# Communications in Computer and Information Science 1278

Editorial Board Members

Joaquim Filipe
*Polytechnic Institute of Setúbal, Setúbal, Portugal*

Ashish Ghosh
*Indian Statistical Institute, Kolkata, India*

Raquel Oliveira Prates
*Federal University of Minas Gerais (UFMG), Belo Horizonte, Brazil*

Lizhu Zhou
*Tsinghua University, Beijing, China*

More information about this series at http://www.springer.com/series/7899

Michael Freitag · Aseem Kinra ·
Herbert Kotzab · Hans-Jörg Kreowski ·
Klaus-Dieter Thoben (Eds.)

# Subject-Oriented Business Process Management

## The Digital Workplace – Nucleus of Transformation

12th International Conference, S-BPM ONE 2020
Bremen, Germany, December 2–3, 2020
Proceedings

Springer

*Editors*
Michael Freitag
University of Bremen and Bremer Institut für Produktion und Logistik GmbH
Bremen, Germany

Aseem Kinra
Universität Bremen
Bremen, Germany

Herbert Kotzab
Universität Bremen
Bremen, Germany

Hans-Jörg Kreowski
Universität Bremen
Bremen, Germany

Klaus-Dieter Thoben
University of Bremen and Bremer Institut für Produktion und Logistik GmbH
Bremen, Germany

ISSN 1865-0929 ISSN 1865-0937 (electronic)
Communications in Computer and Information Science
ISBN 978-3-030-64350-8 ISBN 978-3-030-64351-5 (eBook)
https://doi.org/10.1007/978-3-030-64351-5

© Springer Nature Switzerland AG 2020
This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.
The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.
The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

# Preface

The 12th International Conference on Subject-oriented Business Process Management (S-BPM ONE 2020), was originally planned to be held in Bremen, Germany, at the beginning of July 2020. Due to the COVID-19 pandemic, it was first postponed to the end of the year and then decided to run the conference online during December 2–3, 2020. The former S-BPM ONE conferences were held in Lisbon (Portugal) in 2019, Vienna and Linz (Austria) in 2012 and 2018 respectively, and in Karlsruhe, Ingolstadt, Deggendorf, Eichstätt, Kiel, Erlangen, and Darmstadt (all in Germany) starting from 2009.

The motto of the conference is "Digital Workplace – Nucleus of Transformation." In the mission statement of the German Ministry of Economics for 2030 on the topic of Industry 4.0, we find the following target: sovereignty, interoperability, and sustainability. The flexible networking of different players to form agile value-added networks is one of the central core components of digital business processes in Industry 4.0. The interoperability of all players is a key strategic component for the design of such complex, decentralized structures. Only a high degree of interoperability, to which all partners in an ecosystem are committed and contribute equally, guarantees direct operative and process-related networking across company and industry boundaries. According to Katie Costello's contribution at Gardner on March 18, 2019 (https://www.gartner.com/smarterwithgartner/top-10-technologies-driving-the-digital-workplace/) "How artificial intelligence, smart workspaces, and talent markets will boost employee digital dexterity in future digital workplaces," competitive advantage for 30% of organizations will come from the workforce's ability to creatively exploit emerging technologies such as Deep Learning and Internet of Things applications. Hence, the average work day is becoming filled with interactive technologies that are transforming how work gets done. Business processes – including production and logistics processes – are keys as their representation provide the baseline of operating these technologies and thus (implementation-independent) context for exploring and embodying upcoming developments such as Internet of Behavior.

The 12th S-BPM ONE conference focused on how organizations can help their stakeholders become more engaged in driving competitive advantage framed by or based on (subject-oriented) process technology. Topics of interest are:

- Portfolio development through digital processes as services
- Cloud-based decentralization of organizations
- Autonomous digital workplace design
- Self-sovereign identity development
- Patterns of workforce engagement
- Growing of digital dexterous culture
- Business value generation through process digitalization
- Data-driven process transformation
- Process-sensitive data transformation

- Use of mobile technologies and smart products in logistic networks
- Dynamic smart contracting and tokenization
- Explainable process designs
- Sensor-based sense-making
- Contextual integration of things into business processes
- Process-empowered business analytics
- Horizontal and vertical integration of autonomous entities
- Interoperability networks
- Internet of Actors

All submissions underwent a double-blind peer reviewing of three members of the International Program Committee. Finally, 15 submissions with a high score were accepted. The conference program has been structured into a keynote session and five sessions of three presentations each on:

- Subject-oriented business processing – syntax and semantics
- Cyber-physical and assistance systems
- Process mining and the Internet of Actors and Behaviors
- Industry 4.0
- Various views on business process management

The proceedings are organized accordingly.

We are grateful to the members of the Program Committee for their thorough work. Particular thanks go to Aleksandra Himstedt for her very helpful support in the conference organization. We would like to thank Allgeier IT Solutions GmbH for their financial support. Moreover, we would like to acknowledge the smooth cooperation with the publisher Springer and as our direct contacts Alla Serikova and Aliaksandr Birukou.

September 2020

Michael Freitag
Aseem Kinra
Herbert Kotzab
Hans-Jörg Kreowski
Klaus-Dieter Thoben

# Organization

## Conference and Program Committee Chairs

| | |
|---|---|
| Michael Freitag | University of Bremen and Bremer Institut für Produktion und Logistik GmbH, Germany |
| Aseem Kinra | University of Bremen, Germany |
| Herbert Kotzab | University of Bremen, Germany |
| Hans-Jörg Kreowski | University of Bremen, Germany |
| Klaus-Dieter Thoben | University of Bremen and Bremer Institut für Produktion und Logistik GmbH, Germany |

## Steering Committee

| | |
|---|---|
| Albert Fleischmann | InterAktiv Unternehmensberatung, Germany |
| Werner Schmidt | Technische Hochschule Ingolstadt, Germany |
| Christian Stary | Johannes Kepler University Linz, Austria |

## Program Committee

| | |
|---|---|
| Perdro Antunes | Victoria University of Wellington, New Zealand |
| Stefanie Betz | Furtwangen University, Germany |
| Anke Dittmar | University of Rostock, Germany |
| Matthes Elstermann | Karlsruhe Institute of Technology, Germany |
| Selim Erol | University of Applied Sciences Wiener Neustadt, Austria |
| Herbert Fischer | Deggendorf Institute of Technology, Germany |
| Albert Fleischmann | InterAktiv Unternehmungsberatung, Germany |
| Michael Freitag | University of Bremen, Germany |
| Andreas Gadatsch | University of Applied Sciences Bonn-Rhein-Sieg, Germany |
| Stijn Hoppenbrouwers | HAN University of Applied Sciences, The Netherlands |
| Christian Huemer | Vienna University of Technology, Austria |
| Udo Kannengiesser | Johannes Kepler University Linz, Austria |
| Aseem Kinra | University of Bremen, Germany |
| Stefan Koch | Johannes Kepler University Linz, Austria |
| Herbert Kotzab | University of Bremen, Germany |
| Florian Krenn | Compunity GmbH, Austria |
| Hans-Jörg Kreowski | University of Bremen, Germany |
| Matthias Kurz | Qualitäts- und UnterstützungsAgentur – Landesinstitut für Schule, Germany |
| Matthias Lederer | International School of Management, Germany |
| Francesco Leotta | Sapienza University of Rome, Italy |

| | |
|---|---|
| Matthias Neubauer | University of Applied Sciences Upper Austria, Austria |
| Alexander Nolte | University of Tartu, Estonia |
| Stefan Oppl | Danube University Krems, Austria |
| Henderik Proper | Public Research Centre Henri Tudor, Luxembourg |
| Gustavo Rossi | National University of La Plata, Argentina |
| Thomas Schaller | Hof University of Applied Sciences, Germany |
| Werner Schmidt | Technische Hochschule Ingolstadt, Germany |
| Robert Singer | FH JOANNEUM Graz, Austria |
| Christian Stary | Johannes Kepler University Linz, Austria |
| Florian Strecker | actnconnect, Germany |
| Klaus-Dieter Thoben | University of Bremen, Germany |
| Oktay Turetken | Eindhoven University of Technology, The Netherlands |
| Nicolas Vidakis | Technological Educational Institute of Crete, Greece |
| Marco Winckler | Paul Sabatier University, France |
| Guido Wirtz | University of Bamberg, Germany |
| Cornelia Zehbold | Technische Hochschule Ingolstadt, German |

# Contents


**Keynote**

Business Process Management Based on Subject Orientation from an Economic/Industrial Perspective . . . . . 3
*Herbert Kindermann*

**Subject-Oriented Business Processing – Syntax and Semantics**

S-BPM Diagrams as Decision Aids in a Decision Based Framework for CPS Development . . . . . 23
*Josef Frysak*

Performance Investigation and Proposal for Updates on the Exchange Standard for PASS . . . . . 33
*Matthes Elstermann and André Wolski*

Mapping Execution and Model Semantics for Subject-Oriented Process Models . . . . . 46
*Matthes Elstermann and André Wolski*

**Cyber-Physical and Assistance Systems**

Task-Based Design of Cyber-Physical Systems – Meeting Representational Requirements with S-BPM . . . . . 63
*Georg Weichhart, Maximilian Reiser, and Christian Stary*

Mobile AR-Based Assistance Systems for Order Picking – Methodical Decision Support in the Early Phases of the Product Life Cycle . . . . . 74
*Lukas Egbert, Moritz Quandt, Klaus-Dieter Thoben, and Michael Freitag*

Functionalities and Implementation of Future Informational Assistance Systems for Manual Assembly . . . . . 88
*Christoph Petzoldt, Dennis Keiser, Thies Beinke, and Michael Freitag*

**Process Mining and the Internet of Actors and Behaviors**

The Internet-of-Behavior as Organizational Transformation Space with Choreographic Intelligence . . . . . 113
*Christian Stary*

Security and Safety by Design in the Internet of Actors: An Architectural Approach . . . . . 133
*Giovanni Paolo Sellitto, Helder Aranha, Massimiliano Masi, and Tanja Pavleska*

Process Discovery Method in Dynamic Manufacturing and Logistics Environments . . . . . 143
*Wacharawan Intayoad, Till Becker, and Otthein Herzog*

**Industry 4.0**

Interoperability of Logistics Artefacts in Industry 4.0-Driven IT Landscape . . . . . 167
*Marco Franke, Karl A. Hribernik, and Klaus-Dieter Thoben*

Tindustry: Matchmaking for I4.0 Components . . . . . 177
*Udo Kannengiesser, Florian Krenn, Christian Stary, and Pascal Höfler*

Autonomy and Process Design . . . . . 195
*Richard Heininger*

**Various Views on Business Process Management**

Limitations of Choreography Specifications with BPMN . . . . . 203
*Albert Fleischmann*

Technology-, Human-, and Data-Driven Developments in Business Process Management: A Literature Analysis . . . . . 217
*Matthias Lederer, Matthes Elstermann, Stefanie Betz, and Werner Schmidt*

Subject-Oriented Value-Stream Mapping with SiSi . . . . . 232
*Matthes Elstermann, Jakob Bönsch, and Jivka Ovtcharova*

**Author Index** . . . . . 251