

**NEMO 2019
PROGRAMME**

Next Generation Enterprise Modelling in the Digital Transformation Age

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General Information

Summer School Venue

University of Vienna
Faculty of Computer Science
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1090 Vienna, Austria
T +43 1 4277-78943

Public means of transport

Tram: 5, 33, 37, 38, 40, 41, 42
Tram station:
Spitalgasse/Währinger Straße
Trip planning:
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Police 133
Fire department 122

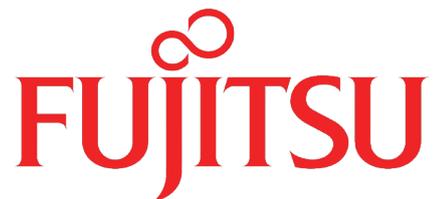
Organisation & Technical Team



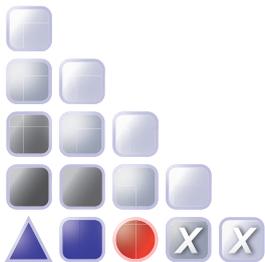
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Welcome!

The “Next Generation Enterprise Modelling” (NEMO) Summer School welcomes you to its 6th 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 2019 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.

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



Vision: an active global community for conceptual modelling that benefits from open artefacts.

Community network: supported by a non-profit organisation (NPO) headquartered in Berlin, Germany and governed by a Scientific Advisory Board (SAB).

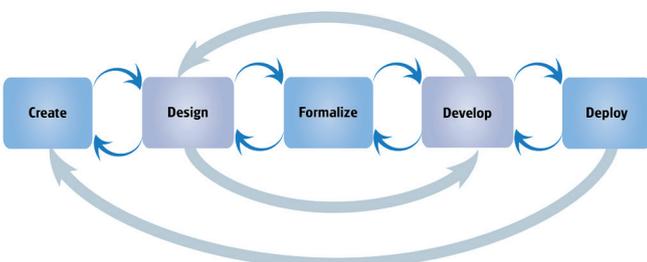
Operations: dedicated research and experimentation spaces for modelling method engineering equipped with tools to explore method creation and design, experiment with method engineering and deploy software tools for modelling. They act as facilitators to the development and application of methods to communities who value models, and implicitly modelling methods.

Operation spaces can be set up as (a) virtual labs or as (b) physical and virtual facilities. They can be affiliated with academia as well as industrial organisations.

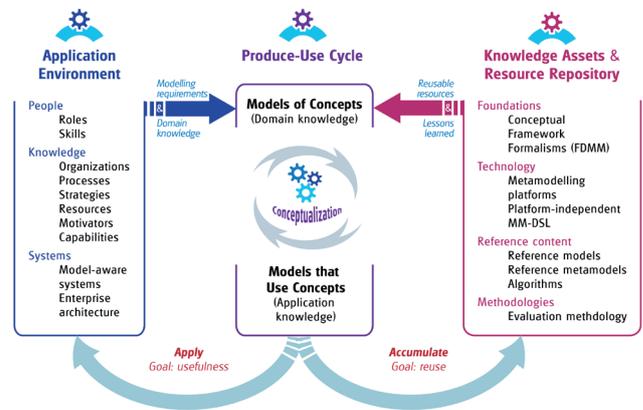
Individual activities are organized in projects in the different labs. A project is a collaborative space where individual engineers and teams can work together. It includes all contributions concerning a modelling method, starting from creation, to implementation all the way to exploitation.

Openness: to all those interested, either as individuals or as institutions. It acts as a platform where participants can bring in ideas related to modelling and engage in the exploration process. OMILAB follows a user-driven approach in its understanding of the term "model" thus users are not limited to a certain domain or functional area 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 and engineering.

the AMME Lifecycle



The AMME Framework



Network Benefits:

- dialogue between scientists, educators and innovators,
- access to infrastructure and open-source services,
- strong and sustainable communities, that are active in domain-specific issues,
- amplification instruments which leverage the impact of the activities performed,
- conferences, workshops, seminars,
- common projects,
- research and teaching stays, internships and traineeships, and
- publications.

Network Resources:

- **Knowledge and procedural resources** like the Agile Modelling Method Engineering Framework (AMME), the Conceptualization Lifecycle, trainings, documentation
- **Technical resources** like open source platforms (e.g. ADOxx, olive), open source tools aiding the modelling engineering work (e.g. GraphRep Generator, Model Annotator, http-based retrieval of models and contents etc.), and service like packaging and deployment
- **Collaboration resources** like events, publications, exploitation opportunities in third-party funded projects, communication and public relations, the NEMO summer school series.

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OMILAB NPO

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D-10785 Berlin



OMILAB[®] Best Practices

The Vienna Node – Austria

Established: 2011

Location: University of Vienna, Faculty of Computer Science, Vienna, Austria

Focus: Knowledge-based Methods and Technologies for Digitalisation

Core competence: Meta-modelling

Resources: Physical node with an CPS-environment and Design Thinking environment

Tools: more than 40 modelling tools

Activities: Research projects, educational activities, NEMO summer school, trainings, conferences

Web: vienna.omilab.org

The Chonbuk Node – Korea

Established: 2015

Location: Chonbuk National University, School of Engineering, Chonbuk, Korea

Focus: Formal Methods, Internet of Things

Core competence: Formal specification and verification

Resources: Physical node with an CPS-design room

Tools: SAVE, PRISM, SRRE, SoS Modelling Tool for Simulation-Based Verification

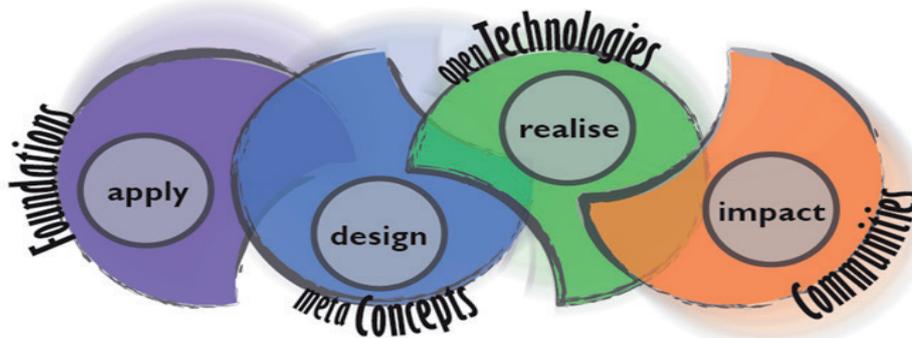
Activities: Industry projects, educational activities, trainings, workshops

Web: korea.omilab.org



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 (vienna.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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University of Vienna

Research Group Knowledge Engineering

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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.

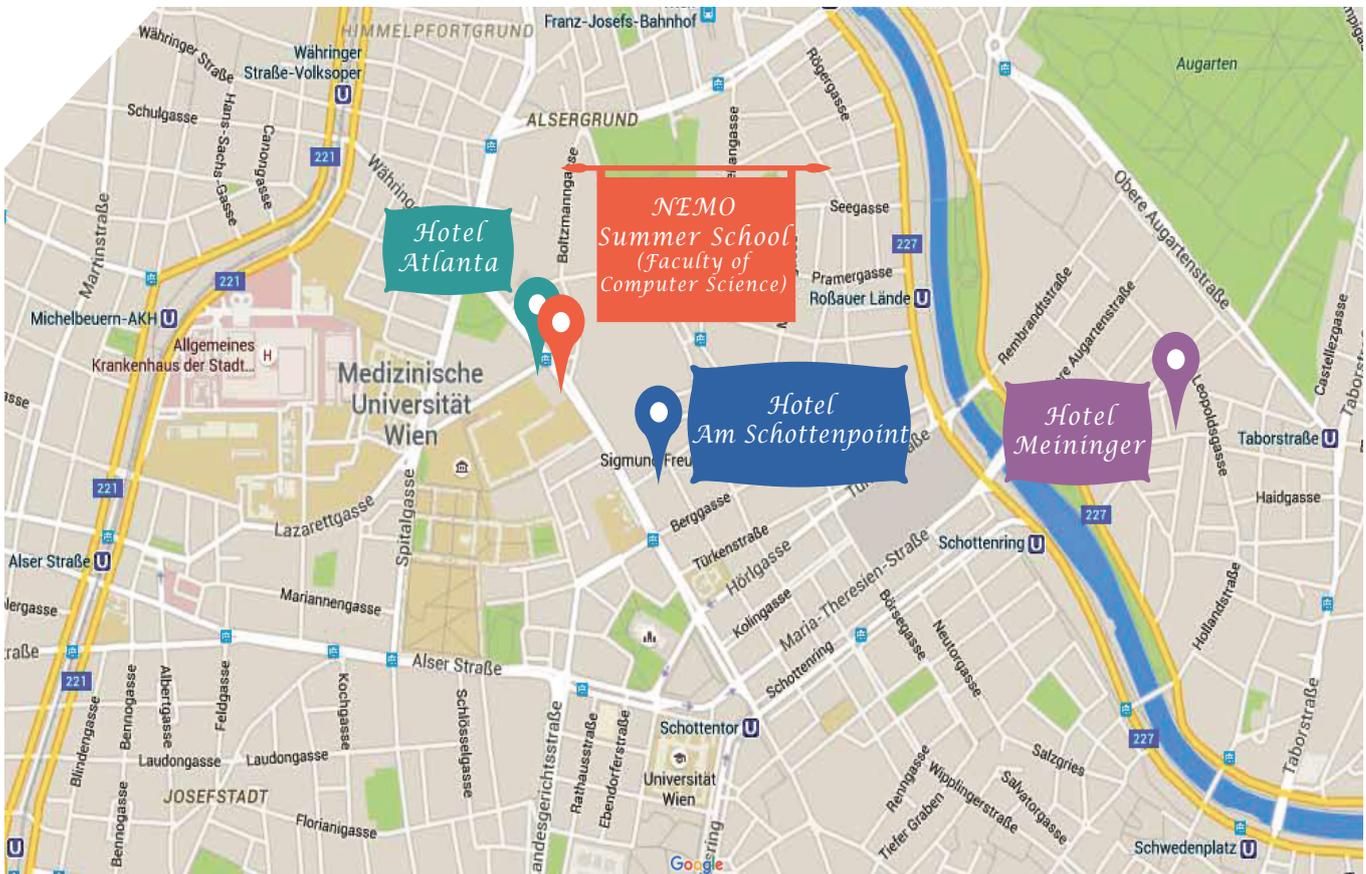


A special „Get Together“ evening is planned for the first day. We invite you to enjoy some beer and BBQ food. This event will allow participants to get to know each other right from the start of the summer school and cooperate better during the practical sessions and in the preparation of the student presentations from the last day.



Detailed information will be provided at the summer school.

HOTEL CONTACTS & NEMO VENUE



MEININGER Hotel Wien Downtown Sissi***

Schiffamtsgasse 15, 1020 Vienna
Tel.: +43 (0) 720 8820 66

Hotel am Schottenpoint***

Währinger Straße 22, 1090 Vienna
Tel.: +43-1-3108787

Hotel Atlanta****

Währinger Straße 33, 1090 Vienna
Tel.: +43 (1) 405 12 30

NEMO VENUE

Währinger Straße 29, 1090 Vienna
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Vienna



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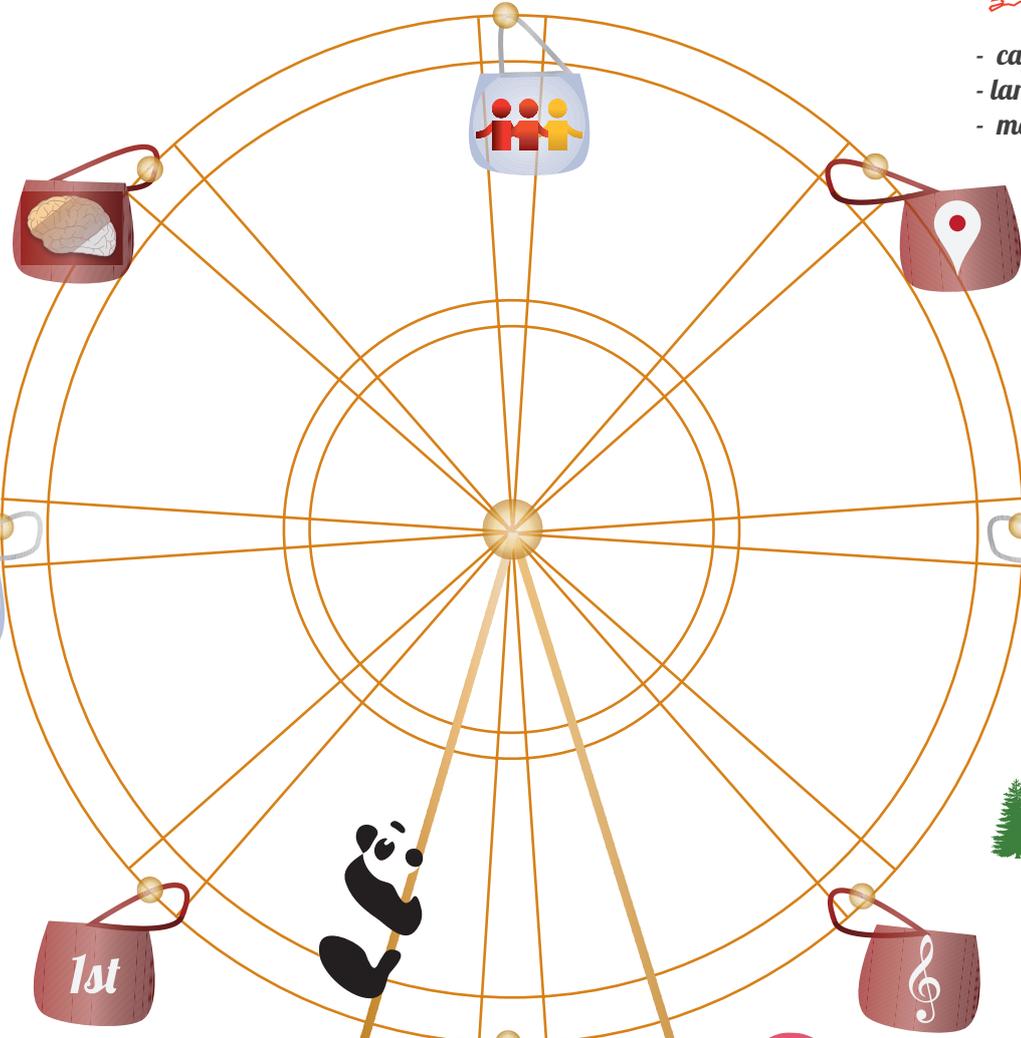
POPULATION
2.6 milion



= about 1/3
of all Austria



AUSTRIA
- capital City of
- largest city in
- most visited of



DANCING
is a tradition!
over 400
balls
each year

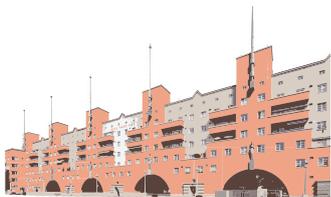
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VIENNA = CITY OF MUSIC
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J. STRAUSS



9 NOBEL PRIZE WINNERS
15 FACULTIES

Room Location



Address:

Faculty of Computer Science
Währinger Straße 29
1090 Vienna

Basement:

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

1st Floor & 2nd Floor:

Practice Sessions & Smart City in:
PC2, PC3, PC5 & PC6

Ground Floor:

Registration

4th Floor:

Organisation Team
OMiLAB

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OMiLAB Day

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THE POWER OF MODEL-CENTERING

Em. Prof. Dr. Heinrich Mayr, Alpen-Adria University Klagenfurt, Austria

Dr. Judith Michael, RWTH Aachen, Germany

Mr. Martin Paczona, Alpen-Adria University Klagenfurt, Austria

ABSTRACT

Models are the basic human tools for managing complexity and understanding. As such, they play a key role in all scientific and engineering disciplines as well as in everyday life. Many modeling paradigms have evolved over time in different disciplines, resulting in a wide variety of modeling languages, methods and tools that have come and gone. This is particularly true for informatics, which is a modeling discipline in itself: for long it has systematized the field of modeling, for example by introducing model hierarchies, by ontological foundations, by developing universal modeling languages such as UML, or by specifying domain-specific modeling methods (DSSMs) for areas of application where universal approaches fail. In the context of digital transformation, modeling plays a central role in ensuring the functionality, security and quality of complex digital ecosystems. We approach this in the lecture from a rigorously model-centered perspective, which sees a digital ecosystem as a construct of networked model handlers in the sense of model producers and model consumers, whereby these handlers in turn are instances of models. We will illustrate the paradigm of model-centric architecture with the results of projects we have carried out in the areas of assistive systems, mechatronic systems and Quality Aware Software Engineering. In addition, Martin Paczona will give students in a working group in-depth and practical insight. Among other things, they will learn and apply the principles of a DSMM for the design and development of electric vehicle test benches.

Heinrich C. Mayr has been Full Professor of Informatics at the Universität Klagenfurt since 1990 and heads the Application Technology Research Group. His research is documented in 230 publications and includes methods of information system design, requirements and modeling as well as knowledge management. He held the position of President of the Gesellschaft für Informatik. He was rector of his university for 6 years. Currently he is editor-in-chief of the „Lecture Notes in Informatics“, chairman of the council of the Software Internet Cluster SIC, member of the TC „Wirtschaftsinformatik“ of the German accreditation agency ASIIN, and supervisory board member of the „Kärntner Beteiligungsverwaltung.“

Judith Michael is a research fellow at the chair of Software Engineering of RWTH Aachen University and chairwomen of the supervisory board of the Lakeside Science & Technology Park GmbH. She received her doctorate in Informatics from the Alpen-Adria-Universität Klagenfurt in 2014. Her Ph.D. thesis was about Cognitive Modeling for Ambient Assistance. Her current research focus are (conceptual) models and domain-specific modeling languages in various domains: She develops DSMLs, methods and systems for Ambient Assisted Living, Controlling and Finances, Energy, Health, IoP, IoT, Industry 4.0 and Smart Homes.

Martin Paczona received his MSc in Engineering from the University of Applied Sciences Graz in 2016. Since 2010 he has been working as a software developer at AVL List GmbH and has been responsible for the coordination of customer-specific development activities, the coordination of quality issues and system modeling. Since 2017, he has been a PhD student at the Application Technology Research Group of the Universität Klagenfurt. Martin is an alumnus of the NEMO Summer School 2017.



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AMME: HOW METAMODELLING CAN SUPPORT DIGITALIZATION

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.

ABSTRACT

Internet's evolution into a generic platform and a pervasive environment enables the creation, provision and consumption of digital services. Cloud-based deployment models offer transparent access to services for a worldwide group of users. The models support 24/7 availability, location independence as well as autonomy of resource processing limitations. At the same time, digital services are the basis of new and innovative business models. All of the above is expected to take place in the digital transformation process. Is it really feasible this way?



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FUJITSU

REBUILDING TRUST IN THE DIGITAL AGE

Dr. Yoshikuni Takashige, Fujitsu Limited

ABSTRACT

Digital transformation is progressing. Everything around us is increasingly digitalized, communicating massive amounts of data. Leveraging data and connectivity, innovation is being generated, transforming our everyday lives as well as businesses. But we are also facing a serious challenge of trust. How can we make sure data is true and trustworthy? How can we protect our privacy? And how can we trust judgement by AI? All these are issues of trust. The most fundamental question today is how we can rebuild trust in this digital age. This interactive lecture is designed for the participants to understand and proactively think about: What is the revolution of trust happening today? What kind of leadership is required to build trusted business and public service? How can we collaborate with AI with confidence? How can we ensure end-to-end trust in an increasingly autonomous and distributed world?

Yoshikuni Takashige joined Fujitsu in 1984. He was engaged in international business, taking strong leadership in developing Fujitsu's important strategic partnerships and joint ventures with global companies. Throughout his career, he has been exposed to many different people, businesses and cultures around the world, which has helped him shape his thought about transformation of business and society. Since 2012, he has been leading the creation of the Fujitsu Technology and Service Vision, which sets out Fujitsu's human-centric vision and its thinking on how organizations can innovate by leveraging digital technology (<https://www.fujitsu.com/global/vision/>). It was first launched in 2013, and has been updated annually. He speaks about innovation and digital transformation internationally. He received an MBA degree from the Johnson Graduate School of Management, Cornell University, and a Bachelor of Law degree from the University of Tokyo.



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MODERN APPROACHES IN DATA ENGINEERING AND INFORMATION SYSTEM DESIGN

Prof. Dr. Ivan Lukovic, University Novi-Sad, Serbia

BIO

Ivan Luković received his diploma degree (5 years) in Informatics from the Faculty of Military and Technical Sciences in Zagreb in 1990. He completed his Mr (2 year) degree at the University of Belgrade, Faculty of Electrical Engineering in 1993, and his Ph.D. at the University of Novi Sad, Faculty of Technical Sciences in 1996. Currently, he works as a Full Professor at the Faculty of Technical Sciences of the University of Novi Sad, where he lectures in several Computer Science and Informatics courses. He also created B.Sc. and M.Sc. study programs in Information Engineering – Data Science. His research interests are related to Database Systems, Business Intelligence Systems, and Software Engineering. He is the author or co-author of over 170 papers, 5 books, and 30 industry projects and software solutions in the area.



Contact:

Prof. Dr. Ivan Lukovic

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ABSTRACT

For decades, in many, particularly complex organization systems, there is an open issue how to support information management process so as to produce useful knowledge and tangible business values from data being collected. One of the central roles in addressing this issue still play databases and information systems. In recent years, we are the witnesses of great movements in the area of business information management. Such movements are both of technological and methodological nature. By this, today we have a huge selection of various technologies, tools, and methods in data engineering as a discipline that helps in a support of the whole data life cycle in organization systems, as well as in information system design that supports the software process in data engineering. Despite that, one of the hot issues in practice is still how to effectively transform large amounts of daily collected operational data into the useful knowledge from the perspective of declared company goals, and how to set up the information design process aimed at production of effective software services in companies. This lecture is intended to address interdisciplinary character of a set of theories, methodologies, processes, architectures, and technologies in disciplines such as Data Engineering, Information System Design, Big Data, NoSQL Systems, and Model Driven Approaches in a development of effective software services. In September 2019, a workshop with the same title and acronym MADESID is organized in the scope of the ADBIS 2019 conference. The lecture will give a short overview of the main workshop contributions.

A MODEL-BASED METHOD FOR INFORMATION ALIGNMENT: A CASE STUDY ON EDUCATIONAL STANDARDS

Prof. Dr. Namyoun Choi, Milligan College, USA

ABSTRACT

We propose a model-based method for information alignment using educational standards as a case-study. Discrepancies and inconsistencies in educational standards across different states/cities hinder the retrieval and sharing of educational resources. Unlike existing educational standards alignment systems that only give binary judgments (either “aligned” or “not-aligned”), our proposed system classifies each pair of educational standard statements in one of seven levels of alignments: Strongly Fully-aligned, Weakly Fully-aligned, Partially-aligned***, Partially-aligned**, Partially-aligned*, Poorlyaligned, and Not-aligned. Such a 7-level categorization extends the notion of binary alignment and provides a finer-grained system for comparing educational standards that can broaden categories of resource discovery and retrieval. This study continues our previous use of mathematics education as a domain, because of its generally unambiguous concepts. We adopt a materialization pattern (MP) model developed in our earlier work to represent each standard statement as a verb-phrase graph and a nounphrase graph; we align a pair of statements using graph matching based on Bloom’s Taxonomy, WordNet, and taxonomy of mathematics concepts. Our experiments on data sets of mathematics educational standards show that our proposed system can provide alignment results with a high degree of agreement with domain expert’s judgments.

Namyoun Choi is currently an assistant professor of computer science for School of Business & Technology, The Willman B. Greene, Jr. at Milligan College in USA. She holds a bachelor’s in mathematics from Ewha Women’s University in Korea, a master’s in computer science from Drexel University in USA and a doctorate in information science and technology from Drexel in USA. Previously, Choi taught at Immaculata University in USA and was an associate faculty in Immaculata’s Department of Mathematics/Information & Digital Systems. Her research interests are Conceptual Modeling, Database Management System, Alignment Systems for Math Educational Standards, Ontology Mapping, and Schema Matching.



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SECURITY ASSESSMENT USING SAPNET IN THE INTERNET OF THINGS (IOT) ECOSYSTEM

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

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 (MEDUSA, CYSM, MIIGATE, SAURON) – in many of them as coordinator and/or technical project manager. He is the co-editor of a book on “Network Security” published by IEEE Press/ John Wiley, a co-editor of a special issue of IEEE Communications Magazine on Medical Informatics and he is on the editorial boards of several scientific journals as well as on the technical program committees of major international conferences. He has been involved extensively in curriculum development both in the USA and Greece.



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Prof. Dr. Christos Douligeris
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ABSTRACT

In the Internet of Things (IoT) era, the computing devices, the machines and even the objects are given the ability of exchanging data by containing or carrying sensors, actuators and network interfaces. Since, oftentimes, this capability is present without supervision, it is very likely that increased security risks per device or object will appear. Therefore, a security assessment that aims at mitigating the risks is of high importance and ideally starts at the designing phase to minimize the impact of vulnerabilities. In the designing phase, this assessment can be applied on the corresponding implementation model. In this lecture, first a short introduction to the ADOxx meta-modeling SAPnet platform will be given. SAPnet includes the ontology toolkit for the Stochastic Petri net (SPN) modeling of the actors' states and transitions. Additionally, it is enriched with tools for an assessment procedure used to estimate the security level of a model based on the actor's (i.e. devices, machines, objects) characteristics. Then, the lecture will walk through the assessment procedure and demonstrate how this procedure is assisted by the platform. Finally, an example implementation of an Intelligent Transportation System (ITS) life-cycle on SAPnet will be presented.

VALUE MODELLING: FROM CURRENT PRACTICE TO FUTURE APPLICATIONS

Prof. Dr. Ben Roelens, Open University, The Netherlands & Ghent University, Belgium

ABSTRACT



Value models are used to represent the organizational structure in terms of what an enterprise must do (i.e. processes) and needs (i.e. capabilities and resources) to create value and deliver it to the various stakeholders. As such, the notion of value enables the alignment of the strategy with the detailed process design in an organization. This lecture gives an overview of the current value modelling methods and the context in which they are used. This entails methods as e3-value, Value Network Analysis, and the Value Delivery Modeling Language. It is also discussed how the application of ontology patterns can further increase the semantic quality of value modelling methods. Finally, a future vision on the Value Modelling field is presented, which includes a more flexible development and use of new modelling methods in private and public organizations.

Ben Roelens is assistant professor at the Open University of the Netherlands' Faculty of Management, Science, and Technology, at which he is member of the department of Information Systems and Business Processes. He obtained his doctoral degree in 2015 at Ghent University, which dealt with the use of conceptual models to realize strategic fit. He (co-)authored 9 publications listed in Web of Science, which are published in journals as Business & Information Systems Engineering and Software and Systems Modeling. His main research interests lie in the fields of Enterprise Modelling, Business Ontology, and Service Science.



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Prof. Dr. Ben Roelens

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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. From 1986 to 1989 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.

HILTI

INTELLIGENT CUSTOMER INTERACTIONS REQUIRE AN INTELLIGENT SYSTEM SETUP

Dr. Martin Petry, Hilti

ABSTRACT



Companies must exploit the potential of new technologies, in order to offer their customers innovative solutions with clearly defined benefits. This implies the transformation towards „intelligent companies“. Thus, IT plays an important role, as the implementation of an innovative and agile system setup is a fundamental success factor. In this lecture, Dr. Martin Petry will present how Hilti lays the foundation for high agility with the concept „Solid Core – Flexible Boundary“ and what significance the newly implemented Core-System S/4 HANA has for a successful change.

Martin Petry became Hilti's CIO in 2005. He is responsible for Hilti's 450 IT employees based in Switzerland (Buchs SG), US (Tulsa, Oklahoma and Plano, Texas) and Malaysia (Kuala Lumpur). Since 2009 he is also in charge of Hilti's Business Excellence initiatives and EVP. Martin joined Hilti in 1993 and has held various leadership roles in Liechtenstein, Switzerland, Great Britain and Japan. He has developed Hilti's groundbreaking IT Strategy in 2000 and has lead its implementation, in particular Hilti's global SAP implementation cum business transformation project (standard global data structures and business processes supported by a global SAP system with ERP, BI, CRM and SCM). Since 2010 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. Recently, Martin initiated the Drive Program to set the technological foundation for the realization of Hilti's digital strategy. The program comprised the successful implementation of S/4HANA. With implementing S/4HANA as single global instance used by 29,000 Hilti employees in more than 50 countries, Hilti is a pioneer in the usage of next generation ERP systems and in setting up an intelligent enterprise. Martin earned his PhD in applied mathematics from Georg-August University in Goettingen, Germany.



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

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

BIO

Dimitris Plexousakis is a Professor of Computer Science at the Univ. of Crete 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 150 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 and Social Robotics 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.

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. 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 will be discussed in the context of solving constraint satisfaction problems for business process optimization. The ECAVI Event Calculus modelling tool, developed on top of the ADOxx metamodeling platform, will also be presented. ECAVI assists knowledge engineers in the process of axiomatizing causal domains.



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SPACE OF SERVICES (SOS) - A METHOD OF DESIGN AND IMPROVEMENT OF SERVICES

Prof. Dr. Vjeran Strahonja, FOI, Zagreb University, Croatia
Dr. Martina Tomicic-Furjan, FOI, Zagreb University, Croatia

ABSTRACT



Nowadays, the emphasis of methodology of business and information systems modelling is on digital transformation and user experience, especially on the application of existing or emerging methods, architectures and technologies in the context of service science and service engineering. With the idea of completing a set of methods and techniques for designing services and digital transformation, the Space of Services (SoS) method has been developed. The method allows us to position and consider some service in relation to other services and add value to it. The method is complementary to the usual service design methods that include structural and functional aspects as well as interaction with the user. Services are multidimensional (content of services / service facility / work intensity / service delivery location / availability of services / formalization of relationships / scalability....). SoS is trying to overcome the complexity by reducing the number of dimensions that we observe at the same time to pairs. In addition to analysis in the SoS, special attention will be paid to the methods and tools offered by OMi-LAB, which can achieve the desired design.

Vjeran Strahonja is a Full Professor at the Faculty of Organization and Informatics, University of Zagreb. His field of scientific and teaching interest are System and Software Engineering, IT Services Management and Service Engineering and ERP Systems. He is author and co-author of three books, more than 90 scientific and professional papers, and project studies. He has proven experience in planning, analysis and design of information systems, including operational and managerial responsibilities and participated in the development and implementation of complex information systems in various fields. He has actively participated in international project teams and actively uses different office and management tools, as well as modelling and development environments.

Martina Tomičić Furjan is an assistant professor at University of Zagreb, Faculty of Organization and Informatics. Her teaching and research disciplines cover operations management, business process modeling and organizational performance measurement. As a researcher, she worked on different projects on strategic planning of information systems, strategic development and implementation of information and communication technologies and organizational performance measurement. She is participating in projects related to digital transformation, creation of competitive digital business models, development of an innovative platform for digital transformation and enhancement of open data usage.



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SERVICE ENGINEERING MODELS FOR THE DESIGN AND DEVELOPMENT OF PRODUCT-SERVICE SYSTEM

Prof. Dr. Sergio Cavalieri, University of Bergamo, Italy

BIO

Sergio Cavalieri is Vice-Chancellor of Technology Transfer, innovation and Research Valorisation at University of Bergamo and President of AIDI (Italian Scientific Association of Industrial Systems Engineering Professors). He holds a Master degree and a PhD in Management and Production Engineering from Politecnico di Milano. He has been founder and coordinator of an Italian joint industry-academic Service Management Forum, made up of 50 associated industrial companies, consultancies and research centers. He has coordinated several national and international scientific projects in the areas of maintenance engineering, product-service systems and supply chain management. He is author of 4 books and more than 150 papers, published in national and international journals or presented in conference proceedings.

ABSTRACT

The design and development of a Product-Service System (PSS) raises new issues since the service component introduces further requirements than traditional product engineering. Compared to physical products, services are generally under-designed and inefficiently developed. Approaches such as New Service Development, Service Design and Service Engineering have emerged during the years to support the design and development of service either as a system itself or as a constituting element of a PSS. In particular, Service Engineering investigates service design and development with a systematic perspective and with a seamless integration of product and service contents. Purpose of the lecture is to provide a holistic conceptualisation and an up-to-date analysis of the current state of the art on Service Engineering models with a specific focus on their adoption in the PSS context. A critical analysis is also performed with the aim to define a research agenda and the most prominent key actions that could give directions for future research.



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CAPABILITY-ORIENTED ENTERPRISE MODELLING FOR MASTERING DYNAMIC BUSINESS CONTEXTS

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 data for describing business environmental contexts for organization's capabilities. In the talk, I intend to outline the capability-oriented approach for supporting model-driven organizations, as well as to present the experiences of developing capability-oriented enterprise models for industrial and data-driven cases.

Jelena Zdravkovic is the Vice Head 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 MBA in E-commerce. Jelena has published around 100 refereed papers in international conferences and scientific journals on the topics of enterprise modelling, business/IT alignment and requirements engineering. She has participated in several national and international projects on the interoperability, service modelling, and model-driven engineering. In her department Jelena is 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, and IEEE Computing. 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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PARTICIPATORY ENTERPRISE MODELING WITH THE 4EM METHOD

Prof. Dr. Janis Stirna, Stockholm University, Sweden

Dr. Birger Lantow, Rostock University, Germany

BIO

Janis Stirna has received a degree of Doctor of Philosophy in Computer and Systems Sciences from the Royal Institute of Technology, Sweden in 2001 and Associate Professor (docent) from Jönköping University, Sweden in 2008.

In 2015 he was promoted to full professor at Department of Computer and Systems Science (DSV), Stockholm University. Stirna's current research interests include enterprise modelling and requirements engineering methods and tools, organisational patterns, knowledge management and transfer of best practices. Stirna is an author or co-author of some 70 research reports and publications as well as two text books on Enterprise Modelling.

Birger Lantow is a post-doctoral researcher and teacher at the chair of Business Information Systems at the University of Rostock. He holds a diploma in Industrial Engineering. In 2010, Birger Lantow received his PhD on the topic of „Load Optimization in Wireless Sensor Networks“ from the University of Rostock. Besides his research, Birger Lantow organized the study program on the topic of information infrastructures and held major responsibilities on the implementation of the Bologna Process for the study program of Business Information Systems. Recent research focuses on Enterprise Architecture Management and Enterprise Modeling as well as Knowledge-based Systems.

ABSTRACT

Companies are often involved in Enterprise Modeling (EM) activities that address various business problems usually relayed to business and IT development or improvement of the quality of business operations. This can be done from a number of perspectives, e.g., strategy (goals, challenges, opportunities), business operations (processes, actors, resources), information (concepts, products), information technology (requirements, components), etc. However, to develop efficient solutions and to ensure their fit, all of these perspectives need to be analyzed in an integrated way, which is a core principle of EM. In practice, EM activities often involve groups of people, i.e. the models are created in a participatory way. This presentation will discuss participatory EM and the 4EM method with a particular focus on modeling business strategies.



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Week 1

10 - 12 July

15 July

16 July

ADOXX TRAINING DAYS

09:00 - 10:00	Opening Ceremony W. Gansterer, Dean Fac. of Comp. Science	Modern Approaches in Data Engineering and Information System Design I. Lukovic
10:00 - 11:00	The Power of Model-Centering H.C. Mayr, J. Michael, M. Paczona	A Model-Based Method for Information Alignment: A Case Study on Educational Standards N. Choi
11:00 - 11:30	B R E	A K
11:30 - 12:30	How can Conceptual Modelling Support Digitalization? D. Karagiannis	Security Assessment Using SAPnet in the Internet of Things (IoT) Ecosystem C. Douligeris
12:30 - 14:00	L U N	C H
14:00 - 15:00	Bee-UP The ADOxx-Team	Value Modelling: from current practice to future applications B. Roelens
15:00 - 16:00	Practice Session - DSMM H.C. Mayr, J. Michael, M. Paczona	Collaborative and well-behaved outdoor robots in harsh environment J. Röning
16:00 - 16:30	B R E	A K
16:30 - 17:30	FUJITSU Rebuilding Trust in the Digital Age Y. Takashige	HILTI Intelligent Customer Interactions Require an Intelligent System Setup M. Petry
	Get Together Open End	

Week 2

20 - 21 July

22 July

23 July

LEISURE DAYS

09:00 - 10:00	Multi-Perspective Enterprise Modelling as a Foundation of IT-Business Alignment U. Frank, A. Bock	Hybrid Knowledge Bases: the Interplay between Domain-specific Models and Knowledge Graphs R. Buchmann, A.M. Ghiran
10:00 - 11:00	Domain Storytelling: A Modelling Approach for Business Processes H. Züllighoven, S. Hofer	The industrial transition towards Product-Service-Systems: articulating enterprise modelling and economic model balancing X. Boucher
11:00 - 11:30	B R E	A K
11:30 - 12:30	Parallel Practice Session U. Frank/ H. Züllighoven	Parallel Practice Session R. Buchmann/ X. Boucher
12:30 - 14:00	L U N	C H
14:00 - 15:00	A User-Centric Platform PRINTEPS to Develop Intelligent Robot Applications T. Yamaguchi	Enterprise Modeling for Continuous Requirements Engineering M. Kirikova
15:00 - 16:00	Joining Distributed Ledger Technologies and Enterprise Models: The Concept of Knowledge Blockchains H.G. Fill	Systematic development of web information systems B. Thalheim
16:00 - 16:30	B R E	A K
16:30 - 17:30	Conceptualisation of Modelling Methods: Challenges, Enablers and Scenarios D. Bork	How to model your eco-system? J. Gordijn

17 July

18 July

19 July

Modelling Knowledge Action and Time: Action Theories and Their Application in Dynamic Domains
D. Plexousakis, T. Patkos

Digital Transformation: Better Guided than Chaotic
J. Ralyte

OMiLAB NPO: An Introduction
D. Karagiannis, M.K. Lee

Space of Services (SoS) - a method of design and improvement of services
V. Strahonja, M. Tomicic Furjan

Foundations and Applications of Business Process Compliance
S. Rinderle-Ma

OMiLAB@work
A Smart City Case - Design Thinking
The OMiLAB-Team

R E A K

B R

E A K

Service Engineering models for the design and development of Product-Service Systems
S. Cavalieri

Japanese Creative Service as a Next Generation Enterprise Modelling
Y. Hara, H. Masuda

OMiLAB@work
A Smart City Case - Metamodelling
The OMiLAB-Team

U N C H

L U

N C H

Capability-oriented Enterprise Modelling for Mastering Dynamic Business Context
J. Zdravkovic

Integrated Decision and Process Modelling
J. Vanthienen

OMiLAB@work
A Smart City Case - Analysis
The OMiLAB-Team

Participatory Enterprise Modeling with the 4EM Method
J. Stirna, B. Lantow

Modelling Knowledge Work: Integrating Decision-aware Business Processes and Case Management
K. Hinkelmann

OMiLAB@work
A Smart City Case - Simulation
The OMiLAB-Team

R E A K

B R

E A K

Practice Session - 4EM
J. Stirna, B. Lantow

Practice Session
K. Hinkelmann

OMiLAB@work
The EU Project: DigiFoF
W. Utz

24 July

25 July

26 July

Process Algebra to Model Probabilistic Behavior of Smart IoT
M. Lee

Enterprise Modelling and Business Intelligence
W. Grossmann, C. Moser

STUDENT PRESENTATIONS

Supporting Business Process Improvement through a Modeling Tool
F. Johannsen

Agent-oriented Cyber-physical Systems Modelling
C. Cares

STUDENT PRESENTATIONS

R E A K

B R

E A K

Parallel Practice Session
M. Lee/ F. Johannsen

Parallel Practice Session
W. Grossmann/ C. Cares

STUDENT PRESENTATIONS

U N C H

L U

N C H

Capability Oriented Requirements Engineering
E. Kavakli

Grounded Enterprise Modelling
E. Proper

STUDENT PRESENTATIONS

Business Processes for Business Communities
A. Oberweis

Fractal Enterprise Model and its Usage for Business Transformation
I. Bider, E. Perjons

STUDENT PRESENTATIONS

R E A K

B R

E A K

Quality Assurance for BPMN Models
A. Polini

PhD Research and Beyond within EIS: Trials and Tribulation
P. Loucopoulos

Closing Ceremony

DIGITAL TRANSFORMATION: BETTER GUIDED THAN CHAOTIC

Prof. Dr. Jolita Ralyte, University of Geneva, Switzerland

ABSTRACT



Digital transformation is not just the adoption of new information technologies and computerization of human activities. It embraces much broader strategic ambitions and involves fundamental changes in the structure, activities and even culture of the organization, with the primary goal of innovating and creating value. The approach for guiding digital transformation is necessarily exploratory, agile, and participatory, involving all stockholders as responsible co-creators. It has to deal with the challenges raised by the gap between the living world (the organization and its activities) and the artificial world (information technologies). It should provide a support for assessing the impact and the risk of the change in the organization implied by the digitalization and evolution of its information systems. Last but not least, we expect this approach to be situation-driven, easily adaptable to different organizational settings. In this course we will analyze the challenges of digital transformation, define the requirements for methods supporting it, and discuss contributions in the field.

Jolita Ralyté is senior researcher and lecturer at the Institute of Information Services Science, University of Geneva, Switzerland. She holds a PhD in Computer Science from the University of Paris 1 – Sorbonne, France. The research areas of Jolita include Situational Method Engineering, Digital Transformation, Design and Evolution of Information Services and Systems, and Requirement Engineering. She co-authored a book on situational method engineering published by Springer. Jolita is active in research coordination and organisation of scientific events. She is Chair of the IFIP WG 8.1 and she has been involved in the organisation of many international conferences. In particular, she has served as General Chair of IFIP WG 8.1 Working Conference ME 2011 and Program Chair of IEEE RCI 2016, PoEM 2015, IEEE CBI 2014, CAiSE 2012 and IFIP WG 8.1 Working Conference ME 2007. Jolita is on the editorial board of the International Journal of Information Systems Modeling and Design and the International Journal of Information Systems in the Service Sector.



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FOUNDATIONS AND APPLICATIONS OF BUSINESS PROCESS COMPLIANCE

Prof. Dr. Stefanie Rinderle-Ma, University of Vienna, Austria

BIO

Stefanie Rinderle-Ma leads the Research Group Workflow Systems and Technology at the Faculty of Computer Science, University of Vienna, Austria. She received her PhD and habilitation degree in Computer Science from Ulm University, Germany where she also worked as research assistant at the Department of Databases and Information Systems. Stefanie's main research interests comprise distributed and flexible process technology, process and data science, as well as compliance and security in process-aware information systems.



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ABSTRACT

Compliance management is a pressing challenge for almost any enterprise. With the constant advent of new regulations such as the GDPR, enterprises are continuously forced to derive, implement, monitor, check, and adapt compliance constraints on top of their business processes. This lecture will explain concepts along the compliance life cycle, including design time compliance and compliance monitoring. Also the the role of imperative and declarative process modeling with respect to compliance as well as the distinction between compliance checking and other approaches such as conformance checking will be discussed. Moreover, approaches for extracting constraints from regulatory documents will be presented. Finally, an outlook on compliance checking in distributed processes will be provided. The lecture will illustrate the concepts and approaches based on practical examples from finance, GDPR, and smart manufacturing.

JAPANESE CREATIVE SERVICE AS A NEXT GENERATION ENTERPRISE MODELLING

Prof. Dr. Yoshinori Hara, Kyoto University, Japan

Prof. Dr. Hisashi Masuda, Kyoto University, Japan

ABSTRACT



We define Japanese creative services and discuss how they have been sustained successfully and its 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 a 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-modelling 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.

Yoshinori Hara serves as professor, 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, for 13 years in Japan, and for 10 years in the Silicon Valley, California, USA. He was responsible for conducting research and development on advanced ubiquitous computing including Web/Hypermedia systems, mobile & embedded systems, adaptive user interfaces, advanced information retrieval technologies, system security & reliable systems. 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.

Hisashi Masuda serves as program-specific senior lecturer, Graduate School of Management, Kyoto University. He received his Ph.D. from Kyoto University in 2013 and served as assistant professor, Japan Advanced Institute of Science and Technology in 2013-2017. His research interest is related to new business model and marketing research method to develop and sustain not only simple services but also complex ones. And also he is focusing on how to empower such business directions by using current digital technologies.



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INTEGRATED PROCESS AND DECISION MODELLING

Prof. Dr. Jan Vanthienen, KU Leuven, Belgium

BIO

Jan Vanthienen is full professor of information systems at KU Leuven (Belgium), Department of Decision Sciences and Information Management, where he is teaching and researching on business intelligence, analytics, business rules, processes & decisions. He has published numerous papers in reviewed international journals and conference proceedings. Jan is a founding member of the Leuven Institute for Research in Information Systems (LIRIS) and 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). 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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ABSTRACT

Modelling business processes is essential for business effectiveness and efficiency. But not all business processes can easily be modelled as simple arrangements of flows and activities. Certainly knowledge-intensive processes incorporate lots of decisions and decision knowledge, that should not be hidden in process flows or activities, because hardcoding (decision) rules in processes leads to complex and inflexible process models. In analogy with the Business Process Modelling & Notation Standard (BPMN), a Decision Model & Notation standard (DMN) was developed, that allows to model the decisions separately, thereby simplifying the process model. Decision models describe business decisions, with their interrelationships and requirements, together with the detailed decision logic used to make the decision. This session is about the basics of decision modelling, and mainly about how decision models and process models should be combined (and separated) into an integrated model of processes and decisions.

ONTOLOGY-BASED ENTERPRISE MODELING FOR HUMAN AND MACHINE INTERPRETATION

Prof. Dr. Knut Hinkelmann, FHNW, Switzerland

ABSTRACT

The continuous alignment of business and IT in a rapidly changing environment is a grand challenge for today's enterprises. Decision makers use models to understand and analyze a situation, to compare alternatives and to find solutions. Additionally, there are systems that support decision makers through data analysis, calculation or simulation. While humans prefer graphical or textual models, machine-interpretable models have to be represented in a formal language. This lecture describes a meta-modelling approach, which combines human-interpretable graphical enterprise architecture models with machine-interpretable enterprise ontologies. A metamodel which is represented as a formal ontology determines the semantics of the modeling language. To create a graphical modelling language, a graphical notation can be added for each class of the ontology. Every time a new modelling element is created during modelling, an instance for the corresponding class is created in the ontology. Thus, models for humans and machines are based on the same internal representation. The approach has been applied in the CloudSocket project for selection of cloud services in order to achieve Business Process as a Service.

[Knut Hinkelmann](#) is Head of the Master of Science in Business Information Systems at the FHNW University of Applied Sciences and Arts Northwestern Switzerland. He also is visiting 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.



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MULTI-PERSPECTIVE ENTERPRISE MODELLING AS A FOUNDATION OF IT-BUSINESS ALIGNMENT

Prof. Dr. Ulrich Frank, University of Duisburg-Essen, Germany
Alexander Bock, 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, i.e. the development and evaluation of modelling languages, methods and corresponding tools. "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. Together with Tony Clark from Sheffield University, he conducts the project "Language Engineering for Multilevel Modelling" (LE4MM). Ulrich Frank is on the editorial board of multiple journals. He has been actively involved in numerous conferences and various major research projects. He had assignments as visiting researcher/professor in various countries. He is a review board member of the German National Science Foundation and the founding director of the international student exchange network IS:link.

Alexander Bock is currently a member of the Research Group for Information Systems and Enterprise Modelling at the University of Duisburg-Essen, Germany. Alexander holds a M.Sc. and B.Sc. in Business Information Systems from the University of Duisburg-Essen. His research interests include human decision making and problem solving and the use of conceptual models to facilitate these. He is concerned also with enterprise modelling, computerized decision support, and the theory and philosophy of modelling.



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ABSTRACT

While it is undisputed that today's enterprises depend crucially on IT, many companies still struggle with exploiting the potential of IT to a full extent. On the one hand, that requires adapting IT infrastructures of ever increasing complexity to changing needs of the business, on the other hand, it recommends rethinking organisational structures and business processes to create new opportunities for the efficient use of IT. In the long run, the digital transformation may even require to reinvent the entire business model, which will usually imply a major restructuring of a company and its IT. IT-Business alignment can be mastered only, if a professional perspective on the business is combined with elaborate knowledge of the IT. The field of enterprise modelling is addressing this demand by integrating models of the business, such as goal models or business process models, with models of the IT, such as models of the IT infrastructure, object models etc. In his talk, Ulrich Frank, will give an overview of "Multi-Perspective Enterprise Modelling" (MEMO) to demonstrate how enterprise models support various kinds of business and IT related analyses that support both, IT managers and line managers and that thereby serve as a pivotal instrument to foster IT business alignment. For this purpose, he will give an overview of the domain-specific modelling languages that are part of MEMO, the language architecture and the language specification. The presentation will be supplemented by a tutorial on the use of MEMO4ADO, a tool that facilitates the construction of integrated enterprise models using the MEMO languages.

DOMAIN STORYTELLING: A MODELLING APPROACH FOR BUSINESS PROCESSES

Prof. Dr. Heinz Züllighoven, WPS, Germany
Dr. Stefan Hofer, WPS, Germany

ABSTRACT

Understanding and describing requirements is probably the greatest challenge in a software development project. Only well-known and well-understood requirements can be successfully implemented. Requirements engineering is a learning and communication process for us. The domain 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 have understood their story correctly. After very few stories, we will be able to talk about people, tasks, tools, work items, and events in a domain. Domain Storytelling is an example-based approach for modelling selected business processes and their IT support. The models are easy to understand for people in different departments, business organizations and their specialists alike. The method aims at common understanding and communication about the processes which are modelled. Characteristics of Domain Storytelling are: cooperative business processes, simple pictograms make models easy to comprehend, 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.

Heinz Züllighoven graduated in Mathematics and German Language and Literature, holds a PhD in Computer Science. From 1991 until 2015 he held a chair in software architecture at the University of Hamburg 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 eGPM approach which preceded Domain Storytelling. 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 and his co-researchers are further developing the tool support for Domain Storytelling.

Stefan Hofer studied Software Engineering in Austria and wrote his PhD thesis on the transformation of application landscapes. He has been working at WPS since 2005 where requirements analysis became his main interest. With Domain Storytelling, he promotes a visual approach for learning domain language.



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A USER-CENTRIC PLATFORM PRINTEPS TO DEVELOP INTELLIGENT ROBOT APPLICATIONS

Prof. Dr. Takahira Yamaguchi, Keio University, Japan

BIO

Takahira Yamaguchi is a professor at the Faculty of Science and Technology at Keio University. He received his B.E., M.E., and Ph.D. degrees in telecommunication engineering from Osaka University in 1979, 1981, and 1984, respectively. His research interests include Ontology Engineering, KBSE, Advanced Knowledge Systems, and Machine Learning. He is a member of IPSJ, JSAI, JSFTS, JCSS, ISSJ, AAI, IEEE-CS, and ACM.

ABSTRACT

We are developing PRactical INTELigent aPplicationS (PRINTEPS), which is a user-centric platform to develop intelligent robot applications by combining five types of intelligent software modules such as knowledge-based reasoning, speech dialog, image sensing, motion management and machine learning. PRINTEPS supports end users to design and develop intelligent robot applications easily. This lecture introduces the architecture and applications of PRINTEPS for robot cafe and teaching assistant robot.



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JOINING DISTRIBUTED LEDGER TECHNOLOGIES AND ENTERPRISE MODELS: THE CONCEPT OF KNOWLEDGE BLOCKCHAINS

Prof. Dr. Hans-Georg Fill, Fribourg University, Switzerland

ABSTRACT



Distributed ledger technologies have recently gained attention due to their successful application to blockchain and smart contract platforms such as Bitcoin and Ethereum. In this talk we will explore how these technologies can contribute to the domain of enterprise modeling by presenting the concept of Knowledge Blockchains. With this concept, enterprise models can be linked with blockchains for the immutable, decentralized and transparent storage of knowledge assets, the traceability of the origin of knowledge, and the application of so-called zero-knowledge proofs. The talk will provide a brief introduction into the underlying technologies and present extensions for the ADOxx meta-modeling platform as a first proof-of-concept. Finally, potential use cases for the approach will be highlighted and an outlook will be given towards future research directions.

Hans-Georg Fill is full professor at the University of Fribourg, Switzerland and head of the Research Group Digitalization and Information Systems. He holds a PhD and a habilitation from the University of Vienna in business informatics. He was a visiting researcher at Stanford University, USA, Karlsruhe Institute of Technology, DE and Ecole Nationale Supérieure des Mines at St. Etienne, FR. His research activities focus on the development of IT-based modelling tools, distributed ledger technologies, visualization, and the alignment of conceptual modelling and semantic technologies.



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CONCEPTUALISATION OF MODELLING METHODS: CHALLENGES, ENABLERS AND SCENARIOS

Dr. Dominik Bork, University of Vienna, Austria

BIO

Dominik Bork is a post-doctoral researcher at the Research Group Knowledge Engineering of the University of Vienna. He holds a PhD and diploma in Information Science from the University of Bamberg where he started his research from 2009 until 2013. His research interests cover conceptual modelling, meta modelling, multi-view modelling, and the methodical support of modelling tool development. Besides the activities at the University of Vienna, he was member of the executive committee of the Berlin-Brandenburg chapter of the German Informatics Society and is currently an elected expert advisor of the GI special interest group of Modeling Business Information Systems. During his post-doctoral position, Dr. Bork was visiting researcher at the University of Technology, Sydney (UTS), the Instituto Tecnológico Autónomo de México (ITAM), and the University of Pretoria. Dr. Bork authored several scientific papers that have been presented at international conferences like AMCIS, ECIS, KSEM, HICSS, RCIS, or published in international journals like Enterprise Modeling and Information Systems Architectures, Interaction Design & Architectures. During his position at the University of Bamberg, he was member of the research project forFlex, dealing with highly-flexible business processes. Starting in 2015, he was part of Open Models Initiative (OMI-KA2) Erasmus+ project. Since 2017, he is project coordinator of the OeAD WTZ Austria – South Africa scientific and technological cooperation program on developing an integrated enterprise architecture management meta model.



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ABSTRACT

The benefits of domain-specific modelling methods – as a complement to general purpose and de-factor standard modelling methods like UML BPMN are doubtless. The process from an idea over the design up to the deployment of new modelling methods is referred to as the modelling method conceptualization. This presentation will provide a condensed walkthrough of all conceptualization phases by highlighting some of the most pressing challenges and discussing recent research results for overcoming these challenges. The second part of this talk will report on different modelling method conceptualization scenarios: the standard realization scenario, the standard extension scenario, and the domain-specific grassroots scenario. The aim of this part of the talk is to show possibilities of modelling method conceptualization in academia and industry.

HYBRID KNOWLEDGE BASES: THE INTERPLAY BETWEEN DOMAIN-SPECIFIC MODELS AND KNOWLEDGE GRAPHS

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 Knowledge Graphs and Domain-specific Modelling Languages was traditionally concerned with the challenge of „ontological commitment“ - i.e., checking the ontological qualities of a language in order to enforce coherence and consistency in model contents. An alternative approach to coupling the two knowledge representation approaches will be promoted by this lecture, motivated by pragmatic requirements of externalizing and combining both human-readable and machine-readable representations, thus giving a novel interpretation to the seminal SECI knowledge conversion cycle. Agile modelling languages are treated here as schemas for knowledge that is amenable to linking, reasoning and publishing with the help of semantic technology - i.e., RDF graph databases, OWL axioms, SPARQL queries and endpoints. The presentation highlights benefits of combining the Agile Modelling Method Engineering Framework with the Resource Description Framework in order to build novel knowledge acquisition methods. The lecture will present results derived from applying and refining this idea in the ComVantage FP7 EU project and the EnterKnow PED Romanian research project, taking it to the point where it may inspire a novel „model-aware“ software engineering method.

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 Technology and Conceptual Modelling, as enablers for Knowledge Management Systems and Enterprise Architecture Management. During 2012-2015 he occupied a postdoctoral 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 a Professor position at Babeş-Bolyai University and is the Scientific Director of the University's Business Informatics Research Center, where his team is investigating opportunities of interplay between the paradigms of Semantic Web, Enterprise Modelling and Requirements Engineering.

Ana-Maria Ghiran has research experience with the Semantic Web technological space, as she had applied it in her own doctoral thesis developed at Babeş-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 the Conceptual Modelling paradigm and applications of semantic technology in model-driven software engineering.



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THE INDUSTRIAL TRANSITION TOWARDS PRODUCT-SERVICE-SYSTEMS: ARTICULATING ENTERPRISE MODELLING AND ECONOMIC MODEL BALANCING

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

BIO

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.



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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 enterprise engineering 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 articulate two dimensions of Enterprise engineering: an advanced modelling method dedicated to support PSS design and engineering (based on a PSS-oriented meta-model) and a decision-making approach for PSS economic-model balancing.

ENTERPRISE MODELING FOR CONTINUOUS REQUIREMENTS ENGINEERING

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

ABSTRACT

In the era of global economy and frequent changes, the information systems development also faces the need for continuous realignment with the business processes and systems. Continuous development, continuous delivery, and continuous engineering have become common notions in contemporary systems development language. In this context, right requirements still are the key of project success; however the methods for their engineering must adhere to challenges and possibilities of enterprise digitalization levels. One of the opportunities that are provided by enterprise modeling tools is the possibility to utilize enterprise models in requirements engineering. FREEDOM framework is one of the means for structured and purposeful usage of As-Is and To-Be enterprise models for requirements engineering in different project types and enterprises.

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 200 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 system paradigms.



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SYSTEMATIC DEVELOPMENT OF WEB INFORMATION SYSTEMS

Prof. Dr. Bernhard Thalheim, Christian-Albrechts University Kiel, Germany

BIO

Bernhard Thalheim (Director, Department of Computer Science, Faculty of Engineering at Christian-Albrechts University Kiel, Germany) (MSc, PhD, DSc) is full professor at Christian Albrechts University in Germany. His major research interests are database theory, logic in databases, and systems development methodologies, in particular for web information systems. He has published more than 300 refereed publications, edited more than 30 conference volumes, co-founded three international conferences, and has been programme committee chair for almost three dozen international conferences such as MFDBS, ER, FoIKS, ASM, SDKB, NLDB and ADBIS. He got several international awards, e.g. the Kolmogorov professorship at Lomonossov University Moscow and the P.P. Chen award of Elsevier. He has been an associated professor at Dresden University of Technology, a visiting professor at Kuwait University, Alpen-Adria University Klagenfurt and others, and a full professor at Rostock University and Brandenburg University of Technology at Cottbus.



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ABSTRACT

The course presents essential elements for development of data-intensive websites. It is based on a language for front-end specification of web information systems, called storyboarding. It covers syntactics, semantics and pragmatics of WIS, introduces sophisticated concepts for conceptual modelling, provides integrated foundations for all these concepts and integrates all these concept into the co-design method for systematic WIS development. Website specification is also supported as an ADOxx add-on. This language has been applied in three-score website projects for large e-business, infotainment, community, e-governemnt, edutainment (often called e-learning), and identity websites. The course describes the research of the Cottbus and Kiel teams over more than two decades on an end-to-end methodology for the design and development of WIS.

HOW TO MODEL YOUR ECO-SYSTEM?

Prof. Dr. Jaap Gordijn, Vrije University Amsterdam, The Netherlands

ABSTRACT

An eco-system comprises a network enterprises and their customers, offering each other valuable services and/or products. How do we develop such eco-systems in a model-based way. We discuss an approach, called e3value that designs and describe eco-systems with models of increasing complexity. The method will be explained by means of a series of case studies.

Jaap Gordijn is founder and director of The Value Engineers (<https://www.thevalueengineers.nl>), a company designing peer-to-peer business models for technologies such as blockchain. Also, he is an associate professor of innovative e-business at the VUA, Amsterdam. He is the key developer of, and has internationally published on, the e3-value methodology, which comprises a graphical technique to design and evaluate networked business models (www.e3value.com). Earlier, he was a member of Cisco's International Internet Business Solution Group. As such, he was active as an e-business strategy consultant in the banking, insurance, and digital content industries for Fortune 500 companies.



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PROCESS ALGEBRA TO MODEL PROBABILISTIC BEHAVIOR OF SMART IOT

Prof. Dr. Moonkun Lee, Chonbuk National University, Republic of Korea

BIO

Moonkun Lee is professor in 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 Ph.D. 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 of NSWC in US Navy to Ada. Main research interests are SW round-trip engineering, distributed real-time systems, formal methods, ontology, behaviour engineering, etc. Currently focusing on Smart City and Factory in order to implement CPS (Cyber-Physical Systems) with dTp-Calculus in SAVE on ADOXX and Web Server.



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ABSTRACT

In general, process algebra can be the most suitable formal method to specify IoT systems due to the equivalent notion of processes as things. However there are some limitations to predict smart IoT systems with the properties of distribution, mobility and real-time. For example, Timed pi-Calculus has capability of specifying time property, but is lack of direct specifying both execution time of action and mobility of process at the same time. And d-Calculus has capability of specifying mobility of process itself, but is lack of specifying various time properties of both action and process, such as, ready time, timeout, execution time, deadline, as well as priority and repetition. In order to overcome the limitations, this lecture presents a process algebra, called, dTp-Calculus, extended from d-Calculus, by providing with capability of specifying probabilistic transitions with the set of time properties, as well as priority and repetition. Further the method is implemented as a tool, called SAVE, on the ADOxx meta-modeling platform. It can be considered one of the most practical and innovative approaches to model probabilistic behavior of smart IoT systems.

SUPPORTING BUSINESS PROCESS IMPROVEMENT THROUGH A MODELING TOOL

Prof. Dr. Florian Johannsen, University of Applied Sciences Schmalkalden, Germany

ABSTRACT



Business Process Improvement (BPI) ranks among the topics of highest priority in modern organizations. However, considering the rapidly changing customer requirements in times of high market transparency and the increasing collaboration between organizations, the conduction of BPI projects has become very challenging. Implicit process knowledge from diverse process participants needs to be elicited and transformed into improvement opportunities. In this context, the results achieved need to be properly documented, communicated and processed throughout a company. The purpose of the lecture is to present a conceptual solution (called “BPI roadmap”), which is a means for systematically performing BPI initiatives based on a set of easy-to-use and proven BPI techniques. In the in the tool “RUPERT” (Regensburg University Process Excellence and Reengineering Toolkit), the BPI techniques are realized in form of corresponding model types. The lecture gives insights into the development of the “BPI roadmap” and “RUPERT” and demonstrates the tool’s functionality by referring to a use case stemming from a cooperation project.

Florian Johannsen will hold the position of a locum professor for “Operational Application Systems” at the University of Applied Sciences Schmalkalden starting in April 2019. Until March 2019 he was a locum professor for Industrial Services in the “Department of Economics” at the University of Bremen. He successfully completed his postdoctoral thesis in October 2017 and was appointed private lecturer (Privatdozent) at the University of Regensburg. He received his doctoral degree at the University of Regensburg in March 2011, where he worked as a research assistant and postdoctoral researcher from 2006 to 2017. During that time, he led several projects with partners from industry and published his research at highly regarded conferences and in reputable journals.



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CAPABILITY ORIENTED REQUIREMENTS ENGINEERING

Prof. Dr. Evangelhia Kavakli, University of the Aegean, Greece

BIO

Evangelia Kavakli is an Associate Professor at the Department of Cultural Technology and Communication of the University of the Aegean. She obtained her PhD in Computation from the University of Manchester, Institute of Science and Technology in 1999. She is in charge of the Cultural Informatics Laboratory of the University of the Aegean. Her research on the topics of goal oriented requirements engineering, enterprise knowledge modelling, information systems privacy and cultural informatics, has been supported in the context of national and EU funded projects. Her current research focuses on requirements engineering for Big Data applications and the design of socio-cyber-physical systems. She has published over 60 peer-reviewed papers in reputed international journals and conferences and edited books. She is member of the editorial board of the Requirements Engineering Journal and has served in the program committee of a substantial number of international conferences in the field of information systems.



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ABSTRACT

The NEMO 2019 lecture concerns an approach to the application of conceptual modelling known as the Capability Oriented Requirements Engineering (CORE) approach. The conceptual modelling framework applied in CORE employs a set of complimentary and intertwined modelling paradigms based on enterprise capabilities, goals, actors, and information objects. The lecture will define the foundational concepts of CORE as well as the way of working from capturing textual descriptions from stakeholders, progressing to formally defining models of early requirements, based on the CORE meta-model, and in a stepwise refinement define functional and non-functional requirements of desired systems. The theory will be supplemented by examples from a real application of CORE on a Cyber Physical Production System.

BUSINESS PROCESSES FOR BUSINESS COMMUNITIES

Prof. Dr. Andreas Oberweis, KIT, Germany

ABSTRACT

Business processes in the age of the internet are typically not restricted to single organizations but cross organizational borders to customers, suppliers and other organizations. The design of business processes for these business communities is a complex collaborative task, which requires special methodological support. This course introduces Horus, which includes a set of modelling methods and languages to support the whole life cycle of business processes within business communities. Horus is based on high-level Petri Nets for procedure modelling and provides additional modelling support for objects, resources, organizational structures, business goals and business rules. Simulation based concepts are provided to evaluate models. Besides describing the basic concepts of Horus, the course also gives an overview about ongoing research work.

Andreas Oberweis is professor at the Karlsruhe Institute of Technology (KIT), Institute of Applied Informatics and Formal Description Methods. He is Research Director and Member of the Board of FZI Research Center for Information Technology Karlsruhe. He is co-founder of several companies in the field of Business Process and Software Engineering.



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QUALITY ASSURANCE FOR BPMN MODELS

Prof. Dr. Andrea Polini, University of Camerino, Italy

BIO

Andrea Polini is an Associate Professor at University of Camerino. He got his PhD from Scuola Superiore „Sant’Anna“ in Pisa. His research interests are in the area of Software Engineering, and in particular on Quality Assurance Strategies for Complex Software Systems, and on Business Process Modelling and Verification. Prof. Polini has conducted research activities within many EU projects and in particular he acted as Scientific Leader for the Learn PAd EU project. He also participated as research member to the FP6 STREP Telcert project, to the FP6 STREP Plastic project, to the FP7 IP TAS3 project. He was WP co-leader in the FP7 IP CHOReOS project, for which he was also responsible for the UNICAM unit. Prof. Polini has been reviewer, among the others, for ICSE 2015, AST11-18, CompSac2018, PESOS12-15, ViDaS10, EGOVIS12-16, ICST10-12, WebTest09, A-MOST08, TAP08, SOQUA07, ICSEA06, CD2005 and he organized events associated to relevant conferences in the Software Engineering domain, such as QASBA11-13, ARAMIS08, IW-SOSwE07, IW-SOSwE06, and WS-MaTe 06. Currently he is the responsible for the Computer Science Division, and UNICAM Rector Delegate for the Development of Digital Infrastructures.



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ABSTRACT

Quality of delivered models is an important aspects when a modelling approach is proposed. Problems discovered during the modelling phase permit to save a lot of money with respect to issues discovered later, and when specific deployment activities are already in place. For such a reason it is in general important to complement modelling methods with strategies to check their qualities, and in particular with automatic tools permitting to spot possible issues. The lesson, after a general introduction, will focus on the Business Process Modelling Notation, and qualities such as understandability and correctness. Understandability will be introduced considering a specific guidelines framework that provides suggestions on how to derive BPMN models that are easier to understand. Correctness will be discussed considering a formal semantics developed according to the SOS style and to the possibility to automatically check general properties such as safeness and soundness, as well as domain specific properties.

ENTERPRISE MODELLING AND BUSINESS INTELLIGENCE

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

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.

Wilfried Grossmann is 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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AGENT-ORIENTED CYBER-PHYSICAL SYSTEMS MODELLING

Prof. Dr. Carlos Cares, University of La Frontera, Chile

BIO

Carlos Cares studied Civil-Informatics Engineering at the Universidad de Concepción obtaining his engineering degree and professional qualification in 1989. He obtained his Master of Engineering degree at the Universidad Federico Santa María, at Chile in 1996 and his PhD. degree at Technical University of Catalonia, Spain in 2011. As part of his PhD thesis he developed iStarML for Agent oriented and Goal-oriented modelling interoperability. In 2005 he led one of the two winning teams in the first version of the Agent-oriented modelling contest called CLIMA in London. Nowadays is the head of the Software Engineering Studies Centre at the University of La Frontera in Temuco, Chile.

ABSTRACT

The low cost of IoT devices such as sensors and micro-controllers has enabled Industry 4.0. This mainstream contains not only industrial applications but also other ones perceived as revolutions, which has been summarized as smart-everything, internet-of-everything and, of course, the smart city revolution. Cyber-physical systems (CPS) are the integration of distributed hardware controlled by distributed software with the aim of controlling physical processes. Therefore they should have both software-hardware devices for perceiving real world variables and software-hardware devices for acting in the real world. In this NEMO-2019' lecture, the current state of modelling techniques for CPS and how agent-oriented modelling languages provide most of the required features for CPS modelling will be presented. In the practice part of the lecture, a set of different agent-oriented patterns are shown and the professor will guide the design of your own CPS by using these patterns.



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GROUNDED ENTERPRISE MODELLING

Prof. Dr. Erik Proper, LIST, 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. 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 semantic 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.

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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FRACTAL ENTERPRISE MODEL AND ITS USAGE FOR BUSINESS TRANSFORMATION

Prof. Dr. Ilia Bider, Stockholm University, Sweden
Prof. Dr. Erik Perjons, Stockholm University, Sweden

BIO

Ilia Bider is a university Lecturer at the Department of Computer and Systems Sciences of Stockholm University. Having background in both engineering and science, I worked in practice in different capacities, such as programmer, bug-fixer, group and project leader, technical and business consultant, functioning as an employee for others, and as a co-founder of a Swedish consulting business IbisSoft. I always use my practical experience as inspiration for research, and my practice as a test-bed for new research ideas. The project group that I led got both national (SISA) and international (AIS) awards for innovation in teaching in 2017.

Erik Perjons My main research focus has been on identifying, understanding and analyzing practical problems in organizations, and designing business and IT solutions addressing these problems. My research interest includes areas such as enterprise and conceptual modeling, business and IT strategies, business process management, system integration, knowledge management, business intelligence and data science. Today, I work as a University Lecturer at the Department of Computer and Systems Sciences of Stockholm University, and function as a manager of DSV's IS unit. I have worked as a media analyst, analyzing how organizations or products are portrayed in different media such as newspapers, television and the internet.

ABSTRACT

The lecture introduces a new type of enterprise models called Fractal Enterprise Models (FEM), with accompanying methodological support for their design. FEM shows interconnections between the business processes in an enterprise by connecting them to the assets they use and manage. Assets considered in the model could be tangible (buildings, heavy machinery, etc.) and intangible (employees, business process definitions, etc.). A FEM model is built by using two types of patterns called archetypes: a process-assets archetype that connects a process with assets used in it, and an asset-processes archetype that connects an asset with processes aimed to manage this asset (e.g., hiring people, or servicing machinery). Alternating these patterns creates a fractal structure that makes relationships between various parts of the enterprise explicit. There are several areas where FEM can be used in practice, e.g. for planning and completing organizational change, including a radical one, such as business model transformation. The lecture will present practical examples of FEM usage.



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PHD RESEARCH AND BEYOND WITHIN EIS: TRIALS AND TRIBULATION

Prof. Dr. Pericles Loucopoulos, Manchester University, UK

ABSTRACT

Research has often been regarded as a “wicked problem”, an activity of informed curiosity when researchers state what they are doing when they don’t really know what they are doing. It is a process which is guided by a particular methodology the choice of which is based on the contextual setting of the research topic (the challenges) as well as the motivation for a solution (the deliverables). In this lecture, we will examine issues involved in research with particular emphasis on research in the field of Enterprise Information Systems (EIS). We will examine the issues underpinning the EIS domain, the emergence of research needs from digitisation, to interpretation and more recently to transformation of enterprises. Given this context, we will explore different research methodologies that may be deployed, such as those of Design Science Research, Action Research, Case Study, Survey Design, Mixed Methods and Qualitative Methods, each one of which is suited to different motivational characteristics of the underlying research goals. We will also explore the social dimension of research, including issues encountered by researchers in settings involving communities within their specific research environment as well as other related communities (e.g. the NEMO Summer School) and the broader EIS community. Branching out from a close research environment by exploiting gained experiences, towards collaborative initiatives, competing for research funding and helping the next generation of researchers will also be addressed in this lecture.

Pericles Loucopoulos holds appointments at the School of Computer Science of the University of Manchester (UK) and at the Department of Informatics of Harokopio University of Athens (Greece). His research has been supported by numerous research grants supporting over 25 research projects, most of them in collaboration with industry. He is the editor-in-chief of the Journal of Requirements Engineering and also serves as Associate Editor on 15 other journals. His research focus is on the use of conceptual modelling for achieving alignment between enterprise and information technology systems with particular focus on requirements specification and analysis. He has developed the Enterprise Knowledge Development (EKD) and more recently the Capability Oriented Requirements Engineering (CORE) methods, both of which are part of the Open Models Initiative (OMI) platform. He is a member of a number of international professional bodies, has served as General Chair or Programme Chair of many international conferences and has served on over 300 conference programme committees. He has been awarded the Edelman Laureate medal and the President’s Medal of the UK OR Society. He has authored 9 books, edited 23 books and conference proceedings and has published over 200 papers in journals and international conferences.



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A Smart City Case - Design Thinking

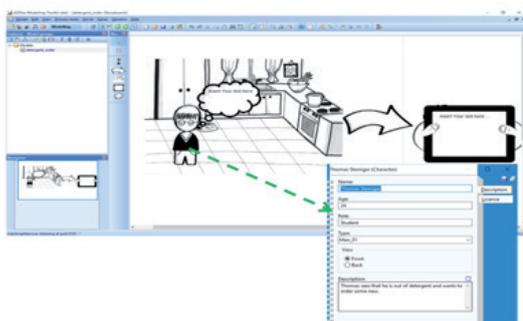
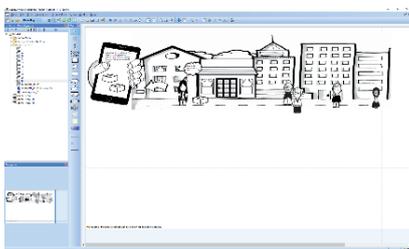
By 2050 two-thirds of the world's population is expected to live in cities (United Nations, 2014). One of UN's explicit development goals is to ensure that urban agglomerations provide sustainable cities and communities.

As cities become more and more complex planning bodies around the world consider digitization as one possible solution to their pressing issues. Initiatives in which technologies play a key role, like smart mobility, smart housing, and smart environment have been implemented all over the world. The ultimate goal is to use technology in such a way, that it is less perceptible to the end user yet it increases the life quality, comfort and safety of the city's citizens. This requires an integrated, interdisciplinary approach, which allows identifying, analyzing, and supporting humans and their context in a predominantly digital environment [1].

Such an approach is facilitated by Design Thinking which applies designer problem solving techniques for agile, ideation, prototyping and testing in innovative processes. It enables early exploration and validation of design(s) of new services, smart products and disruptive business models.

In working groups, students will be introduced to storyboards as a Design Thinking tool. We will use haptic paper objects to depict scenes, the key moments in a storyboard, in the context of a given Smart City problem. Subsequently we will use an automated transformation process supported by the Scene2Model tool to transform these scenes into diagrammatic models while simultaneously semantically enriching them.

The result of this workshop is intended as inspiration for the following Smart City exercises.



adding knowledge to modelling objects



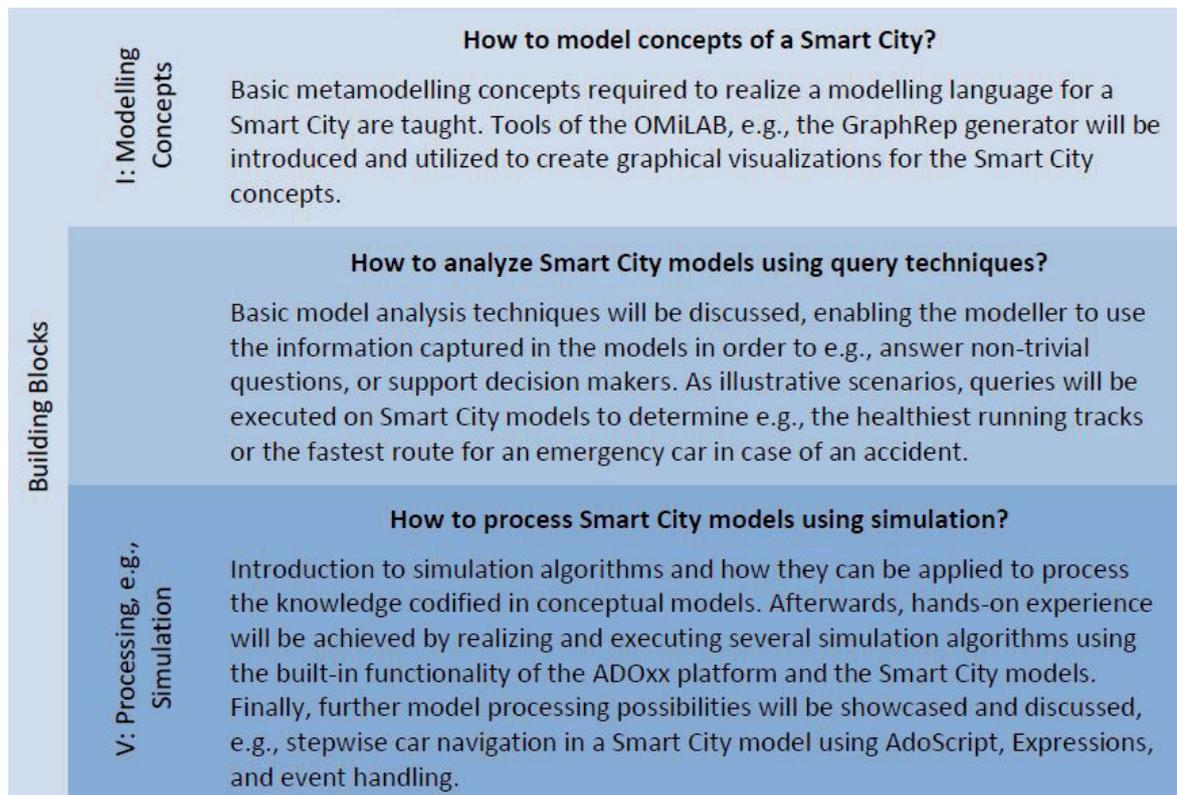
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A Smart City Case - Metamodelling

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 [1]. Based on the outcome of the Design Thinking workshop results, 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 people can be realized [2].

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



^[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.

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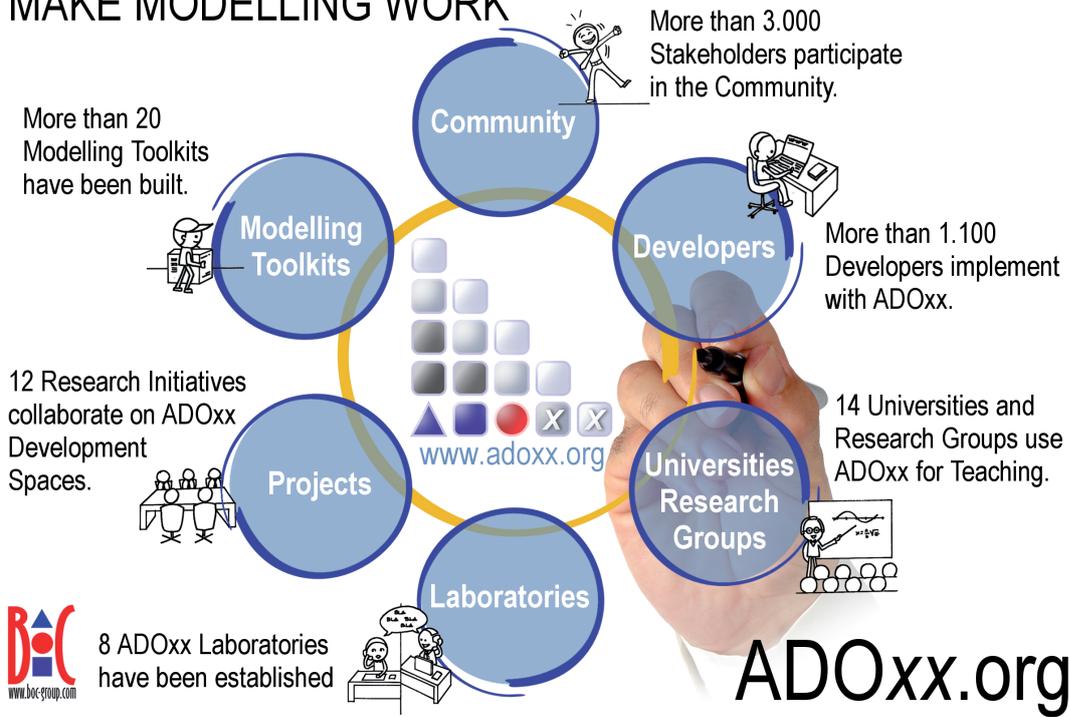
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MAKE MODELLING WORK



OMILAB BOOK

Dimitris Karagiannis
Heinrich C. Mayr
John Mylopoulos *Editors*

Domain-Specific Conceptual Modeling

Concepts, Methods and Tools

 Springer

Volume 2 currently in preparation.

**If you are interested in contributing
please contact Prof. Dr. Karagiannis at**

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