Communications in Computer and Information Science 543

Commenced Publication in 2007
Founding and Former Series Editors:
Alfredo Cuzzocrea, Dominik Ślęzak, and Xiaokang Yang

Editorial Board

Simone Diniz Junqueira Barbosa
  Pontifical Catholic University of Rio de Janeiro (PUC-Rio),
  Rio de Janeiro, Brazil

Phoebe Chen
  La Trobe University, Melbourne, Australia

Xiaoyong Du
  Renmin University of China, Beijing, China

Joaquim Filipe
  Polytechnic Institute of Setúbal, Setúbal, Portugal

Orhun Kara
  TÜBİTAK BİLGEM and Middle East Technical University, Ankara, Turkey

Igor Kotenko
  St. Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences, St. Petersburg, Russia

Ting Liu
  Harbin Institute of Technology (HIT), Harbin, China

Krishna M. Sivalingam
  Indian Institute of Technology Madras, Chennai, India

Takashi Washio
  Osaka University, Osaka, Japan
Systems, Software and Services Process Improvement

22nd European Conference, EuroSPI 2015
Ankara, Turkey, September 30 – October 2, 2015 Proceedings

Springer
Preface

This textbook comprises the proceedings of the 22nd EuroSPI Conference, held from September 30 to October 2, 2015, in Ankara, Turkey.

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 examination processes.


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 professions related to 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 initiation 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-Themed Case Studies**
- **Section II: SPI Approaches in Safety-Critical Domains**
- **Section III: SPI in Social and Organizational Issues**
- **Section IV: Software Process Improvement Best Practices**
- **Section V: Models and Optimization Approaches in SPI**
- **Section VI: SPI and Process Assessment**
- **Section VII: Selected Keynotes and Workshop Papers**

Section I presents three SPI case study papers with the Osborne O’Hagan case study of Game Software Development Processes, while the second paper from Saarelainen and Jantti concentrates on the Incident Investigation Process, and finally in the third paper Ruiz et al. discuss cross-domain assurance projects.

Section II presents three papers under the umbrella topic of “SPI Approaches in Safety-Critical Domains.” Firstly, Sporer examines Lean approaches in an automotive context. Macher et al. discuss the integration of tools to an automotive context. The final paper of this section by Ruiz et al. describes an avionics perspective on assurance cases.

Section III explores the theme of “SPI in Social and Organizational Issues.” In the first of three papers, Yilmaz et al. present a study on personality profiling of software developers. Mayer et al. continue this theme by exploring governance, risk management, and compliance. In the final paper, Clarke and O’Connor investigate the challenge that situational context poses to software developers.

Section IV presents three papers dealing with associated issues surrounding the topic of “SPI Best Practices.” In the first paper, Gasca-Hurtado et al. focus on design techniques for implementing software development best practices. In the second paper, Herranz et al. examine the relationship between gamification and SPI. In the final paper, Munoz et al. attempt to provide a starting point for SMEs in implementing SPI.

Section V discusses issues surrounding “Models and Optimization Approaches in SPI.” In the first paper Natschlager et al. look at resource utilization in processes, while Picard et al. in the second paper present the TIPA approach for ITIL processes assessment. Finally, Karaffy and Balla examine data mining to support SPI approaches.

Section VI discusses issues surrounding “SPI and Process Assessment.” In the first paper Mesquida et al. look at ISO/IEC 15504 (SPICE) and project management. In the second paper Ribaud and O’Connor present blended approaches for SPI assessment. Finally, in the third paper Varkoi and Nevalainen discuss safety and systems engineering process assessment.

Section VII presents selected keynotes from EuroSPI workshops concerning the future of SPI. From 2010 on EuroSPI invites recognized key researchers to publish on new future directions of SPI. These key messages are discussed in interactive workshops and help create SPI communities based on new topics.
In 2015, ECQA (www.ecqa.org) and EuroSPI created a vision of innovation in Europe discussing four key questions: (1) How to create a VISION and a dynamic network, (2) How to create a GLOBAL Community of TRUST, (3) How to be prepared for constant change and be able to (UN)LEARN, and (4) How to provide TRANSPARENCY of rules and business. The idea is create a space where SPI researchers and industry can network and grow. G. Sauberer, Aliyou Mana Hamadou, Jolanta Maj, and Valery Senichev present 10 key criteria to support global innovation and networking. Tomislav Rozman, Anca Draghi, and Andreas Riel present core competencies needed to include leading sustainability concepts in business management processes (EU project LEADSUS). János Ivanyos, Éva Sándor-Kriszt, and Richard Messnarz describe a capability and competency model to increase business capability, transparency, and trust in Europe and world-wide. Christian Reimann, Elena Vitkauskaite, Thiemo Kastel, and Michael Reiner describe how in a university network young people learn to work in networked projects and get prepared for a future networked innovative project environment.

Social Aspects of SPI: A workshop on conflicts, games, gamification, and other social approaches is organized in conjunction with the EuroAsiaSPI² conference, which provides an opportunity for academic and industry practitioners to discuss application of games, gamification, and social approaches in the field of SPI. The goal of this workshop is to provide a complete coverage of the areas outlined and to bring together researchers from academia and industry as well as practitioners to share ideas, challenges, and solutions that are related to SPI. The workshop covers topics such as the practical and industrial implications of games and game-like approaches especially for improving the software development process. In this section Jovanovic et al. present a set of games that are designed to improve the agile software development and management processes. Ribaud and Saliou investigate the relationship between personality types and competencies of information and communication technology professionals. Kosa and Yilmaz review the literature for digital and non-digital games that aim to improve the software development process, and highlight the pros and cons of such approaches. Since 2010, EuroSPI has been organizing functional safety-related workshops. In the workshop, different best practices and model-based design patterns to implement functional safety are exchanged. Masao Ito describes an approach to model the driver inside the functional safety flow and to analyze the controllability of the situation by the driver. Matthieu Aubron describes a practical experience from a leading automotive manufacturer of bikes who created a model-based framework to analyze hazards and safety goals and derive functional safety requirements.

October 2015
Rory V. O’Connor
Mariye Umay Akkaya
Kerem Kemaneci
Murat Yilmaz
Alexander Poth
Richard Messnarz
Recommended Further Reading

In [1], the proceedings of three EuroSPI conferences were integrated into one book, which was edited by 30 experts in Europe. The proceedings of EuroSPI 2005 to 2013 inclusive have been published by Springer in [2], [3], [4], [5], [6] [7] [8] [9] and [10], respectively.

References

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 13 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. EuroSPI also has a separate Industrial Program Committee responsible for the industry/experience contributions.

Alberto Sillitti Free University of Bolzano, Italy
Alok Mishra Atilim University, Turkey
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
Dietmar Winkler Vienna University of Technology, Austria
Fergal McCaffery Dundalk Institute of Technology, Ireland
Jan Pries-Heje Roskilde University, Denmark
Javier Gar’ca-Guzman Carlos III University of Madrid, Spain
Jose Antonio Calvo-Manzano Universidad Politecnica de Madrid, Spain
Keith Phalp Bournemouth University, UK
Kerstin Siakas Alexander Technological Educational Institute of Thessaloniki, Greece
Luigi Buglione Engineering Ingegneria Informatica, Italy
M. Lepmets  
Dundalk Institute of Technology, Ireland

M. Oivo  
University of Oulu, Finland

M. Reiner  
IMC Fachhochschule Krems, Austria

M. Yilmaz  
Çankaya University, Turkey

P. McQuaid  
CalPoly, USA

P. Clarke  
Dundalk Institute of Technology, Ireland

P. Martins  
FCT-University of Algarve, Portugal

R. Colomo  
Ostfold University College, Norway

R. O’Connor  
Dublin City University, Ireland

T. Daughtrey  
James Madison University

T. Makinen  
Tampere University of Technology, Finland

T. Varkoi  
Tampere University of Technology, Finland

T. Dingsoyir  
SINTEF ICT, Norway

**General Chair**

Richard Messnarz

**Scientific Co-chairs**

Rory V. O’Connor  
Murat Yilmaz  
Alexander Poth

**Organization Co-chairs**

Mariye Umay Akkaya  
Kerem Kemaneci

**Acknowledgments**

Some contributions published in this book have been funded with support from the European Commission. European projects (supporting ECQA and EuroSPI) contributed to this Springer book including I2E (Idea to Enterprise), AQUA (Knowledge Alliance for Training Quality and Excellence in Automotive), LEADSUS (Leading Sustainability), and LSSH (Lean Six Sigma for Health Care).

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

SPI Themed Case Studies

Towards an Understanding of Game Software Development Processes:
A Case Study ................................................................. 3
   Ann Osborne O’Hagan and Rory V. O’Connor

A Case Study on Improvement of Incident Investigation Process. ......... 17
   Kari Saarelainen and Marko Jäntti

An Industrial Experience in Cross Domain Assurance Projects .......... 29
   Alejandra Ruiz, Xabier Larrucea, Huascar Espinoza, Franck Aime,
   and Cyril Marchand

SPI Approaches in Safety-Critical Domains

A Lean Automotive E/E-System Design Approach with Open
Toolbox Access ............................................................. 41
   Harald Sporer

Integration of Heterogeneous Tools to a Seamless Automotive Toolchain. . 51
   Georg Macher, Eric Armengaud, and Christian Kreiner

A Tool Suite for Assurance Cases and Evidences: Avionics Experiences . . 63
   Alejandra Ruiz, Xabier Larrucea, and Huascar Espinoza

SPI in Social and Organizational Issues

A Machine-Based Personality Oriented Team Recommender for Software
Development Organizations ............................................. 75
   Murat Yilmaz, Ali Al-Taei, and Rory V. O’Connor

An ISO Compliant and Integrated Model for IT GRC (Governance, Risk
Management and Compliance) ......................................... 87
   Nicolas Mayer, Béatrix Barafort, Michel Picard, and Stéphane Cortina

Changing Situational Contexts Present a Constant Challenge
to Software Developers ................................................. 100
   Paul Clarke and Rory V. O’Connor
Software Process Improvement Best Practices

Protocol to Design Techniques for Implementing Software Development
Best Practices .......................................................... 115

Gloria Piedad Gasca-Hurtado, Vianca Vega-Zepeda, Mirna Muñoz,
and Jezreel Mejía

Gamiware: A Gamification Platform for Software Process Improvement . . . . . 127

Eduardo Herranz, Ricardo Colomo-Palacios,
and Antonio de Amescua Seco

Providing a Starting Point to Help SMEs in the Implementation of Software
Process Improvements .................................................. 140

Mirna Muñoz, Jezreel Mejía, Gloria P. Gasca-Hurtado,
Vianca Vega-Zepeda, and Claudia Valtierra

Models and Optimization Approaches in SPI

Optimizing Resource Utilization by Combining Activities Across
Process Instances ...................................................... 155

Christine Natschläger, Andreas Bögl, Verena Geist, and Miklós Biró

A Maturity Model for ISO/IEC 20000-1 Based on the TIPA
for ITIL Process Capability Assessment Model ......................... 169

Michel Picard, Alain Renault, and Béatrix Barafort

Applying Text Analyses and Data Mining to Support Process Oriented
Multimodel Approaches .................................................. 181

Zoltan Karaffy and Katalin Balla

SPI and Process Assessment

The Project Management SPICE (PMSPICE) Process Reference Model:
Towards a Process Assessment Model ............................... 193

Antoni-Lluís Mesquida, Antònia Mas, and Béatrix Barafort

Blending Process Assessment and Employees Competencies Assessment
in Very Small Entities .................................................... 206

Vincent Ribaud and Rory V. O’Connor

Extending SPICE for Safety Focused Systems Engineering Process
Assessment ................................................................. 220

Timo Varkoi and Risto Nevalainen
Selected Key Notes and Workshop Papers

Creating Environments Supporting Innovation and Improvement

The 10 Must Haves for Global Innovation and Networking. A New Strategic Approach ...................................................... 233
Gabriele Sauberer, Aliyou Mana Hamadou, Jolanta Maj, and Valery Senichev

Achieving Sustainable Development by Integrating It into the Business Process Management System ........................................ 247
Tomislav Rozman, Anca Draghici, and Andreas Riel

ECQA Governance Capability Assessor Skills for Managing Strategic Directions ...................................................... 260
János Ivanyos, Éva Sándor-Kriszt, and Richard Messnarz

Innovation and Project Management in International Distributed Teams. A Description of an Current Project Work ........................................ 276
Christian Reimann, Elena Vitkauskaite, Thiem Kastel, and Michael Reiner

Social Aspects of SPI: Conflicts, Games, Gamification and Other Social Approaches

Process Improvement with Retrospective Gaming in Agile Software Development ...................................................... 287
Milos Jovanovic, Antoni-Lluis Mesquida, and Antònia Mas

Relating ICT Competencies with Personality Types ........................................ 295
Vincent Ribaud and Philippe Saliou

Designing Games for Improving the Software Development Process ........................................ 303
Mehmet Kosa and Murat Yilmaz

Risk Management and Functional Safety Management

Controllability in ISO 26262 and Driver Model ........................................ 313
Masao Ito

KTM Functional Safety Environment – Break Silos, Ensure Full Traceability, Modularity and Automate Reporting ........................................ 322
Matthieu Aubron

Author Index ........................................ 337