Software and Systems Modeling (2023) 22:547–550
https://doi.org/10.1007/s10270-023-01089-2

GUEST EDITORIAL

Guest editorial to the special section on PoEM'2021

Estefanía Serral[1] · Janis Stirna[2] · Jolita Ralyté[3] · Janis Grabis[4]

Received: 20 January 2023 / Accepted: 23 January 2023 / Published online: 9 February 2023

Abstract
This guest editorial presents the special section of 14th IFIP WG 8.1 Working Conference on the Practice of Enterprise Modeling (PoEM 2021). The best papers of PoEM 2021 were invited to be revised and significantly expanded. Eight papers were finally accepted for publication in the special section. These papers are an excellent representation of the state of the art on Enterprise Modeling, showing as well the importance of applying the research contributions into practice.

Keywords Enterprise modeling · Conceptual modeling · Modeling methods

1 Introduction

This special section follows the 14th IFIP WG 8.1 Working Conference on the Practice of Enterprise Modeling (PoEM 2021). PoEM is a conference series aimed at improving the understanding of the practice of enterprise modeling and architecture. Its core mission is to be a forum for sharing experiences and knowledge between the academic community and practitioners working in the area of enterprise modeling. PoEM 2021 took place during November 24–26, 2021. It was organized by the Riga Technical University (RTU), Latvia as a hybrid conference—partially at the newly enhanced Ķīpsala campus of RTU and partially online.

✉ Estefanía Serral
estefania.serralasensio@kuleuven.be

Janis Stirna
js@dsv.su.se

Jolita Ralyté
jolita.ralyte@unige.ch

Janis Grabis
grabis@rtu.lv

[1] LIRIS Organization KU Leuven, Warmoesberg 26, Box 15101, 1000 Brussels, Belgium

[2] Department of Computer and Systems Sciences, Stockholm University, Postbox 7003, SE 164 07 Kista, Sweden

[3] University of Geneva, CUI, Ballette Bât. A, Route de Drize 7, 1227 Carouge, Switzerland

[4] Management Information Technology, Riga Technical University, Zunda Krastmala 10, Riga 1048, Latvia

The theme of PoEM 2021 was the use of enterprise modeling and enterprise architecture toward ensuring sustainability and resilience of enterprises and societies. The theme was motivated by the increasing demand for making businesses, services and products more environmentally friendly and efficient as well as lasting longer and being more robust to unexpected changes. The field of enterprise modeling should seek to support these challenges by analyzing and reporting on the current state of the art in practice, as well as investigating and developing innovative methods and tools.

The main track of PoEM 2021 included 20 papers on topics such as enterprise modeling and enterprise architecture; methods and method engineering; business process modeling and management; requirements for privacy, security and governance; and case studies and experiences [1]. PoEM 2021 also featured two keynotes, namely "Software Sustainability: The Challenges and Opportunities for Enterprises and Their Researchers" by Patricia Lago and "Design Science for Constructive Enterprise Modelling" by Paul Johannsson and Erik Perjons. In addition, the main track of the conference included a panel on *How to Build a Perfect Enterprise Modeling Method*. The panelists discussed the following questions: What are the requirements for a perfect enterprise modeling method, which method engineering approach is to be used for developing enterprise modeling methods, as well as what expertise and effort are required to build and use an enterprise modeling method. The panel discussion is summarized in [2].

In addition to the main conference, PoEM 2021 had several accompanying events. It had three workshops: the

2nd Workshop on Blockchain and Enterprise Systems (BES 2021), the 1st Workshop on AI native Enterprises, and the 1st Workshop on Enterprise Modeling for the Digital Transformation (EM4DT) [3]. A PoEM Forum featured eight papers on emerging topics of enterprise modeling [4].

The best papers of PoEM 2021 were invited to this special section in the Journal of Software and Systems Modeling (SoSyM). Initially, nine papers were invited based on the reviewers' comments, feedback at the conference, and relevance to the special section. Each of the invited articles was thoroughly revised and significantly expanded for the initial submission to SoSyM. This was followed by multiple rounds of reviewing, which led to the final acceptance of eight articles selected for publication.

2 Selected articles

The articles included in this special section offer a good representation of the current research topics addressed by the PoEM conference series and its community of researchers. They tackle topics such as enterprise modeling foundations, business process modeling and management, applications of machine learning for enterprise modeling, method engineering, digital twins, as well as security and resilience. A transcending theme in most of these papers is the application of research contributions in practice thus following the core vision of the PoEM conference series. The following articles have been included in the special section.

On enterprise coherence governance with GEA: a 15-year co-evolution of practice and theory by *Henderik A. Proper, Roel Wagter, and Joost Bekel*. This article reports and reflects on the development of the General Enterprise Architecting (GEA) method including how the theory and practice of enterprise architecture co-evolved. The article presents the core elements of GEA and illustrates them with the real-world case of modeling a social-housing company in The Netherlands. A number of valuable lessons learned from developing and applying this method are also shared in the article.

A method for digital business ecosystem design: situational method engineering in an action research project *by Chen Hsi Tsai, Jelena Zdravkovic, and Fredrik Söder*. This article addresses the challenge to support design and management of digital business ecosystems (DBE) by means of enterprise modeling. Following the principles of method engineering, it analyzes industrial requirements for a modeling method that supports this purpose, as well as proposes a design for it in the form of modular method maps. The proposal is validated by action research in the setting of Digital Vaccine, a Swedish DBE managing health-related service.

Guidelines to derive an e3 value business model from a BPMN process model—an experiment on real-world scenarios by *Isaac da Silva Torres, Marcelo Fantinato, Gabriela Musse Branco, and Jaap Gordijn*. This article elaborates on a solution for deriving e^3value models from BPMN models to explicate interactions of organizations in a business ecosystem. The article puts forward a set of guidelines and tests, which are evaluated in two real-world cases.

Machine learning for enterprise modeling assistance: an investigation of the potential and proof of concept by *Nikolay Shilov, Walaa Othman, Michael Fellmann, and Kurt Sandkuhl.* This article investigates the potential of using machine methods for assistance in improving enterprise models. The authors' assumption is that such an approach could contribute to discovering regularities in models. The article's contribution lies in the proposed modeling assistance scenarios, demonstration of the feasibility of the approach, as well as its evaluation with respect to the potential benefits for the modeler.

Validation and verification in domain-specific modeling method engineering: an integrated life-cycle view by *Qin Ma, Monika Kaczmarek-Heß, and Sybren de Kinderen.* This article deals with the problem of improving enterprise model quality in terms of syntactic validity, semantic validity, and pragmatic validity. To this end, the article proposes systematic embedding of verification and validation techniques into the engineering of domain-specific enterprise modeling methods. The implication for the practice of method engineering, research, and education is also discussed.

Automaton-based comparison of Declare process models by *Nicolai Schützenmeier, Martin Käppel, Lars Ackermann, Stefan Jablonski, and Sebastian Petter.* This article proposes an automaton-based approach to address the problem of the difficulties in determining whether and how much two business processes expressed in the Declare modeling language are semantically equal. The approach transforms Declare process models into finite state automatons and applies automata theory for solving the problem.

Securing critical infrastructures with a cybersecurity digital twin by *Massimiliano Masi, Tanjs Pavleska, Helder Aranha, and Giovanni Paolo Sellitto*. This article puts digital twins in use for system architecture design by elaborating a cybersecurity view. A cybersecurity Digital Twin is then derived from this view as a part of the security-by-design practice for industrial automation and control systems used in critical infrastructures. The proposal supports simulating attacks and helps identifying cybersecurity measures. The practical usefulness of the proposed methodology and its application is demonstrated in two real-world use cases: the cooperative intelligent transport system and the road tunnel scenario.

Context-aware modeling for knowledge-intensive medicinal product development processes by *Zeynep*

Ozturk Yurt, Rik Eshuis, Anna Wilbik, and Irene Vanderfeesten. This article deals with the difficulty in capturing knowledge-intensive processes (KiPs) with conventional modeling and management approaches. The processes targeted in the paper are related to advanced therapy medical products (ATMP) and are often executed in an ad hoc manner. This paper presents an explorative case study in which Enterprise Modeling and Context-aware Business Processes have been used to support ATMP scientists in managing the regulatory aspects of ATMP development processes more efficiently and effectively. The aspect of context awareness is supported by introducing a novel concept of executing-dependent dynamic context, which is defined and subject to changes during the process execution based on the interpretations of the knowledge worker performing the process.

Acknowledgements We wish to thank the reviewers who dedicated a great effort into providing constructive reviews. The review team consisted of 26 renown scholars in the field of Enterprise Modeling and Conceptual Modeling: Steven Alter, Dominik Bork, Robert Buchmann, Michael Fellmann, Ana-Maria Ghiran, Jens Gulden, Simon Hacks, Jennifer Horkhoff, Martin Henkel, Knut Hinkelmann, Amin Jalali, Janis Kampars, Hasan Koç, Graham Mcleod, Oscar Pastor, Rūta Pirta, Henderik Proper, Kristina Rosenthal, Marcela Ruiz, Kurt Sandkuhl, Nikolay Shilov, Eriks Sneiders, Monique Snoeck, Darijus Strasunskas, Stefan Strecker, and Victoria Torres. A big gratitude is due to the SoSyM editorial team and editors-in-chief Bernhard Rumpe, Jeff Gray, and Benoit Combemale for their continued support of the PoEM conference series. We especially would like to thank Martin Schindler for his guidance and support of the work on this special section.

References

1. Serral, E., Stirna, J., Ralyté, J., Grabis, J.: The practice of enterprise modelling-14th IFIP WG 8.1 working conference, PoEM 2021, Riga, Latvia, November 24–26, 2021, In: Proceedings. lecture notes in business information processing 432, Springer (2021)
2. Ralyté, J., Bork, D., Jeusfeld, M.A., Kirikova, M, Stirna J.: Panel discussion: How to build a perfect enterprise modeling method. In Barn, B., et al. (eds). CEUR workshop proceedings 3045, CEUR-WS.org 2021, pp.78–87 (2021)
3. Marín, B., Wautelet, Y., Heng, S., Assar, S., Asprion, P.M., Morichetta A.: Proceedings of workshops co-organized with the 14th IFIP WG 8.1 Working Con-ference on the practice of enterprise modelling (PoEM 2021), Online, originally held in Riga, Latvia, November 24, 2021.In: CEUR Workshop Proceedings 3031, CEUR-WS.org 2021. (2021)
4. Barn, B., Sandkuhl, K., Serral, E., Stirna J.: Proceedings of the forum at practice of enterprise modeling 2021 (PoEM-Forum 2021) (PoEM 2021), Riga, Latvia, November 24–26, 2021.In: CEUR workshop proceedings 3045, CEUR-WS.org 2021. (2021)

Estefanía Serral is an Associate Professor at KU Leuven (Belgium). She has a highly international and interdisciplinary profile, currently doing research in the Internet of Things, Business Process Management, and Model-Driven Development. In 2018, she was also an Assistant professor at TU/e, The Netherlands. From 2012 to 2014, she led the *Semantic Knowledge Representation and Integration* research group at the CDL-Lab at the Technical University of Vienna (Austria). Until 2012, she worked in the ProS Research Center at the Technical University of Valencia (Spain), where she designed a novel method for developing ubiquitous systems using Model-Driven Development (MDD) and Semantic technologies. Prof. Serral has many publications in high-ranking conferences and journals, such as CAiSE, ER, UIC, PMC, ESWA, SOSYM, and MTAP. She completed her PhD in Computer science in 2011; a Master Degree on Software Engineering, Formal Methods and Information Systems in 2008; and a bachelor degree in Computer science in 2006.

Janis Stirna has received PhD in Computer and Systems Sciences from the Royal Institute of Technology, Sweden in 2001. In 2015, he was promoted to full professor at Department of Computer and Systems Sciences, Stockholm University. Research interests include enterprise modeling and requirements engineering methods and tools, capability management, as well as modeling and management of digital business ecosystems. He is author or co-author of more than 150 research publications and reports and four text books on enterprise modeling. He currently serves as chair the IFIP Working Group 8.1 Design and Evaluation of Information Systems.

Jolita Ralyté is a Senior Researcher and Lecturer at the University of Geneva, Switzerland. She holds a PhD in Computer Science from the University of Paris 1 Panthéon – Sorbonne, France. The research areas of Jolita include situational method engineering, digital transformation, transdisciplinary information services and systems, and requirement engineering. She co-authored a book on Situational Method Engineering and published her work in various international conferences and journals. She currently serves as vice-chair of the IFIP TC8 Information Systems.

Janis Grabis is a Professor at the Faculty of Computer Science and Information Technology, Riga Technical University, Latvia. He obtained his Ph.D. from the Riga Technical University in 2001 and worked as a Research Associate at the College of Engineering and Computer Science, University of Michigan-Dearborn, as well as at Stockholm University. His research interests are in enterprise integration, enterprise applications, and project management.