

The Essence of Software Engineering

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Editors

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 Springer Open

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ISBN 978-3-319-73896-3 ISBN 978-3-319-73897-0 (eBook)
<https://doi.org/10.1007/978-3-319-73897-0>

Library of Congress Control Number: 2018935950

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Printed on acid-free paper

This Springer imprint is published by the registered company Springer International Publishing AG part of Springer Nature.

The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Software is key to effective business processes in many industries. As a result, software engineering is an important area in modern societies. Software processes are becoming increasingly reliable and effective, but they are different in nature from production processes.

Software engineering research is all about understanding the nature of software processes, finding appropriate architectures of software systems, and identifying the essential and value-creating activities in software development. There is an urgent need for concise solutions to these issues, which are key to industrial software development. That is why, software engineering research and high-end software development in practice go hand in hand.

adesso was founded 20 years ago in exactly this spirit: to merge scientific cognition with solution approaches from software development in practice. During the last 20 years, adesso has significantly benefited from very close ties with internationally renowned chairs and research facilities in software engineering. At the same time, adesso did not only achieve custom software development. Participation in research projects was always a cornerstone of the company's strategy, mostly to return practical experience to the scientific community.

Today, adesso employs more than 2700 people in distinguished software engineering projects. And the company's growth persists, as in the world of ever-increasing digitalization, software also becomes increasingly relevant. Today, people are literally surrounded by software in any conceivable situation. This leads to entirely new challenges, which we aim to master in the tradition of our long-lasting cooperation with international partners from software engineering.

Thus, this volume about the essence of software engineering shall not only highlight its status quo. It also dares to catch a glimpse of potential future developments in the area. We are very grateful for all the contributions that have been written especially for this volume by authors from scientific and business backgrounds. They make this book very unique! We also highly appreciate those authors who cordially accepted our invitation to speak at the twentieth anniversary of our conference. More than 200 guests joined the conference on November 16,

2017, at the UNESCO World Heritage Site “Zeche Zollverein” and were entertained by world-class speeches.

Finally, special thanks go to Isabell Ehnert, who was responsible for the book’s contributors, and Niklas Spitzok von Brisinski, who took the lead in the organization of the highly acclaimed conference.

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Alfred Bröckers joined adesso AG in 1998 where he worked as a consultant and project manager mainly in software projects for the insurance industry. Currently, he is managing director of adesso insurance solutions GmbH, an adesso subsidiary.

Alfred Bröckers holds a diploma in computer science from the University of Dortmund, Germany, and received his PhD in computer science from the University of Kaiserslautern, Germany, in 1996.



Manfred Broy served as the Founding Dean of the Department of Mathematics and Information Systems at the University of Passau in 1983 and as the Founding Dean of the Department of Informatics at the Technical University of Munich in 1992, where he had been holding the Chair of Software and Systems Engineering since 1989. The research groups under his direction addressed the application of techniques derived from mathematics to software and systems engineering. Broy founded the “fortiss” research institute and currently serves as the Founding President of the Zentrum Digitalisierung.Bayern.



Angela Carell holds a doctorate in education and is working in the IT context since 2002. At adesso, she is responsible for the adesso research division. She also conducts design thinking workshops and coaches design thinking trainers. Since 2015, she has been lecturing at the University of Hannover on design thinking.



Schahram Dustdar is full professor of computer science and head of the Distributed Systems Group at TU Wien, Austria. He is recipient of the ACM Distinguished Scientist award (2009), the IBM Faculty Award (2012), an elected member of the Academia Europaea: The Academy of Europe, where he is chairman of the Informatics Section, and an IEEE Fellow (2016).



Carlo Ghezzi is an ACM fellow (1999), an IEEE fellow (2005), and a member of the European Academy of Sciences and the Italian Academy of Sciences. He received the ACM SIGSOFT Outstanding Research Award (2015) and the Distinguished Service Award (2006). He has been President of Informatics Europe. He has been a member of the program committee of flagship conferences in the software engineering field, such as the ICSE and ESEC/FSE, for which he also served as Program and General Chair. Ghezzi's research has been mostly focused on different aspects of software engineering. He has coauthored over 200 papers and eight books. He coordinated several national and international research projects. He has been the recipient of an ERC Advanced Grant.



Harald Gall is Dean of the Faculty of Business, Economics, and Informatics at the University of Zurich (UZH). He is professor of software engineering in the Department of Informatics at UZH. Prior to that, he was associate professor at the Technical University of Vienna in the Distributed Systems Group (TUV), where he also received his PhD (Dr. techn.) and master's degree (Dipl.-Ing.) in informatics.

He held visiting positions at Microsoft Research in Redmond, USA, and University of Washington in Seattle, USA.

His research interests are in software engineering with focus on software evolution, software architecture, software quality analysis, mining software repositories, and cloud-based software engineering.

He is probably best known for his work on software evolution analysis and mining software archives. Since 1997, he has worked on devising ways in which mining these repositories can help to better understand software development, to devise predictions about quality attributes, and to exploit this knowledge in software analysis tools such as Evolizer, ChangeDistiller, and SOFAS.



Wilhelm Hasselbring is professor of software engineering at Kiel University, Germany. In the competence cluster Software Systems Engineering (KoSSE), he coordinates technology transfer projects with industry. In the excellence cluster Future Ocean, a large-scale collaborative project of Kiel University and the GEOMAR Helmholtz Centre for Ocean Research Kiel, he is principal investigator and coordinator of the research area Digital Ocean.



Ivar Jacobson is a father of Software Engineering with contributions such as component architecture, use cases, Unified Modelling Language, and Rational Unified Process.

Since 2005, he has been working on how to deal with methods and tools in a smart, superlight, and agile way, resulting in the Essence standard kernel and language. He is the principal author of seven influential and bestselling books.



Kim Lauenroth is chief requirements engineer at adesso in Germany and first Chair of the International Requirements Engineering Board (IREB) e.V. Kim has more than 15 years of experience in software and requirements engineering in different domains and in various roles, including requirements engineer, project manager, and consultant. As chief requirements engineer at adesso, he is responsible for the overall quality of Requirements Engineering methods and helps his customers to develop effective and pragmatic methodological cultures for software development. Kim received his PhD in the field of requirements engineering and studied computer science, business administration, and psychology.



Andreas Metzger is senior academic councillor at the University of Duisburg-Essen and head of adaptive systems and big data applications at paluno (The Ruhr Institute for Software Technology). He is deputy secretary general of the European Big Data Value Association (BDVA), vice chair of the steering committee of the European Technology Platform NESSI (Networked European Software and Services Initiative), and technical coordinator of the European big data lighthouse project TransformingTransport.



Stefan Nastic is a postdoctoral research assistant at the Distributed Systems Group at TU Wien, Austria. His research interests include: Internet of Things and Edge Computing, Cloud Computing, Big Data Analytics, and Smart Cities. Nastic has been involved in several EU-funded research projects such as SMART-FI, U-Test and SM4ALL, as well as, large industrial projects such as Pacific Controls Cloud Computing Lab (PC3L).



Leon Osterweil is pursuing research on defining, analyzing, and improving medical, election, software, and other processes. Osterweil received ACM SIGSOFT Lifetime Achievement Awards for Research (2003), Education (2010), and Service (2014). He was General Chair of ICSE 2006 and an editor of IEEE TSE and ACM TOSEM. He was Dean of Sciences at the University of Massachusetts. He is a fellow of the ACM.



Dirk Platz studied computer science at the University of Dortmund and received his doctorate in computer science at the University of Siegen. He has been working for adesso AG since 1999 and currently leads the software development in Business Line Insurance Services with more than 120 software developers. His passion is project management. He is responsible for the education program for project managers at adesso and is active in large projects. Currently, he is the main project manager in the implementation of the policy administration system for life insurance, PSLife, at one of the largest German life insurance companies.



Klaus Pohl is full professor for Software Systems Engineering at the University of Duisburg-Essen and director of paluno (The Ruhr Institute for Software Technology). From 2005 to 2007, he was scientific founding director of lero (The Irish Software Engineering Research Centre). He is member of the board of the European Technology Platform NESSI (Networked European Software and Services Initiative) and member of the steering committee of the German innovation alliance SPES (Software Platform for Embedded Systems).



Manfred Reichert is a full professor at Ulm University, where he is director of the Institute of Databases and Information Systems. His research interests include business process management, service-oriented computing, and mobile services. Manfred was PC Co-Chair of the BPM'08, CoopIS'11, and EDOC'13 conferences. Furthermore, he served as General Chair of the BPM'09 and EDOC'14 conferences as well as the BPM'15 workshops. Recently, he has coauthored a Springer book on process flexibility and obtained the BPM Test of Time Award at the BPM 2013 conference.



Richard N. Taylor is pursuing research on software architecture and design—issues, techniques, and agents involved in creating and evolving software artifacts and processes. His current work is directed at developing the Computational REST style for computational exchange on the Internet.



Bernhard Rumpe heads the Software Engineering Department at the RWTH Aachen University, Germany (one of the top three universities in CS as well as Mechanical Engineering). Earlier he had positions at INRIA/IRISA, Rennes, Colorado State University, TU Braunschweig, Vanderbilt University, Nashville, and TU Munich.

His main interests are rigorous and practical software and system development methods based on adequate modeling techniques. This includes agile development methods like XP and SCRUM as well as model engineering based on UML-like notations and domain-specific languages. He has many modeling techniques to his credit, including the UML standardization. He also applies modeling, e.g., to autonomous cars, human brain simulation, BIM energy management, juristical contract digitalization, production automation, cloud, and many more. In his projects, he intensively collaborates with all large German car manufacturers, energy companies, insurance and banking companies, a major aircraft company, a space company, as well as innovative start-ups in the IT-related domains.

He is author and editor of ten books and Editor-in-Chief of the Springer International Journal on Software and Systems Modeling (www.sosym.org). His newest books *Agile Modeling with the UML* and *Engineering Modeling Languages: Turning Domain Knowledge into Tools* were published in 2016 and 2017.