Lecture Notes in Business Information Processing 370

Series Editors

Wil van der Aalst
RWTH Aachen University, Aachen, Germany
John Mylopoulos
University of Trento, Trento, Italy
Michael Rosemann
Queensland University of Technology, Brisbane, QLD, Australia
Michael J. Shaw
University of Illinois, Urbana-Champaign, IL, USA
Clemens Szyperski
Microsoft Research, Redmond, WA, USA

More information about this series at http://www.springer.com/series/7911

Sami Hyrynsalmi · Mari Suoranta ·
Anh Nguyen-Duc · Pasi Tyrväinen ·
Pekka Abrahamsson (Eds.)

Software Business

10th International Conference, ICSOB 2019
Jyväskylä, Finland, November 18–20, 2019
Proceedings

Springer

Editors
Sami Hyrynsalmi
Tampere University of Technology
Pori, Finland

Anh Nguyen-Duc
University of South-Eastern Norway
Bø i Telemark, Norway

Pekka Abrahamsson
University of Jyväskylä
Jyväskylä, Finland

Mari Suoranta
University of Jyväskylä
Jyväskylä, Finland

Pasi Tyrväinen
University of Jyväskylä
Jyväskylä, Finland

ISSN 1865-1348 ISSN 1865-1356 (electronic)
Lecture Notes in Business Information Processing
ISBN 978-3-030-33741-4 ISBN 978-3-030-33742-1 (eBook)
https://doi.org/10.1007/978-3-030-33742-1

© Springer Nature Switzerland AG 2019
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

Welcome to the proceedings of the 10th International Conference on Software Business (ICSOB 2019). This year, ICSOB celebrated its tenth anniversary and returned to Jyväskylä, Finland where the conference series was started in 2010. Jyväskylä is a vibrant university city located in the heart of the beautiful Finnish lake district. The host organization, University of Jyväskylä, is a highly esteemed multidisciplinary university with six faculties, and its Faculty of Information Technology is known for research on computational sciences, software and telecommunications technology, information systems, cognitive science, and educational technology. Additionally, the research of cyber security, computational thinking, and decision-making crosscut all areas mentioned.

For the tenth anniversary of the conference we selected the conference theme "The First Decade and Beyond" and welcomed submissions summarizing the development during the past decade, addressing the future of software-intensive business, as well as studies on new and emerging ideas. Software is pervasively crosscutting all industries and it is nowadays hard to name a business field which has not been revolutionized by software products and services. While software business has a number of similarities with other knowledge-intensive fields, it still has unique features, which has made it a challenging domain for research.

For ICSOB 2019, we received 52 submissions from all over the world. The papers went through a thorough competitive review process by at least three expert reviewers for each paper. The Program Committee deliberated over all the reviews and accepted 18 full and 10 short paper. The accepted papers follow various methodologies and represent the diversity in our research community.

The proceedings open with a keynote presentation paper by Professor Jan Bosch (Chalmers University of Technology, Sweden) on "From Efficiency to Effectiveness: Delivering Business Value Through Software," which provides an overview of trends changing the software-intensive business in the industry as well as presents the requirements for successful digital transformation. Both the second keynote by Dr. Xiaofeng Wang (Free University of Bozen-Bolzano, Italy): "The Rise of Software Startup Research: an In-sider's View" and the third keynote by Professor Slinger Jansen (Utrecht University, the Netherlands): "There's no Business like Software Business: Trends in Software Intensive Business Research" discuss the development and trends in software-intensive business research which excellently pave the way for the versatile and multidisciplinary contents of the ICSOB proceedings. We have organized the papers according to the following themes: Software Ecosystems, Management of Software Products, Continual Improvement and Product Development, Impacts of Digitalization, Software Business Education, Software Startups, and Digital Business.

ICSOB 2019 brought together researchers and practitioners to share their findings and experiences from the field of software-intensive business in academic paper

sessions but also in more practice-oriented tutorials and workshops. Tutorials sparked discussions on e.g. the current situation in artificial intelligence, ethics research and practice, as well as guidelines and principles. Workshops continued to delve into emerging fields, artificial intelligence technologies, and their implications on both small and large organizations. Additionally, we learned about software business practices in the Asian context.

As Program Committee chairs, we would like to thank the members of the Program Committee and the additional reviewers for their efforts in evaluating the submissions and ensuring the high quality of the conference. The efforts of the Steering and Organizing Committees and all the chairs were of enormous value in building a successful conference. We extend our heartfelt thanks to all the scholars who submitted papers to the conference, all the authors who presented papers, and to the audience, who participated in very inspirational discussions during the conference.

September 2019

Sami Hyrynsalmi
Mari Suoranta
Anh Nguyen-Duc
Pasi Tyrväinen
Pekka Abrahamsson

Organization

General Chairs

Pekka Abrahamsson	University of Jyväskylä, Finland
Pasi Tyrväinen	University of Jyväskylä, Finland

Program Committee Chairs

Sami Hyrynsalmi	Tampere University, Finland
Mari Suoranta	University of Jyväskylä, Finland

Workshop Chair

Dhrubes Biswas	University of California Berkeley, USA

Short Paper and Poster Chair

Anh Ngyuen Duc	University of South-Eastern Norway, Norway

Social Media Chair

Sonja M. Hyrynsalmi	University of Turku, Finland

Program Committee

Leena Aarikka-Stenroos	Tampere University, Finland
Sergey Avdoshin	National Research University Higher School of Economics, Russia
Richard Berntsson Svensson	University of Gothenhurg, Sweden
Sjaak Brinkkemper	Utrecht University, The Netherlands
David Callele	University of Saskatchewan, Canada
João M. Fernandes	University of Minho, Portugal
Awdren Fontão	Sidia Instituto de Ciência e Tecnologia, Brazil
Samuel A. Fricker	University of Applied Sciences and Arts Northwestern Switzerland (FHNW), Switzerland
Paul Grünbacher	Johannes Kepler University Linz, Austria
Ville Harkke	University of Turku, Finland
Georg Herzwurm	University of Stuttgart, Germany
Helena Holmström Olsson	Malmö University, Sweden
Jukka Huhtamäki	Tampere University, Finland
Slinger Jansen	Utrecht University, The Netherlands

Kai-Kristian Kemell	University of Jyväskylä, Finland
Petri Kettunen	University of Helsinki, Finland
Kai K. Kimppa	University of Turku, Finland
Antti Knutas	Lappeenranta-Lahti University of Technology, Finland
Casper Lassenius	Aalto University, Finland
Ulrike Lechner	Universität der Bundeswehr München, Germany
Valentina Lenarduzzi	Tampere University, Finland
Hongxiu Li	Tampere University, Finland
Andrey Maglyas	Maglyas Consulting, Russia
Tommi Mahlamäki	Tampere University, Finland
Konstantinos Manikas	University of Copenhagen, Denmark
Tiziana Margaria	University of Limerick and Lero, Ireland
John McGregor	Clemson University, USA
Tommi Mikkonen	University of Helsinki, Finland
Jürgen Münch	Reutlingen University, Germany
Matti Muhos	University of Oulu, Finland
Matti Mäntymäki	University of Turku, Finland
Päivi Patja	University of Jyväskylä, Finland
Efi Papatheocharous	SICS, Sweden
Samuli Pekkola	Tampere University, Finland
Henri Pirkkalainen	Tampere University, Finland
Petri Rantanen	Tampere University, Finland
Björn Regnell	Lund University, Sweden
Dirk Riehle	Friedrich-Alexander University of Erlangen-Nürnberg, Germany
Matti Rossi	Aalto University, Finland
Rodrigo Pereira dos Santos	Universidade Federal do Estado do Rio de Janeiro, Brazil
Pertti Seppänen	University of Oulu, Finland
Marko Seppänen	Tampere University, Finland
Kari Smolander	Lappeenranta-Lahti University of Technology, Finland
Jari Soini	Tampere University, Finland
Arho Suominen	VTT Technical Research Centre of Finland, Finland
Kari Systä	Tampere University, Finland
Davide Taibi	Tampere University, Finland
Michael Unterkalmsteiner	Blekinge Institute of Technology, Sweden
Marcus Wagner	Augsburg University, Germany
Xiaofeng Wang	Free University of Bozen-Bolzano, Italy
Karl Werder	University of Cologne, Germany
Krzysztof Wnuk	Blekinge Institute of Technology, Sweden

Additional Reviewers

Sohaib Shahid Bajwa
Luciana Chueri
Orges Cico
Siamak Farshidi
Shan Feng
Francisco Ferreira
Sandro Freire
Harri Keto
Dron Khanna
Gururaj Maddodi
Jorge Melegati
Felipe Cordeiro de Paula
Minna M. Rantanen
Sami Rusthollkarhu
Paul van Vulpen

Contents

Keynote Addresses

From Efficiency to Effectiveness: Delivering Business Value Through Software 3
Jan Bosch

The Rise of Software Startup Research: An Insider's View 11
Xiaofeng Wang

There's No Business Like Software Business: Trends in Software Intensive Business Research 19
Slinger Jansen

Software Ecosystems

A SECO Meta-model: A Common Vocabulary of the SECO Research Domain 31
J. Wouters, J. R. Ritmeester, A. W. Carlsen, Slinger Jansen, and Krzysztof Wnuk

Towards an Understanding of iIoT Ecosystem Evolution - MindSphere Case Study 46
Dimitri Petrik and Georg Herzwurm

Identifying Architecture Attributes in the Context of Software Ecosystems Based on a Mapping Study 55
Thaiana Lima, Cláudia Werner, and Rodrigo Santos

Activities and Challenges in the Planning Phase of a Software Ecosystem . . . 71
Kati Saarni and Marjo Kauppinen

API Management Challenges in Ecosystems 86
Sebastien Andreo and Jan Bosch

Management of Software Products

The Product Roadmap Maturity Model DEEP: Validation of a Method for Assessing the Product Roadmap Capabilities of Organizations 97
Jürgen Münch, Stefan Trieflinger, and Dominic Lang

Towards a SaaS Pricing Cookbook: A Multi-vocal Literature Review 114
Andrey Saltan and Kari Smolander

Managing Commercial Conflicts of Interest in Open Source Foundations 130
Florian Weikert, Dirk Riehle, and Ann Barcomb

Dynamic Data Management for Machine Learning in Embedded Systems: A Case Study 145
Hamza Ouhaichi, Helena Holmström Olsson, and Jan Bosch

Continual Improvement and Product Development

Fostering Continuous Innovation with Engaging IT-Assisted Transparent Information Sharing: A Case Study 157
Petri Kettunen, Susanna Teppola, and Jari Partanen

Change Management Practices for Continuous Delivery - A Systematic Literature Mapping 175
Telcio Elui Cardoso, Alan R. Santos, Rafael Chanin, and Afonso Sales

Leveraging Business Transformation with Machine Learning Experiments . . . 183
David Issa Mattos, Jan Bosch, and Helena Holmström Olsson

Intertwined Development of Business Model and Product Functions for Mobile Applications: A Twin Peak Feature Modeling Approach 192
Sebastian Gottschalk, Florian Rittmeier, and Gregor Engels

The Role of the Customer in an Agile Project: A Multi-case Study 208
Erno Vanhala and Jussi Kasurinen

Impacts of Digitalization

Cloud-Based Solution for Construction Documentation and Quality Management – Examination of the Value-in-Use. 225
Taina Eriksson

Initial Coin Offering (ICO) as a Fundraising Strategy: A Multiple Case Study on Success Factors. 237
Aleksei Panin, Kai-Kristian Kemell, and Veikko Hara

Enabling Circular Economy with Software: A Multi-level Approach to Benefits, Requirements and Barriers 252
Juha-Matti Väisänen, Valtteri Ranta, and Leena Aarikka-Stenroos

Implementing AI Ethics in Practice: An Empirical Evaluation of the RESOLVEDD Strategy. 260
Ville Vakkuri and Kai-Kristian Kemell

Towards a Better Society: An Analysis of the Value Basis of the European eGovernment and Data Economy 276
Minna M. Rantanen and Jani Koskinen

Software Business Education

Educational Innovations and Gamification for Fostering Training and Testing in Software Implementation Projects 293
Zornitsa Yordanova

Improving a Startup Learning Framework Through an Expert Panel 306
Rafael Chanin, Afonso Sales, Leandro Pompermaier, and Rafael Prikladnicki

A Board Game to Teach Team Composition in Software Startups 321
Jorge Melegati, Eduardo Guerra, Igor Knop, and Xiaofeng Wang

Does Self-efficacy Matter? On the Correlation of Self-efficacy and Creativity in IT Education 336
Juhani Risku, Kai-Kristian Kemell, Joni Kultanen, Polina Feschenko, Jeroen Carelse, and Krista Korpikoski

Hard Competencies Satisfaction Levels for Software Engineers: A Unified Framework 345
Nana Assyne

Software Startups and Digital Business

How Software Startup Teams Reflect: Approaches, Triggers and Challenges 353
Dron Khanna and Xiaofeng Wang

Amidst Uncertainty – or Not? Decision-Making in Early-Stage Software Startups 369
Kai-Kristian Kemell, Eveliina Ventilä, Petri Kettunen, and Tommi Mikkonen

Customer Churn Prediction in B2B Contexts 378
Iris Figalist, Christoph Elsner, Jan Bosch, and Helena Holmström Olsson

Online Multiplayer Games for Crowdsourcing the Development of Digital Assets: The Case of Ingress 387
Samuli Laato, Sonja M. Hyrynsalmi, and Mauri Paloheimo

Emerging Research Topics

Organizational Innovativeness Relies on Business and IT Alignment 405
Zornitsa Yordanova

MVP Development Process for Software Startups 409
Leandro Pompermaier, Rafael Chanin, Afonso Sales, and Rafael Prikladnicki

Technical Debt Trade-Off - Experiences from Software Startups Becoming Grownups 413
Orges Cico

A Dynamic Software Startup Competency Model 419
Nana Assyne and Isaac Wiafe

Objectives and Challenges in Finnish Software Companies 2018 - Interview of 99 Finnish Software Development Firms 423
Toni Luhti

The Impact of IT Bootcamp on Student Learning - Experience from ICT Enabled Experiential-Based Course 430
Orges Cico

Tutorial

Implementing Artificial Intelligence Ethics: A Tutorial. 439
Ville Vakkuri and Kai-Kristian Kemell

Author Index 443