environments. In short, ERL Emergency tests the capabilities of multi-robot systems (MRS) in SAR and other disaster scenarios. In this talk, the challenges and hands-on experiences on realistic scenarios and terrains are presented. It includes a series of event arrange in ELROB (European Land Robot Trial), euRathlon and now under umbrella of ERL. Also a new testing site, OuluZone, where the harsh weather conditions, unevenness on terrain and dynamic driving conditions challenge outdoor robots. Our aim is to provide reliable operation in any conditions. An ultimate goal is to provide a driving license for autonomous heavy machines.

MODELLING KNOWLEDGE WORK: CASE MANAGEMENT AND DECISION-AWARE BUSINESS PROCESSES

Prof. Dr. Knut Hinkelmann, FHNW University of Applied Sciences and Arts Northwestern, Switzerland

ABSTRACT

BIO

Modelling Knowledge Work is based on two principles: (1) the separation of business logic and process logic and (2) the support of both structured and unstructured knowledge. Case management is the management of long-lived, non-structured collaborative processes that require knowledge and information. The path of case execution cannot be predefined but depends on human skills and judgment. The OMG recently developed the Case Management Modelling and Notation (CMMN). The lecture will give an introduction into this modelling language. For real processes, however, there is no strict separation between structured processes and cases. The lecture will therefore show, how case modeling can be integrated with business process modelling in BPMN. Decision-aware business processes separate business logic from process flow, making process models simpler and easier to modify. This can be achieved by combining process modelling with decision modelling (e.g. using DMN).

Knut Hinkelmann is Head of the Master of Science in Business Information Systems at the University of Applied Sciences and Arts Northwestern Switzerland FHNW. He also is adjunct professor at the University of Camerino, Italy, and research associate at the University of Pretoria, South Africa. In 1988 he obtained a diploma in Computer Science and in 1995 a PhD from the University of Kaiserslautern. After the study he worked for the Research Institute for Applied Knowledge Processing (FAW). Then he was researcher and head of the Knowledge Management research group at the German Research Center for Artificial Intelligence (DFKI). After having worked as product manager for Insiders Information Management GmbH, he joined FHNW in August 2000 as a professor for Information Systems. His research topics include modelling of knowledge-intensive processes, alignment of business and IT, knowledge management and knowledge technologies. He has been supervisor and external examiner of many PhD theses and guest lecturer at the University of Vienna and University of Camerino.

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CONCEPTUAL MODELING AND LEARNING FOR ENTERPRISE BIG DATA

Prof. Dr. Katsumi Tanaka, Kyoto University, Japan

BIO

Professor Katsumi Tanaka received the BS, MS and PhD degrees in Information Science from Kyoto University, in 1974, 1976 and 1981, respectively. In 1986, he joined the Department of Instrumentation Engineering, Faculty of Engineering at Kobe University, as an associate professor. In 1994, he became a full professor at the Department of Computer and Systems Engineering Department, Faculty of Engineering, Kobe University. From 2001 to 2017, he was a professor of the Graduate School of Informatics, Kyoto University. His research interests include database theory and systems, Web search and mining, and multimedia retrieval. He is a leading expert in database systems, multimedia retrieval, and Web information retrieval. He has more than 300 international-journal and major-conference papers published, including papers that have appeared in VLDB?IEEE ICDE, WWW, ACM Multimedia, ACM TODS, TOIS, ACM CIKM and IEEE TKDE. He has also been project leaders of many leading national research projects in Japan, such as Kyoto University Global COE program and NICT (National Institute of Information and Communications Technology) research projects on the fusion of Web and broadcasting content and on Web information credibility. Dr. Tanaka is a member of the ACM, IEEE, the Database Society of Japan (DBSJ) and the Information Processing Society of Japan (IPSJ). He served as a vice president of DBSJ, and he is currently the fellow of IPSJ.

ABSTRACT

Learning big data by neural network, such as word embedding algorithms or deep learning, has now much attention in several areas of computer vision, speech recognition, natural language processing and so on. In this talk, our research on information retrieval and data generation using the big data learning are shown, and the impact of the „big data learning" technology to the area of information retrieval and data generation is discussed.

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EXERCISE

DESCRIPTIONS

Exercise with ADOxx
Metamodelling: A Smart City Case

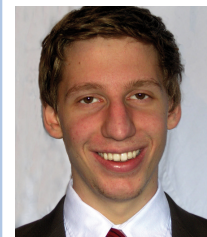**EXERCISE LECTURERS:**

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Michael Walch

Nikolaos Tantouris

Benedikt Pittl

The upcoming of technologies in the context of Internet of Things (IoT) such as ubiquitous sensors, mobile devices, and permanent online interaction has recently also been adopted for the area of urban development. Thereby, the transition towards user-driven digital ecosystems in the form of Smart Cities becomes apparent on three levels: a.) innovation economy, b.) city infrastructure and utilities, and c.) governance (Schaffers et al., 2011). In the foundation exercises of NEMO 2017 we will primarily focus on the aspects of the city infrastructure and the utilities. This will be a key element in realizing services such as smart parking, mobility, or the monitoring of the environment in terms of real-time alerts and safety management.

In particular, the increasing usage of IoT technology in smart vehicles, smart infrastructure and smart phones allows developing new business models and services. Based on the tremendous amount of information that is generated every second by sensors in a smart environment, innovative applications such as services for environmental and energy monitoring, services for the prediction of mobility requirements, smart meters for measuring resource consumption, or medical surveillance and assistance for elderly peoples can be realized (Hernández-Muñoz et al., 2011) .

In this context three foundation exercises have been designed to familiarize the students with modelling concepts, model querying and model processing in an independent application domain.

Foundation Exercises	**I: Modelling Concepts**	**How to model concepts of a Smart City?** Basic metamodelling concepts required to realize a modelling language for a Smart City are taught. Tools of the OMiLAB, e.g., the GraphRep generator will be introduced and utilized to create graphical visualizations for the Smart City concepts.
	III: Queries, e.g., Analysis	**How to analyze Smart City models using query techniques?** Basic model analysis techniques will be discussed, enabling the modeller to use the information captured in the models in order to e.g., answer non-trivial questions, or support decision makers. As illustrative scenarios, queries will be executed on Smart City models to determine e.g., the healthiest running tracks or the fastest route for an emergency car in case of an accident.
	V: Processing, e.g., Simulation	**How to process Smart City models using simulation?** Introduction to simulation algorithms and how they can be applied to process the knowledge codified in conceptual models. Afterwards, hands-on experience will be achieved by realizing and executing several simulation algorithms using the built-in functionality of the ADOxx platform and the Smart City models. Finally, further model processing possibilities will be showcased and discussed, e.g., stepwise car navigation in a Smart City model using AdoScript, Expressions, and event handling.

[1] Schaffers et al. (2011): Smart Cities and the Future Internet: Towards Cooperation Frameworks for Open Innovation, in: J. Domingue et al. (Eds.): Future Internet Assembly, pp. 431–446, Springer.

[2] Hernández-Muñoz, J.M. et al. (2011): Smart Cities at the Forefront of the Future Internet, in: J. Domingue et al. (Eds.): Future Internet Assembly, pp. 447–462, Springer.
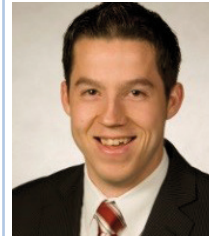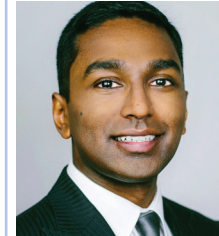
Modelling Method Conceptualisation based on ADOxx

EXERCISE LECTURERS:

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A trend towards the acknowledgement of the benefits of domain-specific modelling methods – as a complement to general purpose and de-factor standard modelling methods like Unified Modelling Language (UML), and Business Process Modelling and Notation (BPMN) can be recognized.

Consequently, researchers are confronted with the challenge of designing and deploying new modelling methods – in the following referred to as the conceptualization. A vital part of this conceptualization is the design of the meta model. Meta models formally specify the syntactic backbone of a modelling language by introducing the relevant modelling language concepts and by constraining the meaningful relationships between them. Meta model design decisions dictate how modelling languages can be used by modellers during the modelling process.

While lots of research can be found that focusses on the effect of notational aspects on modelling language's usability and intuitiveness, guidelines and best practices for meta model design are still scarce.

This exercise will contribute bridging that research gap by focusing on meta model design patterns and their impact on their resulting modelling language and the modelling method as a whole. The goal is to provide, based on experience gained during the design of numerous meta models, a set of generic meta modelling patterns that can be employed in any modelling method conceptualization project.

ADOxx will be utilized to show practical feasibility of the presented generic patterns on a state-of-the-art meta modelling platform.

OMiLAB Modelling Method Engineering Framework
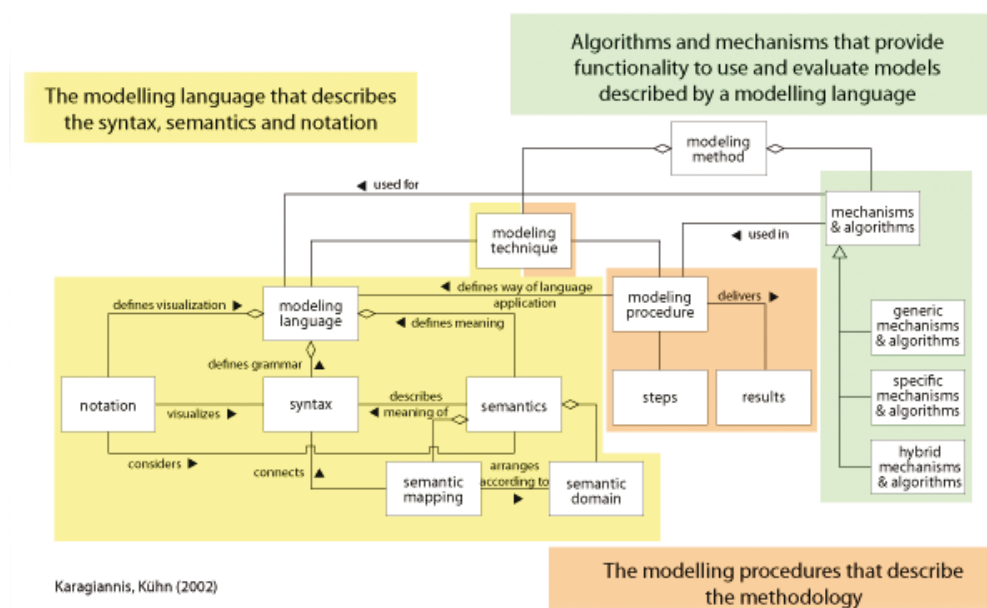
Fundamental Conceptual Modelling Languages within the BEE-UP Tool
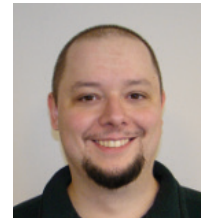
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Several modelling languages have gained wide popularity and are supported by communities with the help of a wide array of modelling tools, both commercial and free. The Business Process Management Notation (BPMN) standard, Entity-Relationship Diagrams (ER), Event-driven Process Chains (EPC), the Unified Modelling Language (UML) and PetriNets are examples of such languages, each of them with a different focus. [1]

Regardless of the application domain, both the analysis of existing systems and the creation of new systems benefit extensively from having the system modelled from a conceptual point of view in order to capture its behavioural, structural and partial semantic characteristics, while abstracting away irrelevant details.
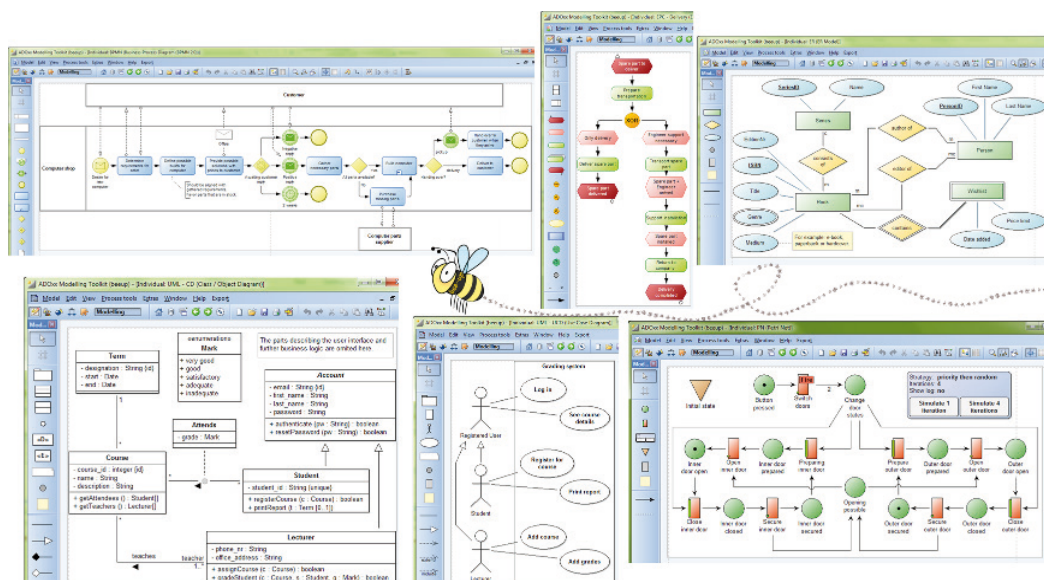
Therefore, the exercise introduces the Bee-Up tool, a prototypical implementation based on the ADOxx meta-modelling platform, which incorporates and partially integrates BPMN, ER, EPC, UML and PetriNets.

CONTENT:

• exercise modelling in different languages given a specific set of problems as well as extensions like linking different modelling languages (e.g. BPMN and ER)
• use additional processing functionalities, which extend the understanding of the modelling concepts used.

Examples for such functionality include:
simulation for process models, analysis of Petri Nets through manual or automatic execution of Transitions, generation of SQL-Create statements from ER-models (tested with MySQL), export of models in formats which can be subsequently processes (e.g. XML, RDF).

Further exercises can be found in the IMKER-Case Study, available at: http://vienna.omilab.org/repo/files/Bee-Up/The_IMKER_Case_Study.pdf

Bee-Up Tool: Modelling Methods

[1] D. Karagiannis, R. Buchmann, P. Burzynski, U. Reimer, M. Walch, Fundamental Conceptual Modeling Languages in OMiLAB, Springer (2016)

ADOXX.ORG TEAM:
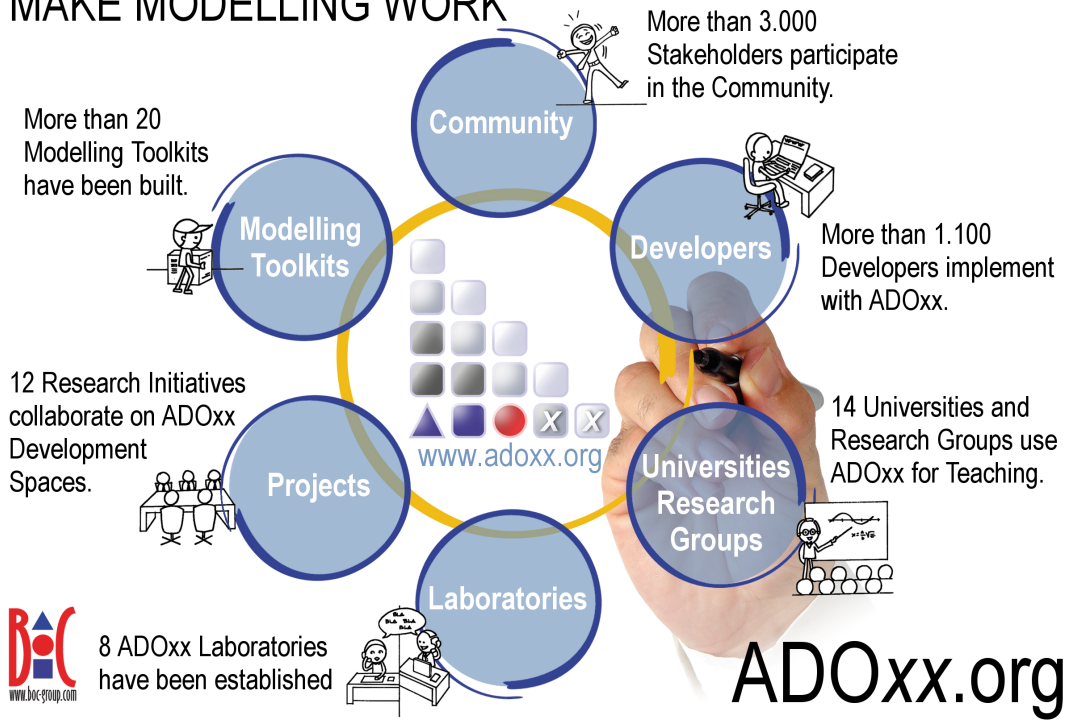
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Dimitris Karagiannis
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Domain-Specific Conceptual Modeling

Concepts, Methods and Tools

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Volume 2 currently in preparation.

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