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Conceptual Modeling


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Valencia, Spain, November 6–9, 2017
Proceedings

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Preface

The International Conference on Conceptual Modeling (ER) is the leading global forum for current research on conceptual modeling (CM) and trendsetting CM applications. The topics of interest span the entire spectrum of CM: theoretical and ontological foundation, methods and tools for developing and communicating conceptual models and meta models, techniques for transforming conceptual models into effective implementations, and the impact of CM techniques on databases, business strategies, and information systems development. The ER conference series has been held at a variety of superb locations, rotating in successive years between Europe, the Asia-Pacific region, and the Americas, and attracting an international community of scholars.

This volume contains the research and technical papers comprising the main program of ER 2017 in its 36th conference edition held during November 6–9, 2017, in the beautiful city of Valencia, Spain. More than 450 researchers from all over the world followed our call for papers and submitted 153 papers about their latest research results. Each paper was carefully reviewed by at least three members of the Program Committee, which consisted of renowned scientists from more than 40 nations. Finally, 28 papers, i.e., about 18%, were selected as full papers to be presented at the conference and to be included in this volume. An additional 10 submissions were accepted as short papers. The quality of these 38 papers is a tribute to the authors and also to the reviewers who guided any necessary improvements.

Focal points of these papers are: (1) CM and ontologies in the context of requirements analysis, business processes, and other domains; (2) foundations of CM, for example, regarding multi-level modeling; (3) CM methodology with a broad spectrum of innovative answers to interesting research questions; (4) ontologies; and (5) model efficiency.

This volume would not have materialized without the support of many people. First, we are very grateful to all the authors for their continuous commitment and intensive work. Second, we would like to thank the Program Committee members and additional reviewers for providing timely and in-depth assessments. Furthermore, we thank all the people and sponsors who helped in the organization of ER 2017. Without all that effort there would have been no substance for this volume and no success for ER 2017. Last but not least, we are greatly indebted to the five invited speakers, Prof. Lois Delcambre (USA), Prof. Josef Mitterer (Austria), Prof. Antoni Olivé (Spain), Francisco Garcia-Moran (Spain), and Prof. Yair Wand (Canada), for accepting our invitation to address this conference.

September 2017

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Conceptual Modeling? When We are Awash in Information?

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Abstract. We challenge the traditional who/what/why of conceptual modeling of information in a world where structured data is ubiquitous.

Who (defines conceptual models?) Analysts? Developers? Ontology specialists? All of the above. But non-traditional users such as scientists, journalists, educators, and almost anyone with data to share are being empowered to define their own information with easy to use data storage and web management systems.

What (is being modeled?) A database as part of an information system or software system? Information that supports a business process? Definitely. But some users define their structured information directly – for display and processing.

Why (is a conceptual model defined?) To describe information and processing of an information system or a software system? To promote collaboration and communication? To increase understanding of a domain? To document a system? Certainly. But let's consider the goals of people who define and publish their own structured information directly; perhaps we can use a conceptual model to offer them useful functionality for their information (e.g., for browsing, mapping, calculations).

We suggest that domain users are doing conceptual modeling. And we believe that they can relate their conceptual model to a domain model when they are enticed by sophisticated information widgets that can select, display, and process their information. We also highlight a problem that has been present since conceptual models (or database schemas) were first created: information of interest to a user might be present in the “data” (such as “Oregon” being part of someone’s address) or in the “schema” such as “Oregon” or “California” being attribute names (for a sport fishing registry). Finally, we show that users (who understand their own information) can perform schema integration, including complex operations such as pivot and unpivot, when guided with examples (of the widgets) using sample data.

Conceptual Modeling: Philosophical Considerations

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Abstract. The underlying philosophies of Conceptual Modeling vary between Critical Realism and Ontological Constructivism and fit into the philosophical panorama: *There are distinctions and therefore we make them* (Realism) — *We make distinctions and therefore they are* (Idealism/Constructivism).

The presupposition of dichotomies between language and world, description and object, between what we talk and what we talk about, helps to freeze, dogmatize and fundamentalize the *status quo* into a “real” world and “its” representations.

Claims of representing the real world remain irrelevant as long as consensus prevails. When conflicts arise, the world and other potential decision criteria in a beyond of discourse stay mute: the criteria fail and the opposing parties get into a stalemate... In a recent conversation the ontologist Barry Smith said on how he would deal with competing ontologies: “I try to win.”

Proposing an alternative philosophy of change requires a shift in the vocabulary and in the direction of discourse: Instead of advocating a dichotomy between a fixed/independent world and privileged representations, a philosophy of change favors relations between *so far* and *from now on*. The object of a description relates to the description of the object like the description *so far* to the description *from now on*. Every description of the object changes the object into a new object of further descriptions.

Philosophical ontologists try to transcend the “here and now” into the past and future. I opt for transparency rather than transcendence. The world, the reality is nothing but the present state of things.

IT Professionals and Conceptual Modeling

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Abstract. IT professionals, explicitly or implicitly, develop conceptual models when trying to produce a high level description of the fundamental principles and the main functionalities of the “systems” (understood in the most general way: Enterprise Architecture, Infrastructure Blueprints, Information Systems, Database Systems, etc.) they want to implement. They do it because they want

1. enhance the understanding of the “users”,
2. facilitate the dialogue among system’s stakeholders,
3. provide system designers with an input to produce system specifications at different levels, and
4. document the system for future reference and collaboration activities.

There are several relevant questions to IT practitioners about the use of conceptual modelling that the author will try to cover in his presentation on his more than 40 years of professional experience in the public sector as well as his conversations with hundreds of IT professionals in the public and private sectors:

1. Why “conceptual modeling” is considered by many IT professionals as “too theoretical” or “too heavy”?
2. Which are the barriers and facilitators for its more formal adoption?
3. Is there a contradiction between “being agile” (for instance using agile development methodologies like Scrum) and the formal use of conceptual models?
4. What can be done about it?

The author will try to illustrate the answer to some of the above mentioned questions based on the results on an informal survey filled in by many of his contacts in public and private sectors.

Classification and Science

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Abstract. Classifying phenomena is deeply intertwined with cognition and human information processing. Therefore, identifying classes is a central aspect of information technology (IT). Choosing a “good” set of classes is both theoretically and practically important. Two cognitive principles underlie the cognitive approach to classification. First, classes encapsulate inferences about the properties of their instances – in other words, knowing a category can “tell” us more about an instance that required to identify the category it belongs to. Second, collections of classes should provide economy of storage. This leads to a view of classes as carriers of domain knowledge in the form of inferences about situations, which is more than “containers” for information.

We discuss how this view can be used to model scientific theories. We explain how the principles can be used to guide the choice of collections of classes. We show how the approach can be used in scientific discourse by applying it to one of the most well-known areas of physics – the electromagnetic equations as developed originally by Maxwell. The example shows how the classification based approach can be generally applied to scientific problems and that it has two advantages. First, it can provide a simpler and more informative account of the sample phenomena. Second, the classification principles can lead to questions to be asked to help resolve differences between observations and predictions. This means that the resolution of problems can be framed in terms of changes to classification structures, and to principles suggesting how such changes might occur.

Contents

The Universal Ontology: A Vision for Conceptual Modeling and the Semantic Web (Invited Paper)	1
<i>Antoni Olivé</i>	
Conceptual Modeling Methodology	
CE-SIB: A Modelling Method Plug-in for Managing Standards in Enterprise Architectures	21
<i>Christoph Moser, Robert Andrei Buchmann, Wilfrid Utz, and Dimitris Karagiannis</i>	
A Catalogue of Reusable Context Model Elements Based on the <i>i*</i> Framework	36
<i>Karina Abad, Wilson Pérez, Juan Pablo Carvallo, and Xavier Franch</i>	
Modelling Processes with Time-Dependent Control Structures	50
<i>Horst Pichler, Johann Eder, and Margareta Ciglic</i>	
Towards Rearchitcting Meta-Models into Multi-level Models	59
<i>Fernando Macías, Esther Guerra, and Juan de Lara</i>	
Mining Goal Refinement Patterns: Distilling Know-How from Data	69
<i>Metta Santiputri, Novarun Deb, Muhammad Asjad Khan, Aditya Ghose, Hoa Dam, and Nabendu Chaki</i>	
Goal-Oriented Regulatory Intelligence: How Can Watson Analytics Help? . . .	77
<i>Okhaide Akhigbe, Susie Heap, Sakib Islam, Daniel Amyot, and John Mylopoulos</i>	
An Alternative Approach to Metainformation Conceptualisation and Use . . .	92
<i>Cesar Gonzalez-Perez and Patricia Martin-Rodilla</i>	
Schema Evolution and Foreign Keys: Birth, Eviction, Change and Absence	106
<i>Panos Vassiliadis, Michail-Romanos Kolozoff, Maria Zerva, and Apostolos V. Zarras</i>	
Conceptual Modelling of Autonomous Multi-cloud Interaction with Reflective Semantics	120
<i>Andreea Buga, Sorana Tania Nemeş, and Klaus-Dieter Schewe</i>	

Querying Graph Databases: What Do Graph Patterns Mean? 134
Stephan Mennicke, Jan-Christoph Kalo, and Wolf-Tilo Balke

Scaffolding Relational Schemas and APIs from Content in Web Mockups . . . 149
Alfonso Murolo, Sybil Ehrensberger, Zera Asani, and Moira C. Norrie

SourceVote: Fusing Multi-valued Data via Inter-source Agreements 164
*Xiu Susie Fang, Quan Z. Sheng, Xianzhi Wang, Mahmoud Barhamgi,
 Lina Yao, and Anne H.H. Ngu*

Level-Aware Ecosystem Transformations for Industrial
 Lifecycle Interoperability 173
Matt Selway, Markus Stumptner, Michael Schrefl, and Andreas Jordan

Conceptual Modeling: Enhancement Through Semiotics. 182
Veda C. Storey and Bernhard Thalheim

Conceptual Modeling and Requirements

Towards an Ontology for Privacy Requirements
 via a Systematic Literature Review 193
Mohamad Gharib, Paolo Giorgini, and John Mylopoulos

What Happens to Intentional Concepts in Requirements Engineering
 if Intentional States Cannot Be Known? 209
Ivan J. Jureta

Goal Models for Acceptance Requirements Analysis
 and Gamification Design 223
Luca Piras, Elda Paja, Paolo Giorgini, and John Mylopoulos

Modeling Regulatory Ambiguities for Requirements Analysis. 231
Aaron K. Massey, Eric Holtgreffe, and Sepideh Ghanavati

An Experimental Evaluation of the Understanding of Safety
 Compliance Needs with Models 239
*Jose Luis de la Vara, Beatriz Marín, Clara Ayora,
 and Giovanni Giachetti*

Foundations

Cardinality Constraints with Probabilistic Intervals 251
Tania Katell Roblot and Sebastian Link

Contextual Keys 266
Ziheng Wei, Sebastian Link, and Jiamou Liu

A Comprehensive Formal Theory for Multi-level Conceptual Modeling 280
*João Paulo A. Almeida, Claudenir M. Fonseca,
and Victorio A. Carvalho*

Alignment-Based Trace Clustering 295
Thomas Chatain, Josep Carmona, and Boudewijn van Dongen

Conceptual Modeling in Specific Context

The Conceptual Modelling of Dynamic Teams for Autonomous Systems 311
Rick Evertsz, John Thangarajah, and Michael Papasimeon

Conceptual Modeling for Genomics: Building an Integrated Repository
of Open Data 325
*Anna Bernasconi, Stefano Ceri, Alessandro Campi,
and Marco Masseroli*

Towards Thinking Manufacturing and Design Together:
An Aeronautical Case Study 340
*Thomas Polacsek, Stéphanie Roussel, François Bouissiere,
Claude Cuiller, Pierre-Eric Dereux, and Stéphane Kersuzan*

OCL_{UNIV}: Expressive UML/OCL Conceptual Schemas
for Finite Reasoning 354
Xavier Oriol and Ernest Teniente

Conceptual Modeling and Business Processes

Goal Orchestrations: Modelling and Mining Flexible Business Processes 373
Metta Santipuri, Aditya Ghose, Hoa Khanh Dam, and Suman Roy

Configurable and Executable Task Structures Supporting
Knowledge-Intensive Processes 388
Nicolas Mundbrod and Manfred Reichert

Various Notions of Soundness for Decision-Aware Business Processes 403
Kimon Batoulis, Stephan Haarmann, and Mathias Weske

Data, Control, and Process Flow Modeling for IoT Driven
Smart Solutions 419
P. Radha Krishna and Kamalakar Karlapalem

Model Efficiency

Determining the Preferred Representation of Temporal Constraints
in Conceptual Models 437
C. Maria Keet and Sonia Berman

User Perception of Numeric Contribution Semantics for Goal Models:
An Exploratory Experiment 451
Norah Alothman, Mehrnaz Zhian, and Sotirios Liaskos

On the Impact of the Model-Based Representation of Inconsistencies
to Manual Reviews: Results from a Controlled Experiment 466
Marian Daun, Jennifer Brings, and Thorsten Weyer

Ontologies

On the Semantics of Ongoing and Future Occurrence Identifiers 477
Nicola Guarino

Ontological Evolutionary Encoding to Bridge Machine Learning
and Conceptual Models: Approach and Industrial Evaluation 491
Ana C. Marcén, Francisca Pérez, and Carlos Cetina

The OntoREA© Accounting and Finance Model: Ontological
Conceptualization of the Accounting and Finance Domain 506
Christian Fischer-Pauzenberger and Walter S.A. Schwaiger

Teleologies: Objects, Actions and *Functions*. 520
Fausto Giunchiglia and Mattia Fumagalli

Correction to: SourceVote: Fusing Multi-valued Data via Inter-source
Agreements E1
*Xiu Susie Fang, Quan Z. Sheng, Xianzhi Wang, Mahmoud Barhamgi,
Lina Yao, and Anne H.H. Ngu*

Author Index 535