# Table of Contents

Foreword ........................................................................................................................................... xxv

Preface ............................................................................................................................................. xxvi

## Section 1

### Software Requirements

**Chapter 1**

What, Why, Who, When, and How of Software Requirements......................................................... 1

*Linda Westfall, Westfall Team, Inc., USA*

**Chapter 2**

Critical Issues in Requirements Engineering Education............................................................... 19

*Rafia Naz Memon, University of Malaya, Malaysia*
*Rodina Ahmad, University of Malaya, Malaysia*
*Siti Salwah Salim, University of Malaya, Malaysia*

**Chapter 3**

When the Wisdom of Communication is Vital During the Requirements Elicitation Process:
Lessons Learnt through Industry Experience .................................................................................. 41

*Sabrina Ahmad, Universiti Teknikal Malaysia Melaka, Malaysia*
*Noor Azilah Muda, Universiti Teknikal Malaysia Melaka, Malaysia*
*Maslita Abd. Aziz, Universiti Teknikal Malaysia Melaka, Malaysia*
*Emaliana Kasmuri, Universiti Teknikal Malaysia Melaka, Malaysia*

## Section 2

### Software Design and Construction

**Chapter 4**

State-of-the Art Concepts and Future Directions in Modelling Coordination............................... 61

*Abdelhamid Abdeljadi Mansor, University of Khartoum, Sudan*
*Wan Mohd Nasir Wan Kadir, Universiti Teknologi Malaysia, Malaysia*

**Chapter 5**

Low-Overhead Development of Scalable Resource-Efficient Software Systems............................. 81

*Wei-Chih Huang, Imperial College London, UK*
*William Knottenbelt, Imperial College London, UK*
Chapter 6
An Empirical Study of the Effect of Design Patterns on Class Structural Quality......................106
Liguo Yu, Indiana University – South Bend, USA
Srini Ramaswamy, BU Power Generation at ABB, India

Chapter 7
Service Discovery Framework for Distributed Embedded Real-Time Systems .......................126
Furkh Zeshan, COMSATS Institute of Information Technology (CIIT), Pakistan
Radziah Mohamad, Universiti Teknologi Malaysia
Mohammad Nazir Ahmad, Universiti Teknologi Malaysia

Chapter 8
An Algebraic Approach for the Specification and the Verification of Aspect-Oriented Systems ......148
Arsène Sabas, Université de Montréal, Canada
Subash Shankar, City University of New York (CUNY), USA
Virginie Wiels, ONERA – The French Aerospace Lab, France
John-Jules Ch. Meyer, Universiteit Utrecht, The Netherlands
Michel Boyer, Université de Montréal, Canada

Section 3
Model-Driven Development

Chapter 9
Supporting Model-Driven Development: Key Concepts and Support Approaches ....................176
Rita Suzana Pitangueira Maciel, Federal University of Bahia, Brazil
Ana Patrícia F. Magalhães Mascarenhas, Federal University of Bahia, Brazil
Ramon Araújo Gomes, Federal University of Bahia, Brazil
João Pedro D. B. de Queiroz, Federal University of Bahia, Brazil

Chapter 10
A Model-Driven Solution for the Automatic Generation of Executable Code from Business Process Models .........................................................................................................................213
Javier Fabra, University of Zaragoza, Spain
Valeria de Castro, Rey Juan Carlos University, Spain
Verónica Andrea Bollati, Rey Juan Carlos University, Spain
Pedro Álvarez, University of Zaragoza, Spain
Esperanza Marcos, Rey Juan Carlos University, Spain

Chapter 11
Modeling Platform-Independent and Platform-Specific Service Architectures with UML and the ArchiMeDeS Framework ......................................................................................................................254
Marcos López-Sanz, Rey Juan Carlos University, Spain
Esperanza Marcos, Rey Juan Carlos University, Spain
Section 4
Agile Methods

Chapter 12
Back to Basics: In Support of Agile Development .......................................................... 279
Roy Morien, Naresuan University Language Centre, Thailand

Chapter 13
Integrating Security into Agile Models: Scrum, Feature-Driven Development (FDD), and
eXtreme Programming (XP)............................................................................................. 293
Imran Ghani, Universiti Teknologi Malaysia, Malaysia
Adila Firdaus Bt Arbain, Universiti Teknologi Malaysia, Malaysia
Zulkarnain Azham, Universiti Teknologi Malaysia, Malaysia
Nor Izzaty Yasin, Universiti Teknologi Malaysia, Malaysia
Seung Ryul Jeong, Kookmin University, South Korea

Chapter 14
Agile Development Processes and Knowledge Documentation ........................................ 309
Eran Rubin, Holon Institute of Technology, Israel
Hillel Rubin, Israel Institute of Technology (Technion), Israel

Section 5
Software Quality and Testing

Chapter 15
An Integrated Secure Software Engineering Approach for Functional, Collaborative, and
Information Concerns ..................................................................................................... 330
J. A. Pavlich-Mariscal, Pontificia Universidad Javeriana, Colombia
S. Berhe, University of Connecticut, USA
A. De la Rosa Algarín, University of Connecticut, USA
S. Demurjian, University of Connecticut, USA

Chapter 16
Lessons from Practices and Standards in Safety-Critical and Regulated Sectors .............. 369
William G. Tuohey, Dublin City University, Ireland

Chapter 17
The Role of Compliance and Conformance in Software Engineering ............................ 392
José C. Delgado, Instituto Superior Técnico, Universidade de Lisboa, Portugal

Chapter 18
Kamal Z. Zamli, Universiti Malaysia Pahang, Malaysia
AbdulRahman A. Alsewari, Universiti Malaysia Pahang, Malaysia
Mohammed I Younis, University of Baghdad, Iraq
Chapter 19
An Improved Model-Based Technique for Generating Test Scenarios from UML Class Diagrams

Oluwatolani Oluwagbemi, Universiti Teknologi Malaysia, Malaysia
Hishammuddin Asmuni, Universiti Teknologi Malaysia, Malaysia

Section 6
Software Quality Measurement

Chapter 20
A Methodology for Model-Based Reliability Estimation

Mohd Adham Isa, Universiti Teknologi Malaysia, Malaysia
Dayang Norhayati Abang Jawawi, Universiti Teknologi Malaysia, Malaysia

Chapter 21
Non-Intrusive Adaptation of System Execution Traces for Performance Analysis of Software Systems

Manjula Peiris, Indiana University Purdue University Indianapolis (IUPUI), USA
James H. Hill, Indiana University Purdue University Indianapolis (IUPUI), USA

Chapter 22
Code Clone Detection and Analysis in Open Source Applications

Al-Fahim Mubarak-Ali, Universiti Teknologi Malaysia, Malaysia
Shahida Sulaiman, Universiti Teknologi Malaysia, Malaysia
Sharifah Mashita Syed-Mohamad, Universiti Sains Malaysia, Malaysia
Zhenchang Xing, Nanyang Technological University, Singapore

Chapter 23
Important Issues in Software Fault Prediction: A Road Map

Golnoush Abaei, University Technology Malaysia, Malaysia
Ali Selamat, University Technology Malaysia, Malaysia

Chapter 24
Building Defect Prediction Models in Practice

Rudolf Ramler, Software Competence Center Hagenberg, Austria
Johannes Himmelbauer, Software Competence Center Hagenberg, Austria
Thomas Natschläger, Software Competence Center Hagenberg, Austria

Section 7
Software Management and Evolution

Chapter 25
Knowware-Based Software Engineering: An Overview of its Origin, Essence, Core Techniques, and Future Development

RuQian Lu, Chinese Academy of Sciences, China & Peking University, China
Zhi Jin, Peking University, China & Chinese Academy of Sciences, China
Chapter 26
Software Evolution Visualization: Status, Challenges, and Research Directions........................................597

Renato Lima Novais, Federal Institute of Bahia, Brazil
Manoel Gomes de Mendonça Neto, Fraunhofer Project Center for Software and Systems Engineering at UFBA, Brazil

Compilation of References ...................................................................................................................... 611

About the Contributors .............................................................................................................................. 671

Index ......................................................................................................................................................... 683