

Founding Editors

Gerhard Goos

Karlsruhe Institute of Technology, Karlsruhe, Germany

Juris Hartmanis

Cornell University, Ithaca, NY, USA


Editorial Board Members

Elisa Bertino

Purdue University, West Lafayette, IN, USA

Wen Gao

Peking University, Beijing, China

Bernhard Steffen 

TU Dortmund University, Dortmund, Germany

Gerhard Woeginger 

RWTH Aachen, Aachen, Germany

Moti Yung

Columbia University, New York, NY, USA

More information about this subseries at <http://www.springer.com/series/7409>


Sara Hofmann · Oliver Müller ·
Matti Rossi (Eds.)

Designing for Digital Transformation

Co-Creating Services with Citizens and Industry

15th International Conference on Design Science Research
in Information Systems and Technology, DESRIST 2020
Kristiansand, Norway, December 2–4, 2020
Proceedings

Editors

Sara Hofmann 
University of Agder
Kristiansand, Norway

Oliver Müller
University of Paderborn
Paderborn, Germany

Matti Rossi 
Aalto University
Aalto, Finland

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-030-64822-0 ISBN 978-3-030-64823-7 (eBook)
<https://doi.org/10.1007/978-3-030-64823-7>

LNCS Sublibrary: SL3 – Information Systems and Applications, incl. Internet/Web, and HCI

© 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

Welcome to the proceedings of the 15th International Conference on Design Science Research in Information Systems and Technology (DESRIST 2020). There has been a surge of interest in design science research (DSR) in the last decade and DSR has developed into a mature research paradigm. The goal of the design science research paradigm is to extend the boundaries of human and organizational capabilities by designing new and innovative constructs, models, methods, processes, and systems. Scholars from different backgrounds – such as information systems, computer science, data science, software engineering, energy informatics, medical informatics, and operations research – are actively engaged in generating novel solutions to interesting design problems. The theme of DESRIST 2020 was “Designing for digital transformation – Co-Creating Services with Citizens and Industry.”

The conference attracted different types of submissions, including completed research, ongoing research, research-in-progress, and prototype papers. In addition, the conference organized a PhD colloquium. DESRIST has brought together researchers and practitioners from the private and public sector to the conference to discuss and debate how to co-create services for citizens and industries. Participants engaged in all aspects of design science research, with a special emphasis on the design of services for digital transformation.

This year’s preparation and execution of the conference have been heavily influenced by the COVID-19 pandemic. Originally planned to take place in June at the University of Agder in Kristiansand, Norway, DESRIST 2020 was eventually held as a fully digital conference during December 2–4, 2020. Authors of completed research papers prepared a five-minute presentation, which was followed by an intensive five-minute discussion. The research-in-progress and prototype contributions were presented in an entertaining one-minute design science research slam. In addition, interesting discussions took place during the two panel sessions on “Ethics in Design Science Research” and “The Role and Impact of Design Research on Digital Transformation.” While we lost some of the ad-hoc meetings and informal gatherings, we managed to have much interaction and participation.

This volume contains 28 full research papers, 7 research-in-progress papers, and 9 prototype papers, which accounts for an acceptance rate of 47%. The contributions span across the overarching topics of Digital Public Services, Data Science, Design Principles, and Methodology.

We would like to thank all the contributors who have aided in making this year’s conference a success. Our gratitude goes to the members of the Program Committee, including associate editors and reviewers for their effort in preparing the conference, and reviewing and selecting the accepted papers, as well as to the authors for

submitting their papers. A special thanks goes to the local organizers at University of Agder for their preparation and their flexibility in these challenging times. The conference was only possible with the help and contribution of you all.

December 2020

Matti Rossi
Oliver Müller
Sara Hofmann

Organization

General Chairs

Bengisu Tulu	Worcester Polytechnic Institute (WPI), USA
Gondy Leroy	University of Arizona, USA
Soussan Djamasbi	Worcester Polytechnic Institute (WPI), USA

Conference Chairs

Leif Skiftenes Flak	University of Agder, Norway
Maung Kyaw Sein	University of Agder, Norway

Program Chairs

Matti Rossi	Aalto University, Finland
Oliver Müller	Paderborn University, Germany

Panel Chairs

Margunn Aanestad	University of Agder, Norway
Monica Chiarini Tremblay	Raymond A. Mason School of Business, USA
Polyxeni Vasilakopoulou	University of Agder, Norway

Doctoral Consortium Chairs

Devendra Bahadur Thapa	University of Agder, Norway
Sandeep Purao	Bentley University, USA

Prototypes Chairs

Amir Haj-Bolouri	University West, Sweden
Leona Chandra Kruse	University of Liechtenstein, Liechtenstein

Proceedings Chair

Sara Hofmann	University of Agder, Norway
--------------	-----------------------------

Industry Relations Chair

Carl Erik Moe	University of Agder, Norway
---------------	-----------------------------

Website

Amna Drace

University of Agder, Norway

Program Committee

Abayomi Baiyere

Copenhagen Business School, Denmark

Ahmed Abbasi

McIntire School of Commerce, University of Virginia,
USA

Ahmed Elragal

Luleå University of Technology, Sweden

Alexander Herwix

University of Köln, Germany

Alexander Maedche

Karlsruhe Institute of Technology, Germany

Andreas Drechsler

Victoria University of Wellington, New Zealand

Arturo Castellanos

Baruch College, USA

Brian Donnellan

Maynooth University, Ireland

Christian Janiesch

University of Würzburg, Germany

Daniel Beverungen

Paderborn University, Germany

Dirk Hovorka

The University of Sydney, Australia

Dominik Gutt

Rotterdam School of Management, The Netherlands

Guido Schryen

Paderborn University, Germany

Heiko Gewalt

Neu-Ulm University of Applied Sciences, Germany

Jan vom Brocke

University of Liechtenstein, Liechtenstein

Jason Thatcher

University of Alabama, USA

Jeffrey Parsons

Memorial University, Canada

Jens Pöppelbuß

Ruhr University Bochum, Germany

Jonas Sjöström

Uppsala University, Sweden

Kathrin Figl

University of Innsbruck, Austria

Kaushik Dutta

University of South Florida, USA

Ken Peffers

University of Nevada, USA

Konstantin Hopf

University of Bamberg, Germany

Martin Matzner

University of Erlangen-Nuremberg, Germany

Matthew Mullarkey

USF Muma College of Business, USA

Matthias Söllner

University of Kassel, Germany

Monica Chiarini Tremblay

Raymond A Mason School of Business, USA

Munir Mandviwalla

Temple University, USA

Netta Iivari

University of Oulu, Finland

Oliver Müller

Paderborn University, Germany

Rangaraja Sundarraj

Indian Institute of Technology Madras, India

Richard Baskerville

Georgia State University, USA

Robert Winter

University of St. Gallen, Switzerland

Roman Lukyanenko

HEC Montréal, Canada

Samir Chatterjee

Claremont Graduate University, USA

Sara Hofmann

University of Agder, Norway

Stefan Morana

Karlsruhe Institute of Technology, Germany

Stefan Seidel

University of Liechtenstein, Liechtenstein

Tuure Tuunanen

University of Jyväskylä, Finland

Reviewers

Abhinay Puvvala
Aleksi Aaltonen
Alexia Athanasopoulou
Alfred Benedikt Brendel
Alfred Castillo
Ali Sunyaev
Alois Paulin
Andrea Kayl
Andreas Weigert
Andy Nguyen
Anik Mukherjee
Anna Sigridur Islind
Ann-Kristin Cordes
Arto Lanamäki
Benedikt Berger
Benjamin Sturm
Brent Kitchens
Casandra Grundstrom
Christian Bartelheimer
Christian Hovestadt
Christian Kalla
Connor Esterwood
Craig A. Horne
Daniel Szopinski
Darwin Hale
David Harborth
David Schuff
Debra Vander Meer
Denis Dennehy
Denis Edwards
Dennis Kundisch
Dixon Prem Daniel
Djordje Djurica
Eli Hustad
Elin Uppström
Elina Annanperä
Elizabeth Sanders
Erol Kazan
Esko Penttinen
Florence Mwagwabi
Gerit Wagner
Guohou Shan
Gustaf Juell-Skielse

Steffi Haag
Hanlie Smuts
Hedda Lüttenberg
Hendrik Wache
Hossam Hassanien
Hossana Twinomurinzi
Hyung Koo Lee
James Wallace
Jan Holmström
Jan Niklas Dörseln
Jan Pries-Heje
Janine Hacker
Jan-Peter Kucklick
Jasper Feine
Jingjing Li
John Venable
Jonna Järveläinen
Joshua Peter Handali
Julian Prester
Jörg Becker
Kai Heinrich
Kai Klinker
Kai-Kristian Kemell
Karin Elisabeth Väyrynen
Karthikeyan Umapathy
Leena Arhippainen
Lena Otto
Lina Bouayad
Louise Harris
Mala Kaul
Manoj Thomas
Marcus Green
Marcus Rothenberger
Maria Cucciniello
Mariem Ben Rehouma
Marius Schmid
Markus Helfert
Mary Tate
Matthew Caron
Maximilian Haug
Maximilian Roeglinger
Mengcheng Li
Michael Fruhwirth

Michael Hausch
 Michael Lee
 Moutaz Haddara
 Na Liu
 Nadine Ogonek
 Niall Connolly
 Nicola Staub
 Nicolai Bohn
 Ning Yang
 Oliver Posegga
 Osmo Mattila
 Padmal Vitharana
 Patrick Delfmann
 Patrick Zschech
 Pengcheng Wang
 Per Rådberg Nagbøl
 Peter Fettke
 Philipp Brune
 Philipp Mazur
 Philipp Zur Heiden
 Ralf Laue
 Roman Rietsche
 Ron Deserranno
 Ryan Murphy
 Sabine Klein
 Samuel Kießling
 Sascha Lichtenberg

Scott Thiebes
 Sebastian A. Günther
 Sebastian Bräuer
 Sebastian Hobert
 Shane Mcloughlin
 Shawn Ogunseye
 Stefan Cronholm
 Stephan Aier
 Sumita Sharma
 Susanne Strahringer
 Thomas Friedrich
 Thomas Schulz
 Tiemo Thiess
 Till J. Winkler
 Tilo Böhmann
 Tim Rietz
 Tobias Brandt
 Tobias Manner-Romberg
 Tobias Pauli
 Ulrike Lechner
 Veda Storey
 Verena Wolf
 William Baber
 Xuanhui Liu
 Yomn Elmistikawy
 Yunxuan Zhang

Contents

Digital Public Services

Delivering Effective Care Through Mobile Apps: Findings from a Multi-stakeholder Design Science Approach.	3
<i>Monica Chiarini Tremblay, Maria Cucciniello, Rosanna Tarricone, Gregory A. Porumbescu, and Kevin C. Desouza</i>	
Design of a Machine Learning System for Prediction of Chronic Wound Management Decisions.	15
<i>Haadi Mombini, Bengisu Tulu, Diane Strong, Emmanuel Agu, Holly Nguyen, Clifford Lindsay, Lorraine Loretz, Peder Pedersen, and Raymond Dunn</i>	
Designing a Real-Time Integrated First Responder Health and Environmental Monitoring Dashboard	28
<i>Ann Fruhling, Margeret Hall, Sharon Medcalf, and Aaron Yoder</i>	
Designing Digital Community Service Platforms for Crowd-Based Services in Urban Areas	35
<i>Christian Bartelheimer, Verena Wolf, Nico Langhorst, and Florian Seegers</i>	
Designing for Digital Government Innovation in Resource Constrained Countries: The Case of Woredas in Ethiopia.	42
<i>Debas Senshaw and Hossana Twinomurinzi</i>	
Designing Transport Supporting Services Together with Users with Intellectual Disabilities	56
<i>Sofie Wass, Lise Amy Hansen, and Chris Safari</i>	
Intrinsic Motivation to Share Health Information: Design Guidelines and Features for Patient Sharing Platforms	68
<i>Lina Bouayad, Monica Chiarini Tremblay, Hemant Jain, and Carmelo Gaudioso</i>	
Technology Personalization in Health Applications for Patients with Autism Spectrum Disorder: Artifact Design and a Controlled Experiment	75
<i>Lina Bouayad, Anol Bhattacharjee, Mavara Agrawal, Spurthy Dharanikota, and Polina Durneva</i>	

The Suggestion of Design Theory Artefacts for e-Government in South Africa	81
<i>Romi Vidmar, Eduan Kotzé, and Thomas M. van der Merwe</i>	

Tutorbot: A Chatbot for Higher Education Practice	93
<i>Jonas Sjöström and Maritha Dahlin</i>	

Data Science

An OOV-Aware Curation Process for Psycholinguistic Analysis of Social Media Text - A Hybrid Approach	101
<i>Kun Liu and Yan Li</i>	

Codifying Interdisciplinary Design Knowledge Through Patterns – The Case of Smart Personal Assistants	114
<i>Ernestine Dickhaut, Andreas Janson, and Jan Marco Leimeister</i>	

Exploring Design Principles for Enterprise Chatbots: An Analytic Hierarchy Process Study	126
<i>Jasper Feine, Martin Adam, Ivo Benke, Alexander Maedche, and Alexander Benlian</i>	

Knowledge Visualization for Sensemaking: Applying an Elaborated Action Design Research Process in Incident Management Systems	142
<i>Quintus van Wyk, Judy van Biljon, and Marthie Schoeman</i>	

Multi-interest User Profiling in Short Text Microblogs.	154
<i>Herman Wandabwa, M. Asif Naeem, Farhaan Mirza, Russel Pears, and Andy Nguyen</i>	

Design Principles

Design Principles Exposition: A Framework for Problematizing Knowledge and Practice in DSR	171
<i>Magnus Rotvit Perl Hansen and Amir Haj-Bolouri</i>	

The Origins of Design Principles: Where do... they all come from?	183
<i>Sandeep Purao, Leona Chandra Kruse, and Alexander Maedche</i>	

Developing Design Principles for Digital Platforms: An Agent-Based Modeling Approach: Research-in-Progress	195
<i>Marius Schmid, Kazem Haki, Stephan Aier, and Robert Winter</i>	

Knowledge Creation - A Perspective on the Development of Design Principles	202
<i>Sofie Wass and Carl Erik Moe</i>	

Towards a Method for Design Principle Development in Information Systems	208
<i>Frederik Möller, Tobias Moritz Guggenberger, and Boris Otto</i>	

Methodology

Considering Context in Design Science Research: A Systematic Literature Review	223
<i>Philipp zur Heiden</i>	
Having a Positive Impact with Design Science Research – Learning from Effective Altruism	235
<i>Alexander Herwix and Amir Haj-Bolouri</i>	
Integrating CCM4DSR into ADR to Improve Problem Formulation.	247
<i>Coquessa Jones and John R. Venable</i>	
Problematising in IS Design Research	259
<i>Peter Axel Nielsen</i>	
Validity in Design Science Research	272
<i>Kai R. Larsen, Roman Lukyanenko, Roland M. Mueller, Veda C. Storey, Debra VanderMeer, Jeffrey Parsons, and Dirk S. Hovorka</i>	

Platforms and Networks

A Platform for Value Co-creation in SME Networks	285
<i>Sarah Hönigsberg</i>	
A Typology of Digital Sharing Business Models: A Design Science Research Approach	297
<i>Maria J. Pouri and Lorenz M. Hilty</i>	
Building Scalable Blockchain Applications - A Decision Process	309
<i>Adrian Hofmann</i>	
Designing for Context Versus the Lock-in Effect of ‘Free’ Global Digital Platforms: A Case of SMEs from Nigeria.	321
<i>Adedamola Tolani, Adebawale Owoseni, and Hossana Twinomurinzi</i>	
Making Cloud Service Selection Easy for SMEs: A Tool for Selecting SaaS Services	333
<i>Raoul Hentschel, Marco Gercken, and Sebastian Leichsenring</i>	
Meta-requirements for Immersive Collaborative Spaces in Industrial Workplace Learning: Towards a Design Theory	339
<i>Amir Haj-Bolouri, Thomas Winman, and Lars Svensson</i>	

Smart Factory – Requirements for Exchanging Machine Data	347
<i>Chiara Freichel, Anna Fuchs, and Peter Werner</i>	
The Design Towards a Collaborative Subscription Service: The Case of the Finnish Newspaper Industry	360
<i>Erol Kazan and Tuure Tuunanen</i>	
Service Science	
A Digital Twin for Safety and Risk Management: A Prototype for a Hydrogen High-Pressure Vessel	369
<i>Alireza Jaribion, Siavash H. Khajavi, Mikael Öhman, Adriaan Knapen, and Jan Holmström</i>	
Bridging the Architectural Gap in Smart Homes Between User Control and Digital Automation	376
<i>Lukas-Valentin Herm, Jonas Wanner, and Christian Janiesch</i>	
Designing a State-of-the-Art Information System for Air Cargo Palletizing. . .	382
<i>No-San Lee, Philipp Gabriel Mazur, Christian Hovestadt, and Detlef Schoder</i>	
Designing Effective Privacy Nudges in Digital Environments: A Design Science Research Approach: Research-in-Progress	388
<i>Torben Jan Bærev, Andreas Janson, and Jan Marco Leimeister</i>	
Enabling Design-Integrated Assessment of Service Business Models Through Factor Refinement	394
<i>Jürgen Anke</i>	
Engineering Industrial Service Systems: Design and Evaluation of System-Oriented Service Delivery	407
<i>Clemens Wolff, Niklas Köhl, and Gerhard Satzger</i>	
Me, Myself and I - Supporting People with Intellectual Disabilities Towards Self-determination	420
<i>Sofie Wass, Lise Amy Hansen, and Erlend K. Stuve</i>	
Please Tell Me What to Do – Towards a Guided Orchestration of Key Activities in Data-Rich Service Systems	426
<i>Fabian Hunke, Stefan Seebacher, and Hauke Thomsen</i>	
PS ³ – A Domain-Specific Modeling Language for Platform-Based Smart Service Systems	438
<i>Hedda Lüttenberg</i>	

SISA News: Software to Support the Swedish Information Systems Community	451
<i>Jonas Sjöström</i>	
System-Wide Learning in Cyber-Physical Service Systems: A Research Agenda.	457
<i>Dominik Martin, Niklas Kühl, Johannes Kunze von Bischhoffshausen, and Gerhard Satzger</i>	
Author Index	469