

Communications
in Computer and Information Science 301

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Systems, Software and Services Process Improvement

19th European Conference, EuroSPI 2012
Vienna, Austria, June 25-27, 2012
Proceedings

Volume Editors

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ISSN 1865-0929
ISBN 978-3-642-31198-7
DOI 10.1007/978-3-642-31199-4
Springer Heidelberg Dordrecht London New York

e-ISSN 1865-0937
e-ISBN 978-3-642-31199-4

Library of Congress Control Number: Applied for

CR Subject Classification (1998): D.2.9, K.6.3, D.2, K.6, J.1, H.3.5, H.4

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Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

This textbook comprises the proceedings of the 19th EuroSPI Conference, held during June 25–27, 2012, in Vienna, Austria.

Since EuroSPI 2010, we have extended the scope of the conference from software process improvement to systems, software and service-based process improvement. EMIRAcle is the institution for research in manufacturing and innovation, which came out as a result of the largest network of excellence for innovation in manufacturing in Europe. EMIRAcle key representatives joined the EuroSPI community, and papers as well as case studies for process improvement on systems and product level will be included in future.

Since 2008, EuroSPI partners packaged SPI knowledge in job role training and established a European certification association (www.ecqa.org) to transport this knowledge Europe wide using standardized certification and exam processes.

Conferences were held in Dublin (Ireland) in 1994, in Vienna (Austria) in 1995, in Budapest (Hungary) in 1997, in Gothenburg (Sweden) in 1998, in Pori (Finland) in 1999, in Copenhagen (Denmark) in 2000, in Limerick (Ireland) in 2001, in Nuremberg (Germany) in 2002, in Graz (Austria) in 2003, in Trondheim (Norway) in 2004, in Budapest (Hungary) in 2005, in Joensuu (Finland) in 2006, in Potsdam (Germany) in 2007, in Dublin (Ireland) in 2008, in Alcala (Spain) in 2009, in Grenoble (France) in 2010, and in Roskilde (Denmark) in 2011.

EuroSPI is an initiative with the following major action lines

<http://www.eurospi.net>:

- Establishing an annual EuroSPI conference supported by software process improvement networks from different EU countries.
- Establishing an Internet-based knowledge library, newsletters, and a set of proceedings and recommended books.
- Establishing an effective team of national representatives (from each EU-country) growing step by step into more countries of Europe.
- Establishing a European Qualification Framework for a pool of profession-related with SPI and management. This is supported by European certificates and examination systems.

EuroSPI has established a newsletter series (newsletter.eurospi.net), the SPI Manifesto (SPI = Systems, Software and Services Process Improvement), an experience library (library.eurospi.net) that is continuously extended over the years and is made available to all attendees, and a Europe-wide certification for qualifications in the SPI area (www.ecqa.org, European Certification and Qualification Association).

A typical characterization of EuroSPI is reflected in a statement made by a company: “... *the biggest value of EuroSPI lies in its function as a European knowledge and experience exchange mechanism for SPI and innovation.*”

Since its beginning in 1994 in Dublin, the EuroSPI initiative has outlined that there is not a single silver bullet with which to solve SPI issues, but that you need to understand a combination of different SPI methods and approaches to achieve concrete benefits. Therefore, each proceedings volume covers a variety of different topics, and at the conference we discuss potential synergies and the combined use of such methods and approaches. These proceedings contain selected research papers under seven headings:

- Section I: SPI and Business Factors
- Section II: SPI Lifecycle and Models
- Section III: SPI Assessment and Quality
- Section IV: SPI Processed and Standards
- Section V: SPI in SMEs
- Section VI: SPI and Implementation
- Section VII: Selected Key Notes and Workshop Papers

Section I presents studies “On SPI and Business Factors.” Clarke and O’Connor examine the role of SPI in business success in software SMEs and provide recommendations for future SPI studies. Sussy et al. present the critical success factors to take into account in the deployment process, and a method of process deployment to be used in software projects; they also highlight the importance of having an effective deployment strategy to adopt, use and institutionalize the process. Yilmaz and O’Connor consider software development as an economic activity, where goods and services can be modelled as a resource-constrained task-allocation problem and introduce a market-based mechanism to overcome task-allocation issues in a software development process.

Section II presents three papers on “SPI Lifecycle and Models.” Lacheiner and Ramler present an approach to detect process conformance violations that reveal deviations between planned and executed software engineering processes, an approach based on process rules that complement the process documentation. Heidenberg et al. propose a model for business value that is intended to make explicit different factors that constitute the concept of business value in agile and lean software development. In the final paper of this section, Heikkinen and Jantti address the research question of which methods and practices are related to continuous service improvement in IT service management and they describe an improved version of the CSI model that provides a more detailed and practical view of CSI activities.

Section III presents papers related to “SPI Assessment and Quality.” In the first of three papers, Woronowicz et al. present an introduction to the innoSPICE Model, the assessment methodology, and provide an initial analysis of the innoSPICE assessments performed so far. Nikitina and Kajko-Mattsson evaluate the conditions necessary for succeeding with the SPI implementations and sustaining their results by providing an SPI health checklist. Finally, Lami et al. discuss the sustainability of software processes by defining a core set of processes that represent the activities to be performed in order to introduce and integrate the greenness culture in a software-developing organization.

Section IV explores “SPI Processes and Standards.” Mercedes de la Cámara et al. present the research context and the results of finding out how PRINCE2 meets the expectations of IT governance and management according to ISO 38500 and ISO 20000 standards in order to achieve the success of IT projects. Larrucea et al. focus on providing a harmonized framework not only covering practice-based process models but also covering product characteristics, and they reconcile this framework for safety critical systems. Finally, in the third paper, García-Mireles et al. present the result of mapping models based on both (process and product) quality perspectives and a mapping of ISO/IEC 25010 onto CMMI-DEV and ISO/IEC 12207.

Section V presents three related papers on the topic of “SPI in SMEs.” Miler and Wesolowski present a method focused on improvements of task management using process models and the results of applying the method in two case studies with SMEs. Renato Ferraz Machado et al. propose a maturity model for IT service management, called MM-GSTI, which is compliant to ISO/IEC 20000 and CMMI-SVC, whose goal is to help service providers in the implementation of improvements for the management of IT services. Boucher et al. address the shortcomings of ISO/IEC 29110 and discuss profiles in an integrated and configurable workflow with illustrations on the requirements engineering activity.

Section VI discusses “SPI and Implementation” issues. Toroi et al. present how functional defect analysis can be applied for software process improvement purposes. Van Stijn et al. present a template for such a structuring method, based on UML use case descriptions and method engineering techniques, together with a case study of two large improvements within a small Dutch software company. Finally, Jenersen et al. discuss the integration of multiple reference models based on automated concept extraction.

Section VII presents selected keynotes from EuroSPI workshops concerning the future of SPI. From 2010 on, EuroSPI invites recognized key researchers to publish work on new future directions of SPI. These key messages are discussed in interactive workshops and help create SPI communities based on new topics.

Three invited papers concerning “Creating Environments Supporting Innovation and Improvement” illustrate that SPI is inherently linked to innovation and that innovation requires constant change. Peisl and Schmied discuss how to innovate the current innovation principles and how this impacts the future of SPI thinking. Riel, Neumann et al. describe how a concept of open innovation and an environment supporting idea creation can lead to improvement and innovation in leading European industry. Kerstin Siakas et al. discuss which competencies in the field of valorization and exploitation are needed to successfully roll out a innovation and improvement (EU project VALO).

Two invited papers concerning “Standards and Experiences with the Implementation of Functional Safety” illustrate that SPI in systems development (e.g., automotive industry, aerospace industry, and medical industry, etc.) needs to consider safety design-related competencies and needs to integrate ISO 15504 assessments with functional safety standards such as IEC 61508 and ISO 26262. Andreas Riel et al. describe results from a European research project that

develops the core competencies required to cover the functional safety standards and incorporate them into the SPI programs in firms. Messnarz, Bachmann et al. describe the results from first trial assessments combining ISO 15504, Automotive SPICE and IEC 61508, ISO 26262.

Three invited papers concerning “Business Process Innovation and Improvement” address new approaches on how to apply SPI principles at a corporate business level. While in the past SPI was a software and system development-related field, it has become more and more a business development topic with world-wide recognition at a business standard level. AncaDraghici et al. describe experiences in university and industry with applying business process modelling principles developed in the EU project CertiBPM. Ivanyos et al. describe how international financial standards are used for SPICE compliant assessments, process modelling and system support improving the business processes and governance of companies (EU project GOSPEL). NájeraVillar and Brändle describe experiences with key factors for organizational learning at a corporate level and how terminology management strategies support such improvements.

Three invited papers illustrate SPI in small and medium enterprises (SMEs) from a project management perspective. Lepmets and McBride consider the value of an organization’s strategic goal for small and agile settings, while Calvo-Manzano and Caballero show how a very small enterprise has tailored Scrum according to its own needs. Finally, O’Connor and Laporte discuss the role and structure of project management in the emerging ISO/IEC 29110 standard.

June 2012

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Recommended Further Reading

In [1] the proceedings of three EuroSPI² conferences were integrated into one book, which was edited by 30 experts in Europe. The proceedings of EuroSPI² 2005 to 2011 inclusive have been published by Springer in [2], [3], [4], [5], [6] [7] and [8], respectively.

References

1. Messnarz, R., Tully, C. (eds.): Better Software Practice for Business Benefit – Principles and Experience, 409 pages. IEEE Computer Society Press, Los Alamitos (1999)
2. Richardson, I., Abrahamsson, P., Messnarz, R. (eds.): EuroSPI 2005. LNCS, vol. 3792, p. 213. Springer, Heidelberg (2005)
3. Richardson, I., Runeson, P., Messnarz, R. (eds.): EuroSPI 2006. LNCS, vol. 4257, pp. 11–13. Springer, Heidelberg (2006)
4. Abrahamsson, P., Baddoo, N., Margaria, T., Messnarz, R. (eds.): EuroSPI 2007. LNCS, vol. 4764, pp. 1–6. Springer, Heidelberg (2007)
5. O'Connor, R.V., Baddoo, N., Smolander, K., Messnarz, R. (eds.): Software Process Improvement. CCIS, vol. 16. Springer, Heidelberg (2008)
6. O'Connor, R.V., Baddoo, N., Gallego, C., RejasMuslera, R., Smolander, K., Messnarz, R. (eds.): Software Process Improvement. CCIS, vol. 42. Springer, Heidelberg (2009)
7. Riel, A., O'Connor, R.V., Tichkiewitch, S., Messnarz, R. (eds.): Software, System, and Service Process Improvement. CCIS, vol. 99. Springer, Heidelberg (2010)
8. O'Connor, R., Pries-Heje, J., Messnarz, R.: Systems, Software and Services Process Improvement. CCIS, vol. 172. Springer, Heidelberg (2011)

Organization

Board Members

EuroSPI Board Members represent centers or networks of SPI excellence having extensive experience with SPI. The board members collaborate with different European SPINS (Software Process Improvement Networks). The following six organizations have been members of the conference board for the last 11 years:

- ASQ, <http://www.asq.org>
- ASQF, <http://www.asqf.de>
- DELTA, <http://www.delta.dk>
- ISCN, <http://www.iscn.com>
- SINTEF, <http://www.sintef.no>
- STTF, <http://www.sttf.fi>

EuroSPI Scientific Program Committee

EuroSPI established an international committee of selected well-known experts in SPI who are willing to be mentioned in the program and to review a set of papers each year. The list below represents the Research Program Committee members. EuroSPI² also has a separate Industrial Program Committee responsible for the industry/experience contributions.

Alain Abran	ETS University of Quebec, Canada
Alberto Sillitti	Free University of Bolzano, Italy
Anca Draghici	Universitatea Politehnica din Timisoara, Romania
Andreas Riel	Grenoble Institute of Technology, France
Antonia Mas Pichaco	Universitat de les Illes Balears, Spain
Antonio De Amescua	Carlos III University of Madrid, Spain
Bee Bee Chua	University of Technology Sydney, Australia
Christian Kreiner	Graz University of Technology, Austria
Christiane Gresse von Wangenheim	Federal University of Santa Catarina, Brazil
Darren Dalcher	Middlesex University, UK
Dieter Landes	Fachhochschule Coburg, Germany
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Gunter Ruhe	University of Calgary, Australia
Ivo Vondrak	Technical University of Ostrava, Czech Republic
Jan Pries-Heje	Roskilde Universitet, Denmark
Javier Garica-Guzman	Carlos III University of Madrid, Spain

Jose Antonio Calvo-Manzano	Universidad Politecnica de Madrid, Spain
Jürgen Münch	University of Helsinki, Finland
Kai Stapel	Leibniz Universität Hannover, Germany
Keith Phalp	Bournemouth University, UK
Kerstin Siakas	Alexander Technological Educational Institute of Thessaloniki, Greece
Luigi Buglione	Engineering Ingegneria Informatica, Italy
Marion Lepmets	CRP Henri Tudor, Luxembourg
Markku Oivo	University of Oulu, Finland
Michael Reiner	IMC Fachhochschule Krems, Austria
MiklósBiró	Software Competence Center Hagenberg, Austria
Patricia McQuaid	California Polytechnic State University, USA
Paul Clarke	Lero, Irish Software Engineering Research Centre, Ireland
Paula Ventura Martins	FCT University of Algarve, Portugal
Ricardo Colomo Palacios	Universidad Carlos III de Madrid, Spain
Rory V. O'Connor	Dublin City University, Ireland
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Timo Varkoi	Tampere University of Technology, Finland
Tom Peisl	HochschuleMünchen, Germany
Tony Gorschek	Blekinge Institute of Technology, Sweden
Torgeir Dingsøy	SINTEF ICT, Norway
Valentine Casey	Dundalk Institute of Technology, Ireland
Vincenzo Ambriola	Università di Pisa, Italy

General Chair

Richard Messnarz

Scientific Chairs

Dietmar Winkler
Rory V. O'Connor

All three Chairs, the General and the Scientific Chairs, have quite a complementary and interesting profile. Dr. Messnarz works in close collaboration with Austrian research institutions (universities of applied sciences) and large German automotive companies. Dietmar Winkler is a key researcher in the Christian Doppler Laboratory “Software Engineering Integration for Flexible Automation Systems” at the Institute of Software Technology and Interactive Systems at Vienna University of Technology. His research interests focus on software processes, SPI, quality assurance and quality management, and empirical software engineering. Dr. Rory O'Connor is a seniorlecturer in Dublin City University and a senior researcher with Lero, the Irish Software Engineering Centre.

His main research interests center on software processes and SPI in relation to small and very small organizations.

The experience portfolio of the Chairs covers different market segments, different sizes of organizations, and different SPI approaches. This strengthens the fundamental principle of EuroSPI² to cover a variety of different markets, experiences, and approaches.

Acknowledgements

Some contributions published in this book have been funded with support from the European Commission.

In this case the publications reflect the views of the author only, and the Commission cannot be held responsible for any use that may be made of the information contained therein.



Education and Culture DG

Lifelong Learning Programme

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